SVKM J .V. Parekh International School

Long Term Plan/Medium Term Plan

Academic Year 2018-2019 & 2019 - 2020

GRADE- 10

SUBJECT: ENGLISH LANGUAGE

Strand/ Topics	**Learning Objectives (CAIE expectations)**	**Learning Experiences/ Engagements**
Reading Writing	1. To be able to skim, scan, and select information thereby understanding the explicit and implicit meaning of the text. 2. to organise and structure ideas and opinions for deliberate effect	students were able to read, comprehend, analyse the text Students were able to demonstrate understanding of written texts and organise and convey facts, ideas and opinions effectively.
Reading Writing	1. to be able to articulate and express experience and organise and structure ideas and use register appropriate to context	Students were able to express their thoughts and demonstrate varied use of vocabulary and effective sentence structures, focusing on understanding of audience, purpose and form.

Reading Writing	1. to demonstrate explicit and implicit meaning, understand how writers achieve effect and influence readers, articulate experience and thoughts and organise and structure ideas and opinions for deliberate effect	Students were able to demonstrate understanding of written texts and of the words and phrases within them, analyse and evaluate ideas and opinions and recognise and respond to linguistic devices, including figurative language.
Reading Writing grammar	1. To be able to understand explicit and implicit meaning and select and use information for specific purposes. 2. to be able to understand the functions of different types of words and sentences and use punctuation and tenses accurately and effectively	students are able to read, comprehend the text and differentiate between closed and open questions and answer them accordingly students were able to identify and understand the key grammar skills needed for effective sentence structure
	Term exam and Diwali holidays	
Reading Writing	1. To be able to organise and structure ideas for a deliberate effect that is appropriate to context.	Students were able to identify the basic structure of a narrative writing thereby using detailed description and appropriate vocabulary.
Reading Writing	1. To be able to read and differentiate between fact and opinion in a text and also analyse and understand the form and purpose of different texts. 2. To be able to understand and use reported speech in a paragraph and also be able to use paragraphing accurately.	Students were able to identify facts and opinions from a paragraph. They were also able to identify form, purpose and paragraphing of the text.
Reading	1. to be able to understand the structure of a speech and diary entry 2. to be able to identify the structure and write a persuasive	Students were able to understand the structure and the audience for

Writing	text using a single viewpoint and focusing on appropriate vocabulary	writing a speech and diary entry. Students were able to write a persuasive paragraph focusing on emotive language and a strong viewpoint.
Reading Writing	1. to be able to understand the explicit and implicit meaning of the text; select, organise and structure a paragraph which is appropriate to the context 2. to be able to identify the structure and audience of a report writing	students were able to write identify and collate points to write an effective summary students were able to write a report using factual details and also giving a perspective
Writing	1. to be able to write an informative paragraph using clear and concise sentences and precise vocabulary	Students were able to write a report concisely focusing ion tenses and given references.
	Term exams	

Academic Year 2019-2020

Strand/ Topics	**Learning Objectives (CAIE expectations)**	**Learning Experiences/ Engagements**
Reading Writing	1. to be able to identify the structure of a magazine article and letter followed by writing one	Students were able to understand the structure of an article and report and write one using appropriate vocabulary and audience.
reading writing	1. to be able to write an argumentative writing using facts of both sides and working logically towards a conclusion 2. to be able to write a discursive writing focusing on clear explanation and exploring different viewpoints	Students were able to understand the structure and write an argumentative writing stating the writer's viewpoint. Students were able to understand the structure and write a discursive writing.

Reading Writing	Revision – paper 1 topics • Summary • Writers effect • Informal letter • Reading passages	students were able to • Read, organise, structure ideas and summarise using relevant context • Recognise and respond to linguistic devices and show the understanding how writer achieves the effect and influences the reader • Read and annotate a text and select relevant facts to extend and answer
Reading Writing	Revision – paper 2 topics • Article • Descriptive • narrative	students were able to • demonstrate explicit and implicit meaning of the text, read and annotate the text and select relevant ideas for an extended response • articulate experience and express understanding content and structure of either narrative or descriptive writing.
	past paper solving	
	term 1 exam	
	topic wise revision, past paper solving & mock exams	

SUBJECT: ENGLISH LITERATURE

Strand/ Topics	Learning Objectives (CAIE expectations)	Learning Experiences/ Engagements
DRAMA Deeper meaning Writers effect Use of language and effect Personal response	To instil an understanding and appreciation of the drama and the distinctive features of a drama script among students. Explore the precise ways in which language the writer uses language to portray characters and communicate themes.	Macbeth-Act 4 Scene 1,2 The students using copies of extracts from their set drama texts will annotate distinctive features of each literary form. This will help them to see the different ways characters, words are presented in the drama texts. They will identify the different types of stage direction in their set drama text: those which introduce character, those indicating tone of voice or silence, those stating key actions. They will role play the characters, analysing how the play begins, develops, shift in the tone and mood and the dramatic impact on the audience.
Poetry **Prose** Deeper meaning Writers effect Use of language and	Develop confidence in communicating beyond surface meanings to explore the poem's deeper implications. Explore how the poet uses language, form and structure to create and shape meanings and effects. Develop confidence in communicating a supported personal response To inculcate an understanding and appreciation of the set prose text among students.	The Popular Field- Stormcock in Elder Students will read the poem aloud from the text. In pairs they will consult the meanings of the difficult words in a dictionary. Students will discuss the meanings of words ,identify the literary devices and the poet's use of: rhythm ,rhyme ,enjambment sound: alliteration, assonance, onomatopoeia etc imagery: simile, personification, rhetorical: , repetition, humour, irony. Etc. They will answer the questions to reach the deeper implication and support it with a personal response. PEE- point, evidence explanation will be stressed upon while analysing the poems.

effect Personal response	Move beyond surface meanings to explore deeper implications about character, how writer appeals to the senses to create settings, how the narrative is told. The portrayal of character in the course of a prose text and the effect created by the author through the use of literary devices.	Journey The Stoat The students will be divided in groups. They will be asked to do a brief research on the writer and the times/era. They will present the above before the lesson commences. Students will read the lesson aloud. They will mark the characters. Mind Mapping to understand the relationships amongst the characters. Each group will be allocated passages from the text to analyse the Mood, setting and theme. They will identify the evidence in support of the point they are making. They will create a QUOTATION + COMMENT table. Then students identify the following aspects of prose fiction form: • narration (moving the plot on) • description (of characters, setting) • Dialogue (and how represented). Focus will be on the IGCSE style questions
Poetry **DRAMA** **Prose** Deeper meaning Writers effect Use of language and effect Personal response	Develop confidence in communicating beyond surface meanings to explore the poem's deeper implications. Explore how the poet uses language, form and structure to create and shape meanings and effects. Develop confidence in communicating a supported personal response. To inculcate an understanding and appreciation of the set prose text among students. Move beyond surface meanings to explore deeper implications about character, how writer appeals to the senses to create settings, how the narrative is told. The portrayal of character in the course of a prose	Poem You will Know When You Get There The Caged Skylark Students will read the poem aloud from the text. In pairs they will consult the meanings of the difficult words in a dictionary. Students will discuss the meanings of words ,identify the literary devices and the poet's use of: rhythm ,rhyme ,enjambment sound: alliteration, assonance, onomatopoeia etc imagery: simile, personification, rhetorical: , repetition, humour, irony. Etc. They will answer the questions to reach the deeper implication and support it with a personal response. PEE- point, evidence explanation will be stressed upon while analysing the poems. Prose. The Open Boat Students will read the lesson aloud. They will mark the characters

	text and the effect created by the author through the use of literary devices. To instil an understanding and appreciation of the drama and the distinctive features of a drama script among students. To understand the Renaissance Era with special reference to Shakespeare. Implore the dramatic effect of the key moments of the play. Explore the precise ways in which language the writer uses language to portray characters and communicate themes	and theme focussing on the imagery, symbol ,and other literary devices. They will identify the evidence in support of the point they are making. They will create a QUOTATION + COMMENT table. Then students identify the following aspects of prose fiction form: • narration (moving the plot on) • description (of characters, setting) • Dialogue (and how represented). Focus will be on the IGCSE style questions <u>Drama</u> Macbeth Act 4 Scene 3 The students using copies of extracts from their set drama texts will annotate distinctive features of each literary form. This will help them to see the different ways characters, words are presented in the drama texts. They will identify the different types of stage direction in their set drama text: those which introduce character, those indicating tone of voice or silence, those stating key actions. They will role play the characters, analysing how the play begins, develops, shift in the tone and mood and the dramatic impact on the audience.

POEM PROSE DRAMA Deeper meaning Writers effect Use of language and effect Personal response	Develop confidence in communicating beyond surface meanings to explore the poem's deeper implications. Explore how the poet uses language, form and structure to create and shape meanings and effects. Develop confidence in communicating a supported personal response To inculcate an understanding and appreciation of the set prose text among students. Move beyond surface meanings to explore deeper implications about character, how writer appeals to the senses to create settings, how the narrative is told . The portrayal of character in the course of a prose text and the effect created by the author through the use of literary devices. Implore the dramatic effect of the key moments of the play. Explore the precise ways in which language the writer uses language to portray characters and communicate themes	<u>POEM</u> Written Near a Port on A Dark Evening In Praise Of Creation Students will read the poem aloud from the text. In pairs they will consult the meanings of the difficult words in a dictionary. Students will discuss the meanings of words ,identify the literary devices and the poet's use of: rhythm ,rhyme ,enjambment sound: alliteration, assonance, onomatopoeia etc imagery: simile, personification etc rhetorical: , repetition, humour, irony. Etc. They will answer the questions to reach the deeper implication and support it with a personal response. PEE- point, evidence explanation will be stressed upon while analysing the poems. <u>PROSE</u> The Fall of The House Of Usher The Students will be asked to research on Colonialism. They will present the above before the lesson commences. Discussion on discrimination will be encouraged. Students will read the lesson aloud. They will mark the characters. Each group will be allocated passages from the text to analyse the -Mood, setting and theme focussing on the imagery, symbol ,and other literary devices. They will identify the evidence in support of the point they are making. They will create a QUOTATION + COMMENT table. Then students identify the following aspects of prose fiction form: • narration (moving the plot on) • description (of characters, setting) • dialogue (and how represented).

		Focus will be on the IGCSE style questions <u>DRAMA</u> Macbeth Act 5 Scene 1,2,3,4 The students using copies of extracts from their set drama texts will annotate distinctive features of each literary form. This will help them to see the different ways characters, words are presented in the drama texts. They will identify the different types of stage direction in their set drama text: those which introduce character, those indicating tone of voice or silence, those stating key actions. They will role play the characters, analysing how the play begins, develops, shift in the tone and mood and the dramatic impact on the audience.
DRAMA Deeper meaning Writers effect Use of language and effect Personal response	Implore the dramatic effect of the key moments of the play. Explore the precise ways in which language the writer uses language to portray characters and communicate themes	<u>Unseen</u> A past paper will be given to the students. They will annotate the poem, making concise comments about the effects of the words and phrases highlighted. Mark the different sections of the poem by drawing a line across the page and will comment how the writer uses structure ,and other devices to communicate his ideas. <u>DRAMA</u> Macbeth Act 5 Scene 5,6,7 The students using copies of extracts from their set drama texts will annotate distinctive features of each literary form. This will help them to see

			the different ways characters, words are presented in the drama texts. They will identify the different types of stage direction in their set drama text: those which introduce character, those indicating tone of voice or silence, those stating key actions. They will role play the characters, analysing how the play begins, develops, shift in the tone and mood and the dramatic impact on the audience.		
	Term Exam and Diwali Holiday				
	Revision Poem Prose Drama Unseen Solve Past Papers Focus will be on the IGCSE style questions	<u>Unseen</u> A past paper will be given to the students. They will annotate the poem, making concise comments about the effects of the words and phrases highlighted. Mark the different sections of the poem by drawing a line across the page and will comment how the writer uses structure, and other devices to communicate his ideas.	<u>Poem</u> The students will draw lines to indicate the different sections of the poem. On the copy of each poem, they highlight key words, phrases and sounds and make concise notes on the effects the poem. Go through past essays and add the essay titles to the relevant poems and think how they will answer these questions now. Draw mind maps to help Them gather ideas.	<u>Prose</u> Test how well they know the text by summarising what happens immediately before and after the extracts. They will be asked to highlight the key words and phrases from these extracts and think how you would answer the questions now. Draw mind maps to help you gather	<u>Drama</u> List past extract. The students will summarize what happens immediately before and after the extracts. They will highlight key words and phrases from these extracts and think how they would answer the questions now. Draw mind maps to help you gather ideas. The students will make lists of quotations together with brief comments on the

				ideas. Make lists of quotations together with brief comments on the writer's use of language for each main: • character • theme • setting.	writer's use of language for each main: • character • theme • setting.
	MOCK EXAMINATION				
	Revision Poem Prose Drama Unseen Solve Past Papers Focus will be on the IGCSE style	<u>Unseen</u> A past paper will be given to the students. They will annotate the poem, making concise comments about the effects of the words and phrases highlighted. Mark the different sections of the poem by drawing a line across the page and will comment how the writer uses structure, and other devices to communicate his ideas.	<u>Poem</u> The students will draw lines to indicate the different sections of the poem. On the copy of each poem, they highlight key words, phrases and sounds and make concise notes on the effects the poem. Go through past essays and add the essay titles to the relevant poems and think how they will answer these questions now. Draw mind maps to help	<u>Prose</u> Test how well they know the text by summarizing What happens immediately before and after the extracts? They will be asked to highlight the key words and phrases from these extracts and think how you would answer the questions now. Draw mind maps to	<u>Drama</u> List past extract. The students will summarize what happens immediately before and after the extracts. They will highlight key words and phrases from these extracts and think how they would answer the questions now. Draw mind maps to help you gather ideas. The students will make lists of quotations together with brief

	questions		them gather ideas.	help you gather ideas. Make lists of quotations together with brief comments on the writer's use of language for each main: • character • theme • setting.	comments on the writer's use of language for each main: • character • theme • setting.
	IGCSE EXAMINATION				

SUBJECT: FRENCH		

Strand/Topics	Learning Objectives (CAIE expectations)	Learning Experiences/Engagements
Listening, Reading, Speaking & Writing Grammar: Verb Constructions, Revision of 'Si' Clauses **Topic Area D: The world of work -** Education (Learning Institutions, Education and Training, The Classroom, Learning tools, Subjects, Studying) Work (Jobs and Careers, the Workplace)	Learners will be encouraged to be confident, responsible, reflective, and innovative and engaged through a gamut of classroom transactions. Learners will be able to discuss future studies, career and marriage plans, exam preparation and revision. They will be able to exchange information and opinions about work experience. They will be able to discuss pocket money and part-time jobs	Resources Reading/Writing/Listening Tasks: Tricolore Total 4: Student's Book, Teacher's Book & Audio CD Pack. Encore Tricolore nouvelle edition 4: Student's Book, Teacher's Book & Audio CD Pack. Cambridge IGCSE French Second Edition https://www.francaisfacile.com/ https://www.bonjourdefrance.com/ http://www.igcsecentre.com/cambridge-igcse-past-exam-papers/ Learners view an audio-visual on the Education System in France. They compare and contrast orally with the Indian Education System. Learners listen to an interview and complete text with missing words.

		Learners read the account of education in a country and identify True/False Statements. Learners read a passage and prepare a list of 3 Verb Constructions. Learners are provided with grammar worksheet for further practice of 'Si' Clauses.
Listening, Reading, Speaking & Writing Grammar: Revision of Tenses, Impersonal Verbs, Degrees of Comparison **Topic Area E: The international world** Countries, Nationalities and Languages; Culture, Customs, Faiths and Traditions	Learners will be able to discuss global problems – traffic, pollution, waste, climate changes and natural disasters; propose solutions and understand news reports. They will be able to talk about charitable/voluntary/ relief organisations	Learners match pictures of natural disasters with appropriate terms. Learners read accounts and listen to recorded bulletins of problems prevailing in different countries and solve comprehensions. Learners are provided with an annotated diagram for explanation of greenhouse effect Learners read extracts and enlist measures for protection of environment. Learners choose appropriate impersonal verbs and complete the gapped text. Learners are provided with grammar worksheet for practice of Degrees of Comparison. Extension Activity: Learners look at the MSF website http://www.msf.org/ and present their ongoing projects.

Revision Consolidation of Topic Areas as per Syllabus Content Focus on CAIE past paper solving	Reading & Writing	Learners are periodically provided with Past Papers for practice and exam preparation. Learners are provided with links to interactive revision exercises for vocabulary and grammar practice/testing.
Revision	Speaking & Listening	Learners listen to dialogues (online/recorded) to explore different scenarios,and identify key vocabulary/oral expressions. They are provided with varied role play situations and work in pairs for practice. Learners are engaged in conversations and answer topical/general questions. Learners practise listening comprehension with the help of Past Papers and online resources.
Revision	Speaking	Simulation of Speaking Exam for learners

SUBJECT: HINDI		

Strand/ Topics	Learning Objectives (CAIE expectations)	Learning Experiences/ Engagements
READING & WRITING **(समाज एवं संस्कृति)** **(स्वास्थ्य)** **(मनोरंजन)** **(विज्ञान)**	• **छात्र को एक जिम्मेदार नागरिक बनाना।** • **छात्र को हमेशा खोज कार्य के लिए प्रवृत्त करना।** • **छात्र में आत्मविश्वास को जागरूक करना ।** • **छात्रों को सेवाभवी समाज कार्य से अवगत कराना।** **छात्र को मननशील एवं स्व चिंतन के लिए बढ़ावा देना। EX 1 -**Identify and select relevant information Understand ideas, opinions and attitudes Show understanding of the connections between ideas, opinions and attitudes Show understanding of the connections between ideas, opinions and attitudes **EX 2 - I**dentify and select relevant information Understand ideas, opinions and attitudes Show understanding of the connections between ideas, opinions and attitudes **EX 3 -**Identify and select relevant information	Resources: ▪ **पठन एवं लेखन के लिए** ▪ पतवार १० –प्रश्नपत्र -१ ▪ **श्रवण कार्य के लिए** ▪ पतवार १० –प्रश्नपत्र -२ ▪ **श्रवण कार्य के लिए** ▪ श्रवण सरिता हिन्दी -१० ▪ अध्यापन तथा छात्रों के पठन एवं लेखन कार्य हेतु निम्नलिखित जगतजाल का उपयोग किया जाएगा। www.jagran.com www.amarujala.com www.rashtriyasahara.com www.bbchindi.com www.hindustandainik.com www.webdunia.com www.bhaskar.com www.navbharattimes.com www.prabhatkhabar.com http://koshnr.tripod.com http://users.panda.be/walter.rajesh http://sanskrit.gde.to/hindi/dict/eng-hin-itrans.html http://aa241ls.aa.tufs.ac.jp/~tjun/sktdic www-aa.tufs.ac.jp/~much/hnd-la-e.htm

(सामाजिक समस्या) **(पर्यावरण)** **(भाषा, संचार माध्यम एवं तंत्रज्ञान)** **Revisions** **Mock Exam** **Grammar Application** **All listed skill**	Understand ideas, opinions and attitudes Show understanding of the connections between ideas, opinions and attitudes Understand what is implied but not directly stated, e.g. gist, writer's purpose, intention and feelings **EX 4 -U**nderstand ideas, opinions and attitudes Show understanding of the connections between ideas, opinions and attitudes Communicate information/ideas/opinions clearly, accurately and effectively Organise ideas into coherent paragraphs using a range of appropriate linking devices Use a range of grammatical structures and vocabulary accurately and effectively Show control of punctuation and spelling Use appropriate register and style/format for the given purpose and audience **EX 5 -**Communicate information/ideas/opinions clearly, accurately and effectively Organise ideas into coherent paragraphs using a range of appropriate linking devices Use a range of grammatical structures and vocabulary accurately	http://www.ishipress.com/wordlist.htm http://osQal. uchicago.edu/dictionaries/index.html http://www.cs.wisc.edu/~navin/india/urdu.dictionary http: www.webuma.com http://hindi.netjaal.com www.rediff.com www.sify.com www.prabhasakshi.com http://www.sahitya-akademi.org www.bbc.co.uk/hindi http://www.nic.in/indiapublications/Hindi-Pub/Reference/HR06.htm http://www.aajtak.com http://www.ddindia.net http://203.200.89.66:8080/Sahara http://www.amarujala.com http://www.bhaskar.com http://www.naidunia.com http://www.rajasthanpatrika.com http://www.jagran.com http://www.prabhatkhabar.com http://www.hindimilap.com http://www.bttlindia.com/mozilla http://www.bridges.org/toolkit/freeIT.html#host http://hindi3.tripod.com. http://www.baraha.com/downloaosQ.htm http://www.cs.colostate.edul/~malaiya/devafonts.htin http://www.alanwood.net/unicode/devanagari.html http://theory.tifr.res.in/bombay/history/peoplel/language/hindi.html http://www.aksharamala.com http://www.ucl.ac.uk/~ucgadkw/indnet-textarchive.html

based exercises will be covered during each topic. **(EX:1,** **Short answer questions** **EX:2,** **Multiple Matching**	and effectively. Show control of punctuation and spelling Use appropriate register and style/format for the given purpose and audience. **EX 6 -**Communicate information/ideas/opinions clearly, accurately and effectively Organise ideas into coherent paragraphs using a range of appropriate linking devices Use a range of grammatical structures and vocabulary accurately and effectively. Show control of punctuation and spelling Use appropriate register and style/format for the given purpose and audience.	http://www.languageinindia.com http://www.tadbhav.com http://www.abhivyakti-hindi.org http://www.aanubhuti-hindi.org http://manaskriti.comlkaavyaalaya http://hindi.india-today.com http://www.womeninfoline.com/hindi/intemet/index.asp http://www.kalayan.org/kalayanpatrika/index.html http://www.bharatdarshan.co.nzlstories/index.html http://groups.yahoo.com/group/HindiForum/messages/50?threaded= http://groups.yahoo.com/group/hindi/messages/359 http://groups.yahoo.com/group/subhaashitas छात्र समय समय पर व्याकरण पर आधारित गतिविधि करेंगे जिससे उन्हे लेखन एवं पठन कार्य हेतु सुविधा होगी। खासकर भाषा को अलंकृत करने हेतु मुहावरे तथा कहावतों , उक्तियों का प्रयोग सीखाने हेतु दमशराज़, कहूत का प्रयोग भी किया जाएगा। लिंग, वचन, कारक , संज्ञा, सर्वनाम, अनेक शब्दों के लिए एक शब्द जैसे व्याकरण का अभ्यास यथा समय करना छात्र के संकल्पनात्मक समझ हेतु लाभदायक होगा। व्याकरण अभ्यास से छात्रों को छोटी छोटी गलतियों से अवगत किया जाएगा। जगतजाल की सहायता से छात्रों की हिन्दी भाषा में जानकारी ढूँढने की प्रवृत्ती को बढ़ाना है। जिससे की उनके शब्द भंडार में वृद्धि हो सके। Learners read text aloud from a newspaper or magazine article. This is followed with an oral activity in which learners answer questions from the article. Assist with learners' pronunciation and intonation. An interactive question and

EX:3, **Note Making** **EX:4,** **Summary**		answer session will benefit the whole class and give you an insight into their learning needs. **(F)** Teach reading comprehension through CLOSE reading exercises, using the following steps: C: Check for unknown words. Check for unusual language. L:Look for key ideas and details.(Comprehension). What is the most important idea the author wants to know? Look for how key details are provided. Look for author's viewpoint and connect it with other relevant facts. O: Observe text features (genre) Is the text written in story form, as poetry or factual and scientific information? S:Study how the sentences and text are structured (sentence-level work.Seek signal words, such as 'however', 'still', 'but', 'yet' E: Evaluate to make possible inferences from the text. Learners create their own grammar and vocabulary book for the rules of grammar and the meaning of unfamiliar words. They write sentences using the unfamiliar words. They can use this book for revision. Use flash cards to play a picture/word matching game in groups or as a whole class activity. Learners carry out simple matching activities such as a pictorial story (a sequence of pictures) to match with sentences given in a random order. More able learners can write their own sentences to describe the pictures.

EX:5, **Writing Exercise**		Learners read aloud a short story with four or five paragraphs and match given sentences to each paragraph. To challenge learners, provide a story that does not follow a chronological order. Learners can develop note-making skills by listening to a long piece of text and making notes of the central idea/s. Notes should succinctly incorporate the gist of the text. The notes in Exercise 3 are developed into a summary form in Exercise 4, so it is a good idea to teach Exercise 3 and 4 together. In this way, learners will understand the significance of including the main points of the text in note form so that they can be used to summarise the text effectively in Exercise 4. As an introductory exercise, read aloud a familiar short story while learners make short notes. Ask learners to focus on the pronunciation and intonation systems of Hindi as they listen. Ask learners to read aloud in class to develop their confidence and competence in spoken Hindi. The texts used in the previous exercise, along with learners' notes, can be used for summary writing in Exercise 4. When using a new text, be sure to provide learners with a focus, format and audience for the task. Explain to learners the rules of summary writing, which consist of focusing on the key messages/gist of the text and eliminating the details that distract attention from the main issue. Discourage learners from lifting large chunks of text in summary writing. Learners should have a clear understanding of the ideas, opinions and attitudes contained in the text,

EX:6 Extended Writing Exercise		show understanding of the connections between them, and communicate them accurately and effectively by using a range of grammatical structures, vocabulary and control of punctuation and spelling. These tasks can be approached verbally to build confidence in learners before approaching the exercise in written form. Display news items or articles for learners to rephrase sentences in their own words using as few words as possible taken from the Use flash cards of synonyms and antonyms played as a matching game and to be added to learners' vocabulary book. Provide texts in different genres, such as emails, a thank you note, a letter of apology, an invitation to an event, short articles/announcements from newspapers and magazines. Learners can bring invitations to weddings/ birthdays/ exhibitions, etc. to model this task: Learners practise writing short pieces of writing with a purpose and audience such as: an invitation for a birthday or anniversary a thank you letter To achieve the objectives of Exercise 6, learners can practise writing for a variety of purposes and audiences throughout the course. The focus is on writing skills which include accurate and effective communication in written form, organisation of ideas in coherent paragraphs, competence in using a range of grammatical structures and subject-appropriate vocabulary, control of punctuation and spelling, as well as use of appropriate register, style and

		format for the given purpose and audience. Learners take part in a writing workshop which involves uninterrupted, silent, sustained writing on a topic of their own choice for 30 minutes. This can be read out in class with the teacher or peers suggesting ideas for improvement. (F) Learners re-draft their text by incorporating suggestions from the class/teacher. (I) Carry out a shared writing session. After a brief discussion about a given topic, learners contribute towards one collaborative piece of writing which is written down on a flip chart, interactive white board or blackboard. Grammar and vocabulary: Revise grammatical rules and vocabulary Introduce figures of speech – similes, metaphors Change a present tense sentence into past/future tenses Match words and pictures for topic-related vocabulary; word searches Brainstorm topic-related vocabulary to create topic webs. Use topic webs to write an extended piece of prose Class dictation to check spellings. श्रवण प्रश्न पत्र अभ्यास हेतु रेडियो तथा दूरदर्शन के समाचार तथा यात्रा

	Identify and select relevant information Understand ideas, opinions and attitudes Identify and select relevant information Understand ideas, opinions and attitudes Understand ideas, opinions and attitudes Show understanding of the connections between ideas, opinions and attitudes Understand what is implied but not directly stated, e.g. gist, speaker's purpose, intention and feelings	वर्णन , एवं साक्षात्कार की सहायता ली जाएगी॥ Explain and practise key words in questions, such as कब, क्य�, �कस, क्या, कहाँ, by providing answers for questions beginning with them. Listening to recordings in a second language with full understanding can be challenging at first. Learners can practise listening to a variety of recordings in Hindi using the following activities. Pre-listening tasks: Pre-teach the vocabulary in a recorded text before learners listen to it. Highlight the key words in questions and discuss possible answers. Ask learners to brainstorm the vocabulary which they expect to hear for a particular topic. Post-listening task: Learners role play and record short conversations about different scenarios, such as travel plans, purchasing cinema/theatre tickets, giving step-by-step instructions for making things/recipes, directions, dialogues between a customer and shopkeeper, personal experiences of organising a social event with a family member, meeting a long lost friend and catching up with them about their past.Follow-up the conversation with a question and answer session Facilitate active listening and provide opportunities for learners to get used to the different accents and a realistic

		pace of spoken Hindi. This can be achieved by listening to a variety of recorded programmes on the radio, watching Hindi films and listening to Hindi songs on YouTube. As a follow-up activity, learners can devise their own gap-filling exercises from the spoken texts.Give learners the words to familiar songs/poems/rhymes with some gaps to complete, and a list of possible vocabulary, before playing a recording of the song/poem/rhyme for learners to listen to. This can increase learners' awareness of what they hear so that they retain the key information to fill in the gaps.Provide learners with recorded texts which contain some details and possible distracters. Select topics from learners' own interests to engage their attention. Highlight the difference between a legitimate answer and distracters that may sound like a true answer. Allow time for learners to ask questions Exercise 3 requires skills in listening and comprehension: the ability to understand the difference between what is said and what is meant. It is very often conveyed by the key words in a sentence as well as the emphasis and intonation in the spoken text. These skills can be developed through the experience of listening to spoken texts in a variety of contexts. Learners will need to differentiate between the literal and inferential meanings of the spoken text and the speaker's intention by paying attention to its context. Give learners a listening exercise which is supported by visual aids/cinema clips, where the spoken words are supported by facial expressions and/or body language Learners take notes during the listening exercise to ensure they understand information, and the connection between

		ideas, opinions and attitudes. (F) You can devise your own exercises for information correction, starting at a basic level where incorrect details and replacement information are obvious. The level of challenge in this exercise will depend on the ability of learners. Some of the following activities can be practised: True/False exercises, inserting the correct information/answers Putting several events in chronological order. Extension activities Learners transcribe recordings of articles about scientific topics, popular figures from the world of sports and entertainment. Learners answer exercises designed to separate facts and opinions. Learners transcribe recorded scripts of plays and answer multiple-choice exercises. (I) Exercise 4 requires detailed comprehension of spoken texts. This skills can be taught progressively throughout the course of the syllabus. This exercise is based on a longer spoken text (conversation between two speakers, interview, etc.) with multiple-choice answers. Learners are required to select precise information derived from their understanding of the spoken text. They need to understand the context of the text including the meaning implied behind the spoken words, and differentiate between the distractor and the legitimate answer. To facilitate learners' understanding, introduce topic-related

LISTENING **PAPER 2** **EX:1,** **EX:2,** **EX:3,** **EX:4,**	Identify and select relevant information Understand ideas, opinions and attitudes Show understanding of the connections between ideas, opinions and attitudes Understand what is implied but not directly stated, e.g. gist, speaker's purpose, intention and feelings	vocabulary before starting the exercise. Discuss a variety of comprehension questions with learners for them to focus upon when listening, such as gist questions to derive the main idea of the spoken text, specific information, and detailed information. Learners should take notes while listening to the text. Classroom activities should at first be based on simple spoken texts on topics related to learners' interests and gradually become more challenging. Select texts that focus on specific listening skills Learners' familiarity with the cultural background of Hindi-speaking countries can be developed by listening to articles and stories about the social/cultural background in Hindi. Familiarity with the cultural background will facilitate learners' understanding of spoken texts. Some of the following strategies will help to develop and improve learners' listening skills: Listen to the spoken text and have a follow-up discussion about the main content/s of the text. Identify unfamiliar words and their meaning. The meaning of unfamiliar words can also be derived by listening to the total speech and its context. Identify the significance of the speaker's tone or stress on any aspect of the speech with implication for inferential meaning and discuss what it may convey. **Final Exam CAIE**

SUBJECT: MATHEMATICS		

Strand / Topic	Learning Objectives (CAIE expectations)	Learning Experiences/Engagements
Transformations	Reflect simple plane figures in Horizontal or vertical lines. Rotate simple plane figures about the origin, vertices or midpoints of edges of the figures, through multiples of 90°. Construct given translations and enlargements of simple plane figures; positive and fractional scale factors for enlargements only; also includes negative scale factors for enlargements for extended learners. Recognise and describe reflections, rotations, translations and enlargements; positive and fractional scale factors for enlargements only; also includes negative scale factors for enlargements for extended learners	Draw an arrow shape on a squared grid. Use this to illustrate the following: reflection in a line (mirror line); rotation about any point (centre of rotation) through multiples of 90° (in both clockwise and anti-clockwise directions); and translation by a vector. Several different examples of each transformation should be shown. Use the word image appropriately. Investigate how transformations are used to make tessellations and produce an Escher-type drawing. For inspiration and step by step guides, see the website www.tessellations.org. **(I)** Ask learners to research the work of Maurits Cornelis Escher linked to tessellations; this can be set at homework. **(I)** Use a pre-drawn shape on (x, y) coordinate axes to complete several transformations using the equations of lines to represent mirror lines and coordinates to represent centres of rotation. Work with (x, y) coordinate axes to show how to find: the equation of a simple mirror line given a shape and its (reflected) image; the centre and angle of rotation given a shape and its (rotated) image; and the vector of a translation. Emphasize all the detail that is required to describe each of the transformations. Draw a triangle on a squared grid. Use this to illustrate enlargement by a positive integer scale factor about any point (centre of enlargement). Use both methods: counting squares and drawing rays. Show how to find the centre of enlargement given a shape and its (enlarged) image

Algebra / Functions	Use function notation, e.g. $f(x) = 3x – 5$, $f: x \longmapsto 3x – 5$, to describe simple functions.	Give learners a definition of a function, f(x): that it is a rule applied to values of x. Look at evaluating simple functions for specific values, for example linear functions, describing the functions using f(x) notation and mapping notation.
	Find inverse functions $f –1(x)$.	The next step is to introduce the inverse function as an operation which 'undoes' the effect of a function. Demonstrate how learners can evaluate simple inverse functions for specific values, describing the functions using the f-1(x) notation and mapping notation. Link this to the work on transforming formulae from topic 2.1. Explain to learners that to find the inverse of the function $f(x) = 2x – 5$, a useful method is to rewrite this as $y = 2x – 5$, then to interchange the x and y to get $x = 2y – 5$, then to make y the subject $y = (x + 5)/2$ and finally to re-write using the inverse function notation as $f\text{-}1(x) = (x + 5)/2$.
	Form composite functions as defined by $gf(x) = g(f(x))$.	Describing the functions using the f-1(x) notation and mapping notation. Link this to the work on transforming formulae from topic 2.1. Explain to learners that to find the inverse of the function $f(x) = 2x – 5$, a useful method is to rewrite this as $y = 2x – 5$, then to interchange the x and y to get $x = 2y – 5$, then to make y the subject $y = (x + 5)/2$ and finally to re-write using the inverse function notation as $f\text{-}1(x) = (x + 5)/2$. Provide learners with examples and questions, either prepared yourself or from textbooks. Extension activity: The video 'Finding inverse functions: linear' on the Kahn academy website (www.khanacademy.org) also talks about what the graph of

		an inverse function looks like. Knowing that the graph of an inverse function is a reflection in the line y = x is is a useful extension for the more able learners.
Vectors	Describe a translation by using a vector represented by ■(x@y) or AB or á' Add and subtract vectors. Multiply a vector by a scalar Calculate the magnitude of a vector $\begin{matrix} x \\ y \end{matrix}$ as root of $x2+y2$ Represent vectors by directed line segments. Use the sum and difference of two vectors to express given vectors in terms of two coplanar vectors. Use position vectors. → Vectors will be printed as AB, or a and their magnitudes denoted by modulus signs,	Use the concept of translation to explain a vector. Use simple diagrams to illustrate column vectors in two dimensions, explaining the significance of positive and negative numbers. Introduce the various forms of vector notation. Show how to add and subtract vectors algebraically by making use of a vector triangle. Show how to multiply a column vector by a scalar and illustrate this with a diagram. The 'vector journeys' problem on the Nrich website (https://nrich.maths.org) gives learners the opportunity to explore the use of vectors. There are also support and extension activities linked to this resource. Revise the work from section 7.1. Use diagrams to help illustrate how to calculate the magnitude of a vector; link this to the work on Pythagoras' theorem from topic 6.2. Explain the notation required, i.e. AB or **a** for vectors and for their magnitudes □AB□□→□or |**a**| (with modulus signs). Define a position vector and solve various problems in vector geometry. Explain to learners that in their answers to questions, they are expected to indicate **a** in some definite way, e.g. by an arrow or by underlining, thus AB or a.
Number / Sets	Use language, notation and Venn diagrams to describe sets and represent relationships between sets. Definition of sets	It is useful to start with revising simple Venn diagrams. For example, group people who wear glasses in one circle and people with brown hair in another circle, and ask

	e.g. A = {x: x is a natural number} B = {(x,y): y = mx + c} C = {x: a Y x Y b} D = {a, b, c, …} Notation Number of elements in set A; n(A) "…is an element of…" A; □ "…is not an element of…"; ∉ Complement of set A; A' The empty set; □ Universal set; ξ A is a subset of B; A ⊆ B A is not a subset of B; A ⊈ B A is not a proper subset of B; A ⊂ B Intersection of A and B; A n B	learners to describe the people in the overlapping region. This can be extended to general Venn diagrams concentrating more on the shading of the regions representing the sets $A \cup B$, $A \cap B$, $A' \cup B$, $A \cup B'$, $A' \cap B$, $A \cap B'$, $A' \cup B'$ and $A' \cap B'$ helping learners to understand the notation. Learners would find it useful to know that is the same as and that is the same as. Make sure that learners understand the language associated with sets and Venn diagrams. ($A \cup B$)' $A' \cap B'$, ($A \cap B$)', $A' \cup B'$ Learners need to be able to distinguish between a subset and a proper subset. The work on Venn diagrams can be extended to look at unions and intersections when there are three sets.
Statistics	Collect, classify and tabulate statistical data Read, interpret and draw simple inferences from tables and statistical diagrams. Compare sets of data using tables, graphs and statistical measures. Appreciate restrictions on drawing conclusions from given data.	Use simple examples to revise collecting data and presenting it in a frequency (tally) chart. For example, record the different makes of car in a car park, or record the number of words on the first page of a series of different books. Ask learners to conduct an experiment of this type, tabulating their data. Use examples to classify data using statistical terminology, e.g. discrete, continuous, numerical (quantitative), non-numerical (qualitative). Use examples to show how to draw simple inferences from statistical diagrams, and tables including two-way tables.

	Construct and interpret bar charts, pie charts, pictograms, stem-and-leaf diagrams, simple frequency distributions, histograms with equal intervals and scatter diagrams Extended learners also cover histograms with unequal intervals; for unequal intervals on histograms, areas are proportional to frequencies and the vertical axis is labelled 'frequency density'. Calculate the mean, median, mode and range for individual and discrete	Explore the Gapminder website (https://www.gapminder.org/) for some interesting ways of displaying data and access to a wide range of data sets. Learners can be encouraged to bring in examples of data used in the media. Discuss how the data is represented. Is it designed to be informative, or to deliver a particular message, or to sell something? 'Interpreting Bar Charts, Pie Charts, Box and Whisker Plots S5'on the STEM learning website (www.stem.org.uk) gives learners the opportunity to interpret bar charts and pie charts, and helps them appreciate the benefits and limitations of these representations. The second part of the resource also compares box-and-whisker plots, which his useful for topic E9.6. Use the data collected in the activity recommend for topic 9.1 to construct a pictogram, a bar chart and a pie chart. Point out that the bars in a bar chart can be drawn apart. Use an example to show how discrete data can be grouped into equal classes. Draw a histogram to illustrate the data (i.e. with a continuous scale along the horizontal axis). Point out that this information could also be displayed in a bar chart (i.e. with bars separated) because data is discrete. Investigate the length of words used in two different newspapers and present the findings using statistical diagrams (links to newspapers can be found online at http://onlinenewspapers.com). Record sets of continuous data, e.g. heights, masses, etc., in grouped frequency tables. Use examples that illustrate equal class widths for core learners and unequal class widths for extended learners. Draw the corresponding histograms. Emphasize the fact that

	data and distinguish between the purposes for which they are used. Calculate an estimate of the mean for grouped and continuous data. Identify the modal class from a grouped frequency distribution. Construct and use cumulative frequency diagrams. Estimate and interpret the median, percentiles, quartiles and inter-quartile range. Construct and interpret box-and-whisker plots.	for continuous data bars of a histogram must touch. On the Mr Barton Maths website eBook 'The Maths E-Book of Notes and Examples' (http://mrbartonmaths.com), there is a section on bar charts and histograms. Use this section to illustrate to extended learners why frequency density is a fairer way to represent data than frequency on the vertical axis. Label the vertical axis of a histogram as 'frequency density' and show that the area of each bar is proportional to the frequency. Show how to calculate frequency densities from a frequency table with grouped data and how to calculate frequencies from a given histogram. Explain how to draw scatter diagrams with simple examples (you may choose to do this at the same time as topic 9.6). Explore the Gapminder website (https://www.gapminder.org/) for innovative approaches to scatter diagrams and videos that you could use to engage learners using some real life topical contexts. Show how to work out the mean, the median and the mode from a list of data or from a frequency table. Explain that if there are two middle values, they need to find the half-way point for the median, because there can only be one median but that there can be more than one mode or no mode. Use simple examples to highlight how these averages may be used. For example, in a discussion about average salaries the owner of a company with a few highly paid managers and

	Understand what is meant by positive, negative and zero correlation with reference to a scatter diagram.	a large work force may wish to quote the mean wage rather than the median. 'Mean, median and mode' on the mathsteacher.com website (www.mathsteacher.com) has examples of when to use the different averages for different situations. Use the 'Life Expectancy' PowerPoint and resources on the Gapminder website (https://www.gapminder.org/) to explore averages in a topical real-life situation. Include examples where the mean is given and the number of people, total or an individual value needs to be found. Explain how the mode can be recognised from a frequency diagram. Use examples to show how to calculate an estimate for the mean of data in a grouped frequency table using the mid-interval values. Explain how the modal class can be found in a grouped frequency distribution. Look at the examples and questions on the 'Centre for innovation in mathematics teaching' website (http://www.cimt.org.uk/). (I) The Maths is Fun website (www.mathsisfun.com) has a good explanation of how to estimate the mean for grouped data, including identifying the modal class. See 'Mean, Median and Mode from Grouped Frequencies'. Extension activity: Explain how to find the interval that contains the median; for more able learners you could show them the idea of linear interpolation.
	Draw, interpret and use lines of best fit by eye	Explain cumulative frequency and use an example to illustrate how a cumulative frequency table is constructed. Draw the corresponding cumulative frequency curve emphasising that

		points are plotted at upper class limits; the curve must always be Increasing; and highlight its distinctive shape. Explain that this can be approximated by a cumulative frequency polygon. Use a cumulative frequency curve to help explain and interpret percentiles. Introduce the names given to the 25th, 50th and 75th percentiles and show how to estimate these from a graph. Show how to estimate the inter-quartile range from a cumulative frequency diagram. Explain how to use a cumulative frequency curve to complete a frequency table. 'Interpreting frequency graphs, cumulative frequency graphs, box and whisker plots S6' on the Stem learning website (www.stem.org.uk) gives learners the opportunity to interpret simple frequency distributions and cumulative frequency diagrams, including using box-and-whisker diagrams, to display the median, percentiles, quartiles and inter-quartile range. The second part of the 'Interpreting Bar Charts, Pie Charts, Box and Whisker Plots S5' on the STEM learning website (www.stem.org.uk) compares box-and-whisker plots. Use specimen Paper 2, Q24 (reference also to E1.16 Personal and household finances). (I) (F) Use simple examples of scatter diagrams to explain the terms and meanings of positive, negative and zero correlation. Revise drawing scatter diagrams and describe the resulting correlation. Explain why and where scatter graphs are useful, e.g. in making predictions. Ask learners to collect some bivariate data of their choice and to predict the correlation, if any, that they expect to find. For example, height and arms span for members of the class.

		Use collected data to draw a scatter diagram and to then look for the expected correlation. Discuss the results. You could use the 'How does income relate to life expectancy' presentation on the Gapminder website (https://www.gapminder.org/) to demonstrate the use of correlation to explore social problems. Explain that if there are too few points on a scatter diagram a correlation may appear apparent when in fact there is no real relationship between the variables. Learners should understand that a correlation does not prove cause and effect it just provides evidence to support a potential relationship and/or identify an area for further research. For example, it may be that a third unidentified variable is causing the apparent correlation. Learnerscould do a web search for the 'Televisions, Physicians, and Life Expectancy' problem to demonstrate this phenomenon. (I) The 'David and Goliath' problem on the Nrich website (https://nrich.maths.org/7360) is a nice activity. (I) Explain, with diagrams, that the purpose of a good line of best fit is to have the sum of the vertical distances from each point to the line as small as possible. In simpler terms, ask learners to aim for a similar number of points on each side of the line and as many points as possible on the line or as close to it as possible. Draw diagrams showing bad lines of best fit explaining what is wrong with them. For example, a common error made by learners is to draw the line of best fit through the origin when that doesn't fit with the trend of the data.
		Understand and use the probability scale from 0 to 1. Probability Calculate the probability of a single event as either a fraction,

		decimal or percentage. Problems could be set involving extracting information from tables or graphs. Understand that the probability of an event occurring = 1 – the probability of the event not occurring. Understand relative frequency as an estimate of probability.
	Calculate the probability of simple combined events, using possibility diagrams, tree diagrams and Venn diagrams. In possibility diagrams, outcomes will be represented by points on a grid, and in tree diagrams, outcomes will be written at the end of branches and probabilities by the side of the branches. For Core, Venn diagrams will be limited to two sets Calculate conditional probability using Venn diagrams, tree diagrams and tables. For example, two dice are rolled. Given that the total showing on the two dice is 7, find the probability that one of the dice shows the number 2	Roll two different dice, or spin two spinners, and list all the outcomes. Use simple examples to illustrate how possibility diagrams and tree diagrams can help to organise data. Use possibility diagrams and tree diagrams to help calculate probabilities of simple combined events, paying close attention to how diagrams are labelled. The article 'Probability calculations from tree diagrams' on the Nrich website (https://nrich.maths.org/9648) suggests a set of activities that introduce students to combined events in an intuitive way using tree diagrams as a means of recording and visualising the outcomes of combined events. The examples are set at different levels of complexity. The article 'Tree diagrams, 2-way Tables and Venn Diagrams' also on the Nrich website (https://nrich.maths.org/9861) considers a range of diagrammatic representations for probability. The resources include some detailed examples of how different representations could be used to support the solution to example problems. These could be used to stimulate discussion with learners. Try the 'In a box' probability problem on the Nrich website (https://nrich.maths.org/919). **(I)**

	Term Exams / Outbound Trip / Diwali Vacations	Paper 22 and Paper 42
	Revision	Solving Past Papers with Topic Wise Revision
	Mock Examination	Paper 22 and Paper 42
	Marathon Session	Solving Past Papers

SUBJECT: PHYSICS

Strand/Topics	Learning Objectives (CAIE expectations)	Learning Experiences/Engagements
4.1Simple phenomena of magnetism	• Describe the forces between magnets, and between magnets and magnetic materials • Give an account of induced magnetism • Distinguish between magnetic and non-magnetic materials • Describe methods of magnetisation, to include stroking with a magnet, use of d.c. in a coil andhammering in a magneticfield • Draw the pattern of magneticfield lines around a barmagnet • Describe an experiment to identify the pattern of magnetic field lines, including the direction • Distinguish between themagnetic properties of softiron and steel • Distinguish between thedesign and use of permanent magnets and electromagnets	Simple experiments with magnets to show attraction and repulsion, leading to investigation of the field patterns around bar magnets (individually and between attracting poles and between repelling poles). **Extension activity:** extend to show the direction of the field lines using a plotting compass. Make and use a simple electromagnet.**(I)** Experiments to investigate the magnetisation of iron or steel by mechanical and electrical means. Iron is considered to be magnetically soft whilst steel is magnetically hard. It should be realised, however, that, in reality, iron is rarely pure and the term steel covers a wide range of different alloys of iron with various magnetic properties. 'Gallery of Electromagnetic Personalities' contains brief histories of 43 scientists who have made major contributions, from Ampere to Westinghouse:www.ee.umd.edu/~taylor/frame1.htm How to make an electromagnet: www.sciencebob.com/experiments/electromagnet.php

4.1 Simple phenomena of magnetism	• Explain that magnetic forces are due to interactions between magnetic fields • Describe methods of demagnetisation, to include hammering, heating and use of a.c. in a coil	Explain that magnetic forces are due to interactions between magnetic fields Describe methods of demagnetisation, to include hammering, heating and use of a.c. in a coil
4.2.1Electric charge	• State that there are positive and negative charges • State that unlike charges attract and that like charges repel • Describe simple experiments to show the production and detection of electrostatic charges • State that charging a body involves the addition or removal of electrons • Distinguish between electrical conductors and insulators and give typical examples	Electrostatics experiments are best performed in dry climates and in some areas the time of year chosen for teaching this will affect the ease with which the experiments are demonstrated. Even in relatively damp conditions, however, it is usually possible to show most of what is needed provided a hair-dryer or an industrial dryer is used regularly as the experiment is being carried out. Use simple experiments with strips of insulating material (e.g. Perspex and cellulose acetate) rubbed with a cloth to show attraction and repulsion. Balloons or cling film can also be used to give a larger scale result. Learners are always impressed when a charged rod diverts a stream of flowing water. Remember that wood can act as a conductor when discharging electrostatically charged objects. Show this and remind learners not to use wooden objects if rescuing someone from electrocution. Introductory work on static electricity:www.sciencemadesimple.com/static.html Electricity (for the teacher):www.amasci.com/emotor/sticky.html
4.2.1 Electric charge	• State that charge is measured in coulombs • State that the direction of an electric field at a point is the direction of the force on a positive charge at that point • Describe an electric field as a region in which an electric charge experiences a force	For abler learners, electric field patterns can be demonstrated, e.g. two electrodes dipped in castor oil, contained in a petri dish – the electrodes are connected to a high voltage supply and semolina grains sprinkled around the electrodes show the field pattern. Also charging by induction can be shown using a gold-leaf electroscope. In a dry environment, very small pieces of paper (roughly 2 mm) can be picked up from a table using a charged rod and

	• Describe simple field patterns, including the field around a point charge, the field around a charged conducting sphere and the field between two parallel plates(not including end effects) • Give an account of charging by induction • Recall and use a simple electron model to distinguish between conductors and insulators	may even be made to bounce between the rod and the table a few times if the rod is horizontal and just a few centimetres from the table. This behaviour is explained because the paper is a (poor) conductor and becomes charged by induction. Deals with common misconceptions about static electricity (for the teacher):www.eskimo.com/~billb/emotor/stmiscon.html An interesting way to teach about charge and current using an overhead projector demonstration:www.eskimo.com/~billb/redgreen.html
4.3.1Circuit diagrams	• Draw and interpret circuit diagrams containing sources, switches, resistors (fixed and variable), heaters ,thermistors, light-dependent resistors, lamps, ammeters ,voltmeters, galvanometers, magnetising coils, transformers, bells, fuses and relays	Learners can be given experience of these components as parts of working circuits (perhaps a circus arrangement), setting circuits up from given diagrams and drawing circuit diagrams of actual circuits. Measure the current at different points in a series circuit. What is electricity? www.physicsclassroom.com/class/circuits/Lesson-2/What-is-an-Electric-Circuit Shows the relationship between voltage, current (called 'amperage') and resistance. Learners can change the resistance and voltage in a circuit, switch on and see the effect on the lamp: www.jersey.uoregon.edu/vlab/Voltage/
4.3.1Circuit diagrams	• Draw and interpret circuit diagrams containing diodes	At IGCSE, a diode can be thought of as a one-way conductor. Its resistance is infinite in the reverse direction but finite in the forward direction. Its behaviour can be demonstrated with simple experiments. It can be used in battery chargers. LEDs are diodes which happen to emit visible light when conducting a current.

4.3.2Series and parallel circuits	• Understand that the current at every point in a series circuit is the same • Give the combined resistance of two or more resistors in series • State that, for a parallel circuit, the current from the source is larger than the current in each branch • State that the combined resistance of two resistors in parallel is less than that of either resistor by itself • State the advantages of connecting lamps in parallel in a lighting circuit	The behaviour of current in circuits is commonly misunderstood and it is very helpful to demonstrate the equality of the current in a series circuit by using more than one ammeter in a circuit. If it also includes a variable resistor, then the circuit can be used to vary the current. Learners may observe the current changing both before and after the variable resistor and they may notice that they change at the same time. If digital meters are used, then the fact that the readings are not identical can confuse and it is usually best to use a range which does not supply unnecessary significant figures which are liable to be different on different meters. A useful class practical is to take the measurements so that a graph of *V* against *I* may be plotted for: • resistor 1 • resistor 2 • resistor 1 and resistor 2 in series.**(I)** The gradient of the graph is used to determine the resistance of the three arrangements and to show the law for resistors in series. A parallel circuit with ammeters in the appropriate positions can show how the current in two branches of different resistances compare and how a parallel pair of resistors allows a larger current to be supplied than does either resistor on its own. If available, an ohmmeter can be used to measure the resistance of various series and parallel combinations of resistors. When considering the advantages of lamps in parallel, it should be emphasised that normal, full brightness is only achieved because they are designed to operate using the full voltage supply. It is possible to design lamps that work with full brightness in series and these would burn out if connected in parallel. Series resistors:www.bbc.co.uk/bitesize/higher/physics/elect/resistors/revision/1/

		Current in series circuits:www.youtube.com/watch?v=SEAxrcOaHW8 www.youtube.com/watch?v=D2monVkCkX4 Parallel resistors:www.youtube.com/watch?v=fyeBfaxwQqs Lamps in parallel:www.youtube.com/watch?v=vIicY0Y491Q
4.3.2 Series and parallel circuits	• Calculate the combined e.m.f. of several sources in series • Recall and use the fact that the sum of the p.d.s across the components in a series circuit is equal to the total p.d. across the supply • Recall and use the fact that the current from the source is the sum of the currents in the separate branches of a parallel circuit • Calculate the effective resistance of two resistors in parallel	The core work can be extended for abler learners to a quantitative approach to series and parallel circuits. Use voltmeters and ammeters to show the relationship required. **(I)** Measurements of current in series and parallel circuits, e.g. with cells and lamps, could form the basis of the work on combinations of resistors. Demonstrate with ammeters that the current flowing into a junction equals that flowing out.
4.5 Dangers of electricity	• State the hazards of: ○ damaged insulation ○ overheating of cables ○ damp conditions • State that a fuse protects a circuit • Explain the use of fuses and circuit breakers and choose appropriate fuse ratings and circuit-breaker settings • Explain the benefits of earthing metal cases	The heating effect work can be extended to use a very thin wire, e.g. strand of iron wool in a circuit powered by two 1.5 V cells. A short piece of iron wool will ‘burn out’, illustrating the action of a fuse. The action of a fuse is commonly misunderstood by learners and so it should be emphasised that it does not control or just reduce the current, but reduces it to zero by breaking the circuit. Likewise, the action of an earth wire is not to divert the current away from the user but to allow so much current to be supplied that the fuse melts and breaks the circuit. A person holding a device by its metal casing when the casing becomes live is likely to be killed or severely injured as the casing would stay live until the fuse had melted. This might take several seconds.

		Hazards of electricity: www.youtube.com/watch?v=igK-DRB5faU
4.6.1 Electro-magnetic induction	• Show understanding that a conductor moving across a magnetic field or a changing magnetic field linking with a conductor can induce an e.m.f. in the conductor • Describe an experiment to demonstrate electromagnetic induction • State the factors affecting the magnitude of an induced e.m.f.	This topic really must be demonstrated by experiment. One such includes moving a permanent magnet into and out of a coil, connected to a very sensitive meter. This can be extended to show the same effect using an electromagnet moved in and out of the coil and then by simply switching the electromagnet on and off. **Extension activity:** extend the experiments above to show the effects of the strength of the field (use a stronger permanent magnet or increasing the current in the electromagnet), the speed of movement and the number of turns per metre in the coil. **Resource Plus** **Experiment:** How to make an electromagnet This experiment focuses on an investigation to measure the strength of an electromagnet. Links with 4.6.4 The magnetic effect of a current and 4.1 Simple phenomena of magnetism Electromagnetic induction: www.ndt-ed.org/EducationResources/HighSchool/Electricity/electroinduction.htm www.youtube.com/watch?v=hajIIGHPeuU

4.6.1 Electro-magnetic induction	Show understanding that the direction of an induced e.m.f. opposes the change causing it State and use the relative directions of force, field and induced current	Induce a current in a solenoid by inserting a known pole at one end. Then pass a current through the solenoid in the same direction as the induced current; show that the field opposes the original insertion of the magnet. There are various rules for remembering the relative directions of the force, field and induced current of which Fleming's right-hand rule is one. Lenz's law:http://hyperphysics.phy-astr.gsu.edu/hbase/electric/farlaw.html#c2l www.youtube.com/watch?v=KGTZPTnZBFE http://video.mit.edu/watch/physics-demo-lenzs-law-with-copper-pipe-10268/ www.youtube.com/watch?v=uGUsTWjWOI8
4.6.2a.c. generator	• Distinguish between direct current (d.c.) and alternating current (a.c.)	This can be taught at more or less the same time as the a.c. generator. It is difficult to explain at first why a.c. exists but learners might well see what happens when one is displayed on a c.r.o. It might help to listen to the hum of a.c. devices and even to see the flickering (with the aid of a diode) of a lamp. a.c. and d.c.:www.bbc.co.uk/schools/gcsebitesize/science/add_aqa_pre_2011/electricity/mainselectrev5.shtml
4.6.3 Transformer	• Describe the construction o fa basic transformer with a soft-iron core, as used for voltage transformations • Recall and use the equation (Vp / Vs) = (Np / Ns) • Understand the terms step-up and step-down • Describe the use of the transformer in high-voltage transmission of electricity	Make a working model transformer (two 'C-cores' with suitable wire windings) to introduce the ideas, and follow with a demonstration (demountable) transformer. Use the experiment from 4.6.1 but use a.c. rather than switching on and off. Use a model transmission line and show that more energy gets through at a higher voltage; do not have high voltage wires uninsulated in the laboratory. There are several persistent errors encountered when the transformer is explained. These include the idea that a current passes through the

	Give the advantages of high voltage transmission	core and that this is why it is made of iron (a metal). Some learners use the term induction to describe the production of a current in the primary coil. Some learners suspect that a step-up transformer is contravening the principle of the conservation of energy by generating an increased voltage from nothing. All of these hint at a fundamental misunderstanding by the learner. How transformers work: www.energyquest.ca.gov/how_it_works/transformer.html www.youtube.com/watch?v=VucsoEhB0NA
4.6.3 Transformer	Describe the principle of operation of a transformer Recall and use the equation IpVp = IsVs (for 100% efficiency) Explain why power losses in cables are lower when the voltage is high	A simple worked example using specific values is often a clear way of showing the significance of high voltage transmission. A model power line, if used with appropriate safety precautions, can help learners to see what is happening. Power line repairs:www.youtube.com/watch?v=EWbBdAeW1m8
4.6.4 The magnetic effect of a current	• Describe the pattern of the magnetic field (including direction) due to currents in straight wires and in solenoids • Describe applications of the magnetic effect of current, including the action of a relay	Use iron filings on a suitably placed card to show the field patterns around a straight wire and a solenoid.**(I)**The direction of the field can be shown with a plotting compass. If a thin sheet of Perspex is used in place of the card the apparatus can be mounted on an overhead projector to give a class demonstration. Perspex sheets with dozens of built-in plotting compasses are also available. Fields in 3D can be shown with commercially available cylinders containing floating magnetic particles in a dense oil. Use a relay mounted in a Perspex box and it can be seen and heard switching a mains circuit on and off. Plotting magnetic fields: www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway_pre_2011/living_future/5_magnetic_field1.shtml www.youtube.com/watch?v=JUZC679CwKs

	• State the qualitative variation of the strength of the magnetic field over salient parts of the pattern • State that the direction of a magnetic field line at a point is the direction of the force on the N pole of a magnet at that point • Describe the effect on the magnetic field of changing the magnitude and direction of the current	Extension activity: extend the experiments to show the effect of changing the magnitude and direction of the current (separation of lines of iron filings and direction of plotting compass).(I) When drawing the field pattern around a straight wire, learners should be encouraged to draw circles whose separation increases outwards from the wire; this shows that the field gets weaker further from the wire. Magnetic and electric field lines:www.physics4kids.com/files/elec_magneticfield.html Magnetic field lines:www.boundless.com/physics/magnetism/magnetism-and-magnetic-fields/magnetic-field-lines/
4.6.5 Force on a current-carrying conductor	• Describe an experiment to show that a force acts on a current-carrying conductor in a magnetic field, including the effect of reversing: ○ the current the direction of the field	Use the 'catapult' experiment or similar. Use two parallel strips of aluminium foil mounted a few mm apart vertically. Pass a current through them in the same direction and in opposite directions and watch them attract or repel; like currents attract and unlike currents repel. Force on current carrying conductor:www.youtube.com/watch?v=14SmN_7EcGY
	• State and use the relative directions of force, field and current • Describe an experiment to show the corresponding force on beams of charged particles	When teaching the existence of the force the actual directions relative to each other can be incorporated into the lesson. Fleming's left-hand rule is just one of the rules that can be used to remember these directions. Use a cathode-ray tube or an e/m tube to demonstrate the effect of the force on a beam of charged particles (electrons). The left-hand rule:www.bbc.co.uk/schools/gcsebitesize/science/triple_aqa/keeping_things_moving/the_motor_effect/revision/3/ Force on an electron beam:www.youtube.com/watch?v=3McFA40nP0A

4.6.6 d.c. motor	• State that a current-carrying coil in a magnetic field experiences a turning effect and that the effect is increased by: ○ increasing the number of turns on the coil ○ increasing the current ○ increasing the strength of the magnetic field	Make a coil from wire and position the coil in a magnetic field so that magnetic field lines lie in the plane of the coil. When it is carrying a current the coil experiences a torque. When the magnetic field lines are perpendicular to the plane of the coil the torques is absent. The existence of the torque can be shown to be due to motor effect and deduced mathematically. Torque:www.youtube.com/watch?v=E-3yQqgu8OA
	• Relate this turning effect to the action of an electric motor including the action of a split-ring commutator	Make a model motor and investigate the effect of changing the number of turns.(I) As with the generator, make a large and visible model with cereal packets and so on which does not work but is very clear to see. Make sure that learners do not confuse split-ring (commutator) with slip rings. Increase the current in the coil of an electric motor and see it speed up. How a motor works:www.youtube.com/watch?v=Xi7o8cMPI0E Explanation of how the motor works, with helpful illustrations:www.howstuffworks.com/motor.htm Model motor kits:www.practicalphysics.org/go/Experiment_334.html
5.1.1Atomic model	• Describe the structure of an atom in terms of a positive nucleus and negative electrons	Extension learners could discuss the limitations of the simple atomic model. Atomic structure: www.youtube.com/watch?v=lP57gEWcisY www.youtube.com/watch?v=sRPejoNktKE

5.2.1Detection of radioactivity	• Demonstrate understanding of background radiation • Describe the detection of α-particles, β-particles and γ-rays (β+ are not included: β-particles will be taken to refer to β^-)	Use a Geiger-Müller tube to detect background radiation and α, β and γ radiations. Emphasise that these radiations are emitted from the nucleus. This website has an interesting history of Marie Curie:www.aip.org/history/curie/contents.htm Detecting background radiation:www.youtube.com/watch?v=5TCZqT7enHw
5.2.2 Characteristics of the three kinds of emission	• Discuss the random nature of radioactive emission • Identify α, β and γ-emissions by recalling ○ their nature ○ their relative ionising effects ○ their relative penetrating abilities (β^+ are not included, β-particles will be taken to refer to β^-)	Show the presence of background radiation using a detector and explain that it varies from location to location. Show that it varies randomly over time. Use a radiation detector with suitable absorbers to show penetrating abilities. Use a diffusion type cloud chamber to show particle tracks and lead to discussion of ionising effects. A spark counter could also be used. Properties:www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway_pre_2011/living_future/4_nuclear_radiation1.shtml www.youtube.com/watch?v=Qlb5Z8QBpcI Radioactivity: http://fiziknota.blogspot.com/2010/01/radioactivity.html www.youtube.com/watch?v=T7NhgaJCg5A
5.2.2Characteristics of the three kinds of emission	• Describe their deflection in electric fields and in magnetic fields • Interpret their relative ionising effects • Give and explain examples of practical applications of α, β and γ-emissions	Emphasise the links between the properties (penetration, ionisation and deflection by magnetic or electric fields) and the nature (charge, relative size, particles/electromagnetic radiation). One reason why α-particles are less penetrating is that they are more strongly ionising. Magnetic deflection of α-particles:www.youtube.com/watch?v=AkO4PZn2_Vs Magnetic deflection of β-particles:www.youtube.com/watch?v=1yANM8r1WR8

5.2.3 Radioactive decay	• State the meaning of radioactive decay • State that during α- or β-decay the nucleus changes to that of a different element	Emphasise that a radioactive material decays nucleus by nucleus over time and not all at once.
5.2.3 Radioactive decay	• Use equations involving nuclide notation to represent changes in the composition of the nucleus when particles are emitted	The nuclide notations for α-particles and β-particles are easily learnt and the balancing of nuclear equations is best understood through practice. It can be emphasised that the 0 and the –1 from the β-particle symbol do not have the usual meaning of numbers in those places but that, following the nuclear reaction taking place, they make the equation bala
5.2.4Half-life	• Use the term half-life in simple calculations, which might involve information in tables or decay curves	**Extension activity:** extend to work from data involving long half-lives. Use a radioactive decay simulation exercise and if possible an experiment with a Geiger counter and short half-life isotope to plot decay curves. **Resource Plus** **Experiment:** A model to determine half-life This experiment focuses on a model to determine half-life using sweets. Radioactive half-life videos: www.youtube.com/watch?v=fToMbj3Xz2c www.youtube.com/watch?v=PYn8vFmyGPM www.youtube.com/watch?v=Tp2M9tndGG0

	• Calculate half-life from data or decay curves from which background radiation has not been subtracted	The principles here are the same as before except that the background radiation must be subtracted in order to obtain the count-rate due to the sample that is decaying.
5.2.5 Safety precautions,	• Recall the effects of ionising radiations on living things • Describe how radioactive materials are handled, used and stored in a safe way	This should arise naturally from the teacher demonstrations where these are permitted, and is best integrated within the unit as a whole extending discussion to cover industrial and medical issues.
4.3.3 Action and use of circuit components	• Describe the action of a variable potential divider (potentiometer) • Describe the action of thermistors and light-dependent resistors and show understanding of their use as input transducers • Describe the action of a relay and show understanding of its use in switching circuits	Make a potential divider using a fixed and a variable resistor. Set up, in parallel, two voltmeters. Show that changing the resistance of the variable resistor causes one voltmeter reading to increase and the other to decrease. The larger resistor gets the larger share of the voltage. A series of straightforward circuits could be used here so that learners become familiar with the various components. The circuits could model the action of temperature sensors, light sensors, alarms, etc. Potential divider:www.bbc.co.uk/schools/gcsebitesize/design/electronics/calculationsrev2.shtml Thermistor circuit:www.youtube.com/watch?v=txGZljOfob0 Using an LDR:www.youtube.com/watch?v=29DgffpMh3k Reed relay:www.youtube.com/watch?v=kjg4Ue5wGS4
4.3.3Action and use of circuit components	• Describe the action of a diode and show understanding of its use as a rectifier • Recognise and show understanding of circuits operating as light-sensitive switches and temperature-operated alarms (to include the use of a relay)	Set up such circuits and show how they work. Display a half-wave rectified current using a c.r.o. Explain that devices such as phone chargers always include a rectifier. Rectifier circuits:www.allaboutcircuits.com/vol_3/chpt_3/4.html

4.4Digital electronics	• Explain and use the terms analogue and digital in terms of continuous variation and high/low states • Describe the action of NOT, AND, OR, NAND and NOR gates • Recall and use the symbols for logic gates • Design and understand simple digital circuits combining several logic gates • Use truth tables to describe the action of individual gates and simple combinations of gates	Model logic gates with switches and show how two switches in series act as an AND gate – both must be on before the lamp is turned on, etc. It is worth emphasising that logic gates are active components which require their own power source. A NOT gate with a 0 input, does not generate a voltage from nothing, it diverts the power supply voltage to the output. Analogue and digital signals: www.youtube.com/watch?v=ubEijRkLweo www.youtube.com/watch?v=XwHXeZZf8fY
	• Term Exams / Outbound Trip / Diwali Vacations • Paper 22 and Paper 42 Paper solving	
	• Revision • Past Paper solving	
	• MOCK EXAMINATION	
	Marathon Session	PAST PAPER SOLVING

SUBJECT: ENVIRONMENTAL MANAGEMENT		

Strand/Topics	Learning Objectives (CAIE expectations)	Learning Experiences/Engagements
EMS/The atmosphere and human activities 7.1 The atmosphere	• describe the structure and composition of the atmosphere – troposphere, stratosphere, mesosphere, thermosphere – nitrogen, oxygen, carbon dioxide, argon, water vapour – the ozone layer • describe the natural greenhouse effect	Watch Felix Baumgartner's space jump from an altitude of 39.045 m. Possible resource: **www.youtube.com/** – search 'Felix Baumgartner stratosphere jump'. Learners prepare a poster on the structure of the atmosphere that includes the names of the different regions, their heights and temperature trend. The chemical composition should be drawn as a pie chart with a suitable key. **www.geocoops.com/structure-of-the-atmosphere.html** **https://climate.ncsu.edu/edu/k12/.AtmStructure** **https://climate.ncsu.edu/edu/k12/.AtmComposition** Learners research the natural greenhouse effect and answer the question: 'What would happen to the Earth without the natural greenhouse effect?' They could present their findings as a short report **(I)**. Possible resource: **www.bgs.ac.uk/discoveringGeology/climateChange/CCS/greenhouseEffect.html**
7.2 Atmospheric pollution and its	• describe and explain the causes of atmospheric pollution, with reference to:	**www.youtube.com/** – search 'The Antarctic ozone hole – from discovery to recovery, a scientific journey' (UN Environment) and 'Ozzy

causes	– smog – acid rain – ozone layer depletion – enhanced greenhouse effect □ smog: volatile organic compounds (from industrial processes), vehicle emissions, impact of temperature inversion □ acid rain: sulfur dioxide and oxides of nitrogen □ ozone layer depletion: action of chlorofluorocarbons (CFCs) □ enhanced greenhouse effect: greenhouse gases (carbon dioxide, water vapour and methane)	Ozone' (TVE Asia Pacific), an animated cartoon of ozone depletion. **www.epa.gov/** – search 'ozone hole'. Look at data that show the extent of ozone depletion. Learners should examine data that show both concentration of ozone and areas of depleted ozone; both data types are often referred to as an ozone hole. **www.esrl.noaa.gov/** – search 'South Pole ozone hole' **www.theozonehole.com/** **https://vimeo.com/104321114** – 'The Antarctic ozone hole' video by Patrick Cullis. Look at data that show the increase in carbon dioxide levels over the past 100 years and increase in global temperatures. **www.ncdc.noaa.gov/** – search 'Temperature change and carbon dioxide change'. **www.nova.org.au/earth-environment/enhanced-greenhouse-effect**
7.3 Impact of atmospheric pollution	• describe and explain the impact of atmospheric pollution – smog: effects on human health – acid rain: acidification of bodies of water, effects on fish populations, damage to crops and vegetation, damage to buildings – ozone depletion: higher levels of ultraviolet radiation reaching the Earth's surface, increased	For each atmospheric pollution type, learners should produce an A4 page 'Key Facts' summary sheet on the impact of each atmospheric pollution type **(F)**. Smog: **www.youtube.com/** – search 'The Great Smog of 1952 in London' or 'Smog in China: Beijing is extremely uncomfortable' (Guardian Explainers). Acid rain:

	rates of skin cancer and cataracts, damage to vegetation – climate change: melting of ice sheets, glaciers and permafrost; rise of sea-level; flooding and loss of land; forced migration	Learners do acid rain experiments. **https://www3.epa.gov/acidrain/education/experiments.html** has nine suggested practical activities. **www.clean-air-kids.org.uk/acidrain.html** Ozone depletion: Watch the 'slip slop slap' cartoon that is used in Australia to encourage people to avoid sun exposure. **www.sunsmart.com.au/** – search 'Slip! Slop! Slap! Original SunSmart campaign'. Climate change: **http://climate.nasa.gov/effects/** **www.metoffice.gov.uk/** – search 'what is climate change?' and 'Impacts of climate change'.
7.4 Managing atmospheric pollution	• describe and explain the strategies used by individuals, governments and the international community to reduce the effects of atmospheric pollution – reduction of carbon footprint – reduced use of fossil fuels – energy efficiency – carbon capture and storage – transport policies – international agreement and policies	Learners think of as many different ways they can to reduce their carbon footprint and they suggest one way they will try to reduce their carbon footprint over the course of a week **(I)**. Possible resource: **https://carbonfund.org** – search 'reduce'. Learners could write a 'day in the life without the use of fossil fuels'. How would this affect their daily lives? Learners could write a quiz on carbon capture and storage, which they 'test' each other on. Possible resource:

	– CFC replacement – catalytic converters – flue-gas desulfurisation – taxation – reforestation and afforestation	**www.globalccsinstitute.com/** – search ‘understanding carbon capture and storage’. Learners research the top five most influential international agreements and policies that tackle atmospheric pollution and compare their five choices as a group. Invite the chemistry teacher to give a short talk on CFCs and their replacements. The lesson could cover why CFCs were a problem and how their replacements are considered less harmful to the ozone layer. Possible resource: **http://theozonehole.com/cfc.htm** Learners produce a flow diagram of how a catalytic converter works. Possible resource: **www.gcsescience.com/index.html** – search ‘catalytic converters’. Learners summarise why removing sulfur dioxide from exhaust gases of fossil fuel power plants is needed. Possible resource: **http://powerplantstechnology.blogspot.co.uk/** – search ‘Flue gas desulfurization’. Learners explain the differences between reforestation and afforestation. Possible resources: **www.differencebetween.com/difference-between-afforestation-and-reforestation/**

		www.earthtimes.org/encyclopaedia/environmental-issues/deforestation/ **Extension:** Learners answer the question: 'Why is managing atmospheric pollution a global problem?' **Extension:** Learners could research alternative methods of transport that avoid using fossil fuels.
EMS/Human population 8.1 Human population distribution and density	• identify where people live in the world – population density – population distribution	Learners look at a world population clock and population by country. Plot a bar graph for 10 countries, including the learner's own country. A double y-axis could be used and area of country could be plotted next to population. Learners could comment on the two sets of data. Possible resource: **www.worldometers.info/** – see 'Current World Population' and click on the '+' to show more information. You can find 'population by country' by clicking on the 'World Population' link and then choosing 'Population by country' in the World Population Sections area. Learners view a world map of population density and describe the data
8.2 Changes in population size	describe and explain the growth curve of populations – lag, exponential (log), carrying capacity • describe and explain the changes in human population	Learners do a practical investigation by observing a population increase in microbes. Consider asking a biology teacher to support the teaching of this lesson. Before doing any experiment in handling microbial material you must have carried out a risk assessment in accordance with your local rules and regulations. Possible resource for the experiment and links to safe handling of

	– birth and death rates – factors affecting birth and death rates – factors affecting migration	microbes: **www.nuffieldfoundation.org/** – search 'Microbes all around us'. Learners make a glossary of key population terms. **www.prb.org/** – click on 'Publications/Lesson plans/Glossary of demographic terms'. Learners label a typical population curve. Possible resource: **www.s-cool.co.uk/** – search 'populations'. Watch a short YouTube video on world population growth through time by the American Museum of Natural History. **www.youtube.com/** – search 'Human population through time'. Learners produce 'true or false' cards on the factors affecting population density **(F)**. Possible resource: **www.bbc.co.uk/education/levels/z98jmp3** – click on 'Geography/GCSE Geography/Human geography/Population and migration/Population distribution and density' Case study: Learners investigate the population of a country of species. Possible resources: Population growth in Mumbai: **www.coolgeography.co.uk/** – click on 'GCSE/Urban issues and challenges/Mumbai, causes of growth' The population of the American bison: **www.nature.com/scitable/knowledge** – click on 'Population ecology/An introduction to population growth'.

		Extension: Learners find out about the 'Gaia hypothesis' **(I)**. Possible resources: **www.gaiatheory.org/overview/** Watch an interview of James Lovelock, who proposed the Gaia hypothesis: **www.youtube.com/** – search 'Gaia hypothesis – James Lovelock'
8.3 Population structure	describe population structure in MEDCs and LEDCs – population pyramids	Learners look at population pyramids for MEDCs and LEDCs and interpret the data. Possible resources: **www.populationpyramid.net/** **www.cia.gov/library/publications/the-world-factbook/** – click on a country and click on 'People and society', then scroll to view the population pyramid.
8.4 Managing human population size	• evaluate strategies for managing human population size – family planning – improved health and education – national population policies – pronatalist or antinatalist	Watch a news report on Lagos that highlights some of the problems that growing populations can cause. **www.youtube.com/** – search '[Channel 4 News] Population explosion causes poverty crisis'. Case study: Learners investigate how a country is managing its population size. Possible resources: **www.worldwatch.org/** – search 'Nine population strategies' **www.japanfs.org/en/news/archives/news_id034953.html** – search

		'depopulation of society in Japan' **www.bbc.co.uk/** – search 'How Ethiopia slowed its population growth' **http://geography.about.com/** – search 'China's one child policy'.
EMS/Natural ecosystems and human activities 9.1 Ecosystems	• define the terms ecosystem, population, community, habitat and niche • describe the biotic (living) and abiotic (non-living) components of an ecosystem – biotic: producers, primary, secondary and tertiary consumers, decomposers – abiotic: temperature, humidity, water, oxygen, salinity, light, pH • describe biotic interactions – competition, predation and pollination • describe the process of photosynthesis – state the word equation and the importance of chlorophyll • describe the process of respiration • describe energy flow using food chains, food webs and trophic levels • describe and explain ecological pyramids based on	Create a 'Tarsia jigsaw' for learners on the key terms in this topic **(F)**. Note: Tarsia is a free download available at **www.ideaseducation.co.uk/resources/Tarsia-guide.pdf** Play an 'ecosystem game'. Possible resources: **http://gamequarium.com/ecology.html** has a wide variety of possible games and activities. **http://illinois.pbslearningmedia.org/** – search 'Feed the dingo'. Learners create a PowerPoint presentation on the components of an ecosystem **(I)**. Possible resource: **http://sciencebitz.com/** – search 'biotic and abiotic'. Watch a short clip on photosynthesis and respiration. Possible resources: **www.bbc.co.uk/education/subjects** – search 'photosynthesis and respiration'. **www.saps.org.uk/** – search 'Animation – respiration and photosynthesis'. Learners create their own online food web. **www.scholastic.com/teachers/student-activities** – search 'Build a food web: an endangered ecosystems activity' **(I)**.

	numbers and energy • describe the carbon cycle	Give learners examples of food webs and food chains. They should identify the trophic levels and the producers and consumers and any decomposers **(F)**. Possible resource: Internet search for 'examples of food webs' or 'food chains'. Learners look at pyramids of number, biomass and energy and interpret the data. They should label the trophic levels and identify the levelled producers and consumers **(F)**. Possible resources: **www.scienceaid.co.uk/biology/ecology/** – search 'food chains and energy' **www.rspb.org.uk/** – search 'pyramids of numbers'. Learners label a carbon cycle diagram or create their own **(I)(F)**. Possible resources: **https://scied.ucar.edu/** – search 'carbon cycle' **www.esrl.noaa.gov/** – search 'carbon cycle'.
9.2 Ecosystems under threat	• describe and explain causes and impacts of habitat loss – causes: the drainage of wetlands, intensive agricultural practices, deforestation – impacts: loss of biodiversity and genetic depletion, extinction	Watch a YouTube clip on wetland drainage. **www.youtube.com/** – search: 'More than water is lost with drained wetlands' (Ducks unlimited Canada) 'Drainage story of wetland' (Melbourne Water) 'Bill Nye The Science Guy: Wetlands'.

9.3 Deforestation	• describe and explain the causes and impacts of deforestation – causes: timber extraction and logging, subsistence and commercial farming, roads and settlements, rock and mineral extraction – impacts: habitat loss, soil erosion and desertification, climate change, loss of biodiversity and genetic depletion	Learners look at a map of deforestation and describe the data. Possible resources: **www.globalforestwatch.org/** – search 'GFW interactive map' **www.livescience.com/** – search 'Vanishing forests: New Map Details Global Deforestation' and click on 'interactive map'. Learners look at images of deforestation. **www.nationalgeographic.com/environment/** – search 'Photo gallery: rain forest deforestation'. **www.shutterstock.com/search/deforestation** In groups, learners discuss the possible impacts of deforestation. Each group then report their ideas to the rest of the class **(I)**. Possible resource: **www.worldwildlife.org/threats/deforestation** Case study: Look at the causes and impacts of deforestation in a named area. **Extension:** Watch a video clip on Palau about preserving coral reefs. **http://illinois.pbslearningmedia.org/** – search 'Coral reefs: feeding and protecting us | Nature works everywhere'.
9.4 Managing forests	• describe and explain the need for the sustainable management of forests – growing forests act as carbon sinks and mature forests act as carbon stores	Look at a country or region's approach to sustainable management of forests. Possible resource: **www.bbc.co.uk/education** – search 'Sustainable management of the

	– role in water cycle – prevention of soil erosion – biodiversity as a genetic resource – food, medicine and industrial raw materials – ecotourism	forest' and 'Sustainable planting and industry in a forest environment' for a look at the Karkonosze National Park in Poland. Learners do one of four activities based on sustainable forests. **www.forestry.gov.uk/** – search 'sustainable futures'.
9.5 Measuring and managing biodiversity	• describe and evaluate methods for estimating biodiversity – pitfall traps, pooters, quadrats and transects – random and systematic sampling • apply sampling techniques to unfamiliar situations • evaluate national and international strategies for conserving the biodiversity and genetic resources of natural ecosystems – sustainable harvesting of wild plant and animal species – sustainable forestry/agroforestry – national parks, wildlife/ecological reserves and corridors – extractive reserves – world biosphere reserves	Learners do practical experiments in biodiversity. Pitfall traps: **www.eiu.edu/index.php** – search 'Schoolyard pitfall trap experiment'. Pooters: **www.amentsoc.org/** – search 'Make a pooter activity for kids'. Quadrats: **www.saps.org.uk/** – search 'Questions about quadrats'. **www.youtube.com/** – search 'quadrat sampling'. Transects: **www.saps.org.uk/** – search 'Ecology practical 2: The distribution of species across a footpath'. Random and systematic sampling: **www.rgs.org/HomePage.htm** – search 'sampling techniques' **www.nuffieldfoundation.org/** – search 'Biodiversity in your backyard!' **www.saps.org.uk/** – search 'Ecology practical 1: Measuring abundance and random sampling' **www.saps.org.uk/** – search 'Ecology practical 3: abundance and random sampling at Waun Las Nature Reserve, Wales'. Learners research one national or international strategy and present

	– seed banks – role of zoos and captive breeding – sustainable tourism and ecotourism	their findings to the class **(I)** and produce a quick quiz for other learners **(F)**. Each learner should produce an A4 summary of each strategy. Possible resources: Sustainable harvesting: **http://onnaturemagazine.com/sustainable-harvesting** **www.forestharvest.org.uk/Sustainable.htm** **www.iucn.org/** – search sustainable harvesting. **http://falconwoodgcsegeography.weebly.com/** – search 'A UK national park case study'. **http://wwf.panda.org/** – search 'national parks'. Extractive reserves: **http://archive.unu.edu/unupress/unupbooks/80906e/80906E07.htm** **http://cmsdata.iucn.org/downloads/rubber_story.pdf** on the Chico Mendes Extractive Reserve World biosphere reserves: **http://wwf.panda.org/** – search 'biosphere reserves'. **www.unesco.org.uk/designation/biosphere-reserves/** **www.escarpment.org/biosphere/index.php** Seed banks: **www.bgci.org/resources/Seedbanks/** Zoos and captive breeding: **http://wwf.panda.org/** – search 'captive breeding'.

		Ecotourism: Watch a video clip on sustainable interactions with sharks. **http://illinois.pbslearningmedia.org/** – search 'Osprey Reef shark feed: life on the reef'. Case study: Look at the conservation of a named species or of a named biosphere reserve.
EMS/	Solving Past Year Papers	
EMS/	Solving Past Year Papers	
EMS/	Solving Past Year Papers	
EMS/	Solving Past Year Papers	

SUBJECT: CHEMISTRY

Strand/Topics	Learning Objectives (CAIE expectations)	Learning Experiences/Engagements
The particulate nature of matter **Experimental techniques**	State the distinguishing properties of solids, liquids and gases •• Describe the structure of solids, liquids and gases in terms of particle separation, arrangement and types of motion •• Describe changes of state in terms of melting,boiling, evaporation, freezing, condensation and sublimation •• Describe qualitatively the pressure and temperature of a gas in terms of the motion of its particles •• Show an understanding of the random motion of particles in a suspension (sometimes known as Brownian motion) as evidence for the kinetic particle (atoms, molecules or ions) model of matter •• Describe and explain diffusion **2 Experimental techniques** **2.1 Measurement** •• Name appropriate apparatus for the measurement of Demonstrate knowledge and understanding of paper chromatography •• Interpret simple chromatograms •• Identify substances and assess their purity from melting point and boiling point information •• Understand the importance of purity in	•• Explain changes of state in terms of the kinetic theory •• Describe and explain Brownian motion in terms of random molecular bombardment •• State evidence for Brownian motion •• Describe and explain dependence of rate of diffusion on molecular mass •• Interpret simple chromatograms, including the use of *R*f values •• Outline how chromatography techniques can be applied to colourless substances by exposing chromatograms to substances called locating agents. (Knowledge of *specific* locating agents is **not** required.) 2.2.2 Methods of purification •• Describe and explain methods of purification by the use of a suitable solvent, filtration, crystallisation and distillation (including use of a fractionating column). (Refer to the fractional distillation of petroleum in section 14.2 and products of fermentation in section 14.6.)

Atoms, elements and compounds **Atomic structure and the Periodic Table continued**	substances in everyday life, e.g. foodstuffs and drugs Describe and explain methods of purification by the use of a suitable solvent, filtration, crystallisation and distillation (including use of a fractionating column). (Refer to the fractional distillation of petroleum in section 14.2 and products of fermentation in section 14.6.) •• Suggest suitable purification techniques, given information about the substances involved **Atoms, elements and compounds** •• State the relative charges and approximate relative masses of protons, neutrons and electrons •• Define *proton number* (atomic number) as the number of protons in the nucleus of an atom •• Define *nucleon numbe*r (mass number) as the total number of protons and neutrons in the nucleus of an atom •• Use proton number and the simple structure of atoms to explain the basis of the Periodic Table (see section 9), with special reference to the elements of proton number 1 to 20 •• Define *isotopes* as atoms of the same element which have the same proton number but a different nucleon number •• State the two types of isotopes as being radioactive and non-radioactive **Atomic structure and the Periodic Table continued** •• State one medical and one industrial use of radioactive isotopes •• Describe the build-up of electrons in 'shells' and understand the significance of the noble	•• Suggest suitable purification techniques, given information about the substances involved Understand that isotopes have the same properties because they have the same number of electrons in their outer shell •• Describe the formation of ionic bonds between metallic and non-metallic elements •• Describe the lattice structure of ionic compounds as a regular arrangement of alternating positive and negative ions 3.2.3 Molecules and covalent bonds •• Describe the formation of single covalent bonds in H2, C*l*2, H2O, CH4, NH3 and HC*l* as the sharing of pairs of electrons leading to the noble gas configuration •• Describe the differences in volatility, solubility and electrical conductivity between ionic and covalent compounds •• Describe the electron arrangement in more complex covalent molecules such as N2, C2H4, CH3OH and CO2 •• Explain the differences in melting point and

Structure and bonding	gas electronic structures and of the outer shell electrons. (The ideas of the distribution of electrons in s and p orbitals and in d block elements are **not** required.) **3.2 Structure and bonding** 3.2.1 Bonding: the structure of matter •• Describe the differences between elements, mixtures and compounds, and between metals and non-metals •• Describe an alloy, such as brass, as a mixture of a metal with other elements 3.2.2 Ions and ionic bonds •• Describe the formation of ions by electron loss or gain •• Describe the formation of ionic bonds between elements from Groups I and VII 3.2.4 Macromolecules •• Describe the giant covalent structures of graphite and diamond •• Relate their structures to their uses, e.g. graphite as a lubricant and a conductor, and diamond in cutting tools	boiling point of ionic and covalent compounds in terms of attractive forces •• Describe the macromolecular structure of silicon(IV) oxide (silicon dioxide) •• Describe the similarity in properties between diamond and silicon(IV) oxide, related to their structures 3.2.5 Metallic bonding •• Describe metallic bonding as a lattice of positive ions in a 'sea of electrons' and use this to describe the electrical conductivity and malleability of metals
Stoichiometry	**Stoichiometry** •• Use the symbols of the elements and write the formulae of simple compounds •• Deduce the formula of a simple compound from the relative numbers of atoms present	Define the *mole* and the *Avogadro constant* •• Use the molar gas volume, taken as 24 dm3 at room temperature and pressure •• Calculate stoichiometric reacting masses, volumes of gases and solutions, and concentrations of solutions expressed in g / dm3 and mol / dm3. (Calculations

	•• Deduce the formula of a simple compound from a model or a diagrammatic representation •• Construct word equations and simple balanced chemical equations •• Define *relative atomic mass*, *A*r, as the average mass of naturally occurring atoms of an element on a scale where the 12C atom has a mass of exactly 12 units •• Define *relative molecular mass*, *M*r, as the sum of the relative atomic masses. (*Relative formula mass* or *M*r will be used for ionic compounds.) (Calculations involving reacting masses in simple proportions may be set. Calculations will **not** involve the mole concept.)	involving the idea of limiting reactants may be set. Questions on the gas laws and the conversion of gaseous volumes to different temperatures and pressures will **not** be set.) •• Calculate empirical formulae and molecular formulae •• Calculate percentage yield
Electricity and chemistry	**Electricity and chemistry** •• Define electrolysis as the breakdown of an ionic compound, molten or in aqueous solution, by the passage of electricity •• Describe the electrode products and the observations made during the electrolysis of: — molten lead(II) bromide — concentrated hydrochloric acid — concentrated aqueous sodium chloride — dilute sulfuric acid between inert electrodes (platinum or carbon) •• State the general principle that metals or hydrogen are formed at the negative electrode (cathode), and that non-metals (other than hydrogen) are formed at the positive electrode (anode) •• Predict the products of the electrolysis of a specified binary compound in the molten state •• Describe the electroplating of metals Describe the reasons for the use of copper and (steel-	Relate the products of electrolysis to the electrolyte and electrodes used, exemplified by the specific examples in the Core together with aqueous copper(II) sulfate using carbon electrodes and using copper electrodes (as used in the refining of copper) •• Describe electrolysis in terms of the ions present and reactions at the electrodes in the examples given •• Predict the products of electrolysis of a specified halide in dilute or concentrated aqueous solution •• Construct ionic half-equations for reactions Describe the transfer of charge during electrolysis to include: — the movement of electrons in the metallic conductor — the removal or addition of electrons from the external circuit at the electrodes — the movement of ions in the electrolyte •• Describe the production of electrical energy from simple cells, i.e. two electrodes in an electrolyte. (This should be linked with the reactivity series in

	cored) aluminium in cables, and why plastics and ceramics are used as insulators	section 10.2 and redox in section 7.4.) •• Describe, in outline, the manufacture of: — aluminium from pure aluminium oxide in molten cryolite (refer to section 10.3) — chlorine, hydrogen and sodium hydroxide from concentrated aqueous sodium chloride (Starting materials and essential conditions should be given but not technical
Chemical energetics **Energy transfer**	**Chemical energetics** Describe the meaning of *exothermic* and *endothermic* reactions •• Interpret energy level diagrams showing exothermic and endothermic reactions **Energy transfer** Describe the release of heat energy by burning fuels •• State the use of hydrogen as a fuel •• Describe radioactive isotopes, such as 235U, as a source of energy	•• Describe bond breaking as an endothermic process and bond forming as an exothermic process •• Draw and label energy level diagrams for exothermic and endothermic reactions using data provided •• Calculate the energy of a reaction using bond Energies Describe the use of hydrogen as a fuel reacting with oxygen to generate electricity in a fuel cell. (Details of the construction and operation of a fuel cell are **not** required.)
	Identify physical and chemical changes, and understand the differences between them Describe and explain the effect of concentration, particle size, catalysts (including enzymes) and temperature on the rate of reactions •• Describe the application of the above factors to the danger of explosive combustion with fine powders (e.g. flour mills) and gases (e.g. methane in mines) •• Demonstrate knowledge and understanding of a practical method for investigating the rate of a reaction involving gas evolution	•• Devise and evaluate a suitable method for investigating the effect of a given variable on the rate of a reaction •• Describe and explain the effects of temperature and concentration in terms of collisions between reacting particles. (An increase in temperature causes an increase in collision rate **and** more of the colliding molecules have sufficient energy (activation energy) to react whereas an increase in concentration only causes an increase in collision rate.)

	•• Interpret data obtained from experiments concerned with rate of reaction Note: Candidates should be encouraged to use the term *rate* rather than *speed*.	•• Describe and explain the role of light in photochemical reactions and the effect of light on the rate of these reactions. (This should be linked to section 14.4.) •• Describe the use of silver salts in photography as a process of reduction of silver ions to silver; and photosynthesis as the reaction between carbon dioxide and water in the presence of chlorophyll and sunlight (energy) to produce glucose and oxygen
Reversible reactions	**Reversible reactions** Understand that some chemical reactions can be reversed by changing the reaction conditions. (Limited to the effects of heat and water on hydrated and anhydrous copper(II) sulfate and cobalt(II) chloride.) (Concept of equilibrium is **not** required.) Define *oxidation* and *reduction* in terms of oxygen loss/gain. (Oxidation state limited to its use to name ions, e.g. iron(II), iron(III), copper(II), manganate(VII).)	Predict the effect of changing the conditions (concentration, temperature and pressure) on other reversible reactions •• Demonstrate knowledge and understanding of the concept of equilibrium Define *redox* in terms of electron transfer •• Identify redox reactions by changes in oxidation state and by the colour changes involved when using acidified potassium manganate(VII), and potassium iodide. (Recall of equations involving KMnO4 is **not** required.) •• Define *oxidising agent* as a substance which oxidises another substance during a redox reaction. Define *reducing agent* as a substance which reduces another substance during a redox reaction. •• Identify oxidising agents and reducing agents from simple equations
Acids, bases and salts	**Acids, bases and salts** **8.1 The characteristic properties** Describe the characteristic properties of acids as reactions with metals, bases, carbonates and effect on litmus and methyl orange •• Describe the characteristic properties of bases as	Define *acids* and *bases* in terms of proton transfer, limited to aqueous solutions •• Describe the meaning of weak and strong acids and bases

	reactions with acids and with ammonium salts and effect on litmus and methyl orange •• Describe neutrality and relative acidity and alkalinity in terms of pH measured using universal indicator paper (whole numbers only) •• Describe and explain the importance of controlling acidity in soil Classify oxides as either acidic or basic, related to metallic and non-metallic character Demonstrate knowledge and understanding of preparation, separation and purification of salts as examples of some of the techniques specified in section 2.2.2 and the reactions specified in section 8.1 Describe the following tests to identify: *aqueous cations*: aluminium, ammonium, calcium, chromium(III), copper(II), iron(II), iron(III) and zinc (using aqueous sodium hydroxide and aqueous ammonia as appropriate). (Formulae of complex ions are **not** required.) *cations*: use of the flame test to identify lithium, sodium, potassium and copper(II) *anions*: carbonate (by reaction with dilute acid and then limewater), chloride, bromide and iodide (by reaction under acidic conditions with aqueous silver nitrate), nitrate (by reduction with aluminium), sulfate (by reaction under acidic conditions with aqueous barium ions) and sulphite (by reaction with dilute acids and then aqueous potassium manganate(VII)) *gases*: ammonia (using damp red litmus paper), carbon dioxide (using limewater), chlorine (using damp litmus paper), hydrogen (using lighted splint), oxygen (using a glowing splint), and sulfur dioxide (using aqueous potassium manganate(VII))	Further classify other oxides as neutral or Amphoteric Demonstrate knowledge and understanding of the preparation of insoluble salts by precipitation •• Suggest a method of making a given salt from a suitable starting material, given appropriate information

The Periodic Table **Transition elements**	**The Periodic Table** Describe the Periodic Table as a method of classifying elements and its use to predict properties of elements Describe the change from metallic to non-metallic character across a period Describe lithium, sodium and potassium in Group I as a collection of relatively soft metals showing a trend in melting point, density and reaction with water •• Predict the properties of other elements in Group I, given data, where appropriate •• Describe the halogens, chlorine, bromine and iodine in Group VII, as a collection of diatomic non-metals showing a trend in colour and density and state their reaction with other halide ions •• Predict the properties of other elements in Group VII, given data where appropriate **Transition elements** Describe the transition elements as a collection of metals having high densities, high melting points and forming coloured compounds, and which, as elements and compounds, often act as catalysts **Noble gases** Describe the noble gases, in Group VIII or 0, as being unreactive, monoatomic gases and explain this in terms of electronic structure •• State the uses of the noble gases in providing an inert atmosphere, i.e. argon in lamps, helium for filling balloons	Describe and explain the relationship between Group number, number of outer shell electrons and metallic/non-metallic character Identify trends in Groups, given information about the elements concerned Know that transition elements have variable oxidation states

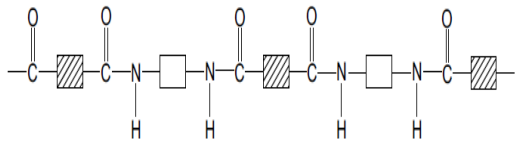
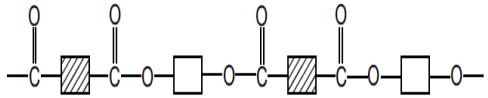
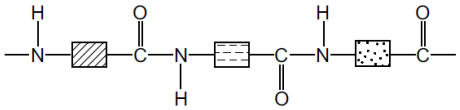
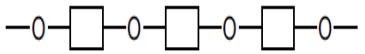
Metals **Extraction of metals**	**Metals** List the general physical properties of metals •• Describe the general chemical properties of metals, e.g. reaction with dilute acids and reaction with oxygen •• Explain in terms of their properties why alloys are used instead of pure metals •• Identify representations of alloys from diagrams of structure **Reactivity series** Place in order of reactivity: potassium, sodium, calcium, magnesium, zinc, iron, (hydrogen) and copper, by reference to the reactions, if any, of the metals with: — water or steam — dilute hydrochloric acid and the reduction of their oxides with carbon **Extraction of metals** Describe the ease in obtaining metals from their ores by relating the elements to the reactivity series •• Describe and state the essential reactions in the extraction of iron from hematite •• Describe the conversion of iron into steel using basic oxides and oxygen •• Know that aluminium is extracted from the ore bauxite by electrolysis •• Discuss the advantages and disadvantages of recycling metals, limited to iron/steel and aluminium Name the uses of aluminium: — in the manufacture of aircraft because of its strength and low density	Describe the reactivity series as related to the tendency of a metal to form its positive ion,illustrated by its reaction, if any, with: — the aqueous ions — the oxides of the other listed metals •• Describe and explain the action of heat on the hydroxides, carbonates and nitrates of the listed metals •• Account for the apparent unreactivity of aluminium in terms of the oxide layer which adheres to the metal Describe in outline, the extraction of zinc from zinc blende •• Describe in outline, the extraction of aluminium from bauxite including the role of cryolite and the reactions at the electrodes Explain the uses of zinc for galvanising and for making brass •• Describe the idea of changing the properties of iron by the controlled use of additives to form steel alloys

	— in food containers because of its resistance to corrosion •• Name the uses of copper related to its properties (electrical wiring and in cooking utensils) •• Name the uses of mild steel (car bodies and machinery) and stainless steel (chemical plant and cutlery)	
	Revision	
	HOLIDAYS	
Air and water	**Air and water** Describe chemical tests for water using cobalt(II) chloride and copper(II) sulfate •• Describe, in outline, the treatment of the water supply in terms of filtration and chlorination •• Name some of the uses of water in industry and in the home **Air** State the composition of clean, dry air as being approximately 78% nitrogen, 21% oxygen and the remainder as being a mixture of noble gases and carbon dioxide •• Name the common pollutants in the air as being carbon monoxide, sulfur dioxide, oxides of nitrogen and lead compounds •• State the source of each of these pollutants: — carbon monoxide from the incomplete combustion of carbon-containing substances — sulfur dioxide from the combustion of fossil fuels which contain sulfur compounds (leading to 'acid rain') — oxides of nitrogen from car engines	Discuss the implications of an inadequate supply of water, limited to safe water for drinking and water for irrigating crops

	— lead compounds from leaded petrol •• State the adverse effect of these common pollutants on buildings and on health and discuss why these pollutants are of global concern •• State the conditions required for the rusting of iron •• Describe and explain methods of rust prevention, specifically paint and other coatings to exclude oxygen	
Nitrogen and fertilisers	**11.3 Nitrogen and fertilisers** •• Describe the need for nitrogen-, phosphorus- and potassium-containing fertilisers •• Describe the displacement of ammonia from its Salts	•• Describe and explain the essential conditions for the manufacture of ammonia by the Haber process including the sources of the hydrogen and nitrogen, i.e. hydrocarbons or steam and air •• Describe the carbon cycle, in simple terms, to include the processes of combustion, respiration and photosynthesis
Carbonates	State that carbon dioxide and methane are greenhouse gases and explain how they may contribute to climate change •• State the formation of carbon dioxide: — as a product of complete combustion of carbon-containing substances — as a product of respiration — as a product of the reaction between an acid and a carbonate — from the thermal decomposition of a carbonate •• State the sources of methane, including decomposition of vegetation and waste gases from digestion in animals **Carbonates** •• Describe the manufacture of lime (calcium oxide) from calcium carbonate (limestone) in terms of thermal decomposition	

	•• Name some uses of lime and slaked lime such as in treating acidic soil and neutralising acidic industrial waste products, e.g. flue gas desulfurisation •• Name the uses of calcium carbonate in the manufacture of iron and cement	
Organic chemistry	Name and draw the structures of methane, ethane, ethene, ethanol, ethanoic acid and the products of the reactions •• State the type of compound present, given a chemical name ending in *-ane*, *-ene*, *-ol*, or *-oic acid* or a molecular structure Name the fuels: coal, natural gas and petroleum •• Name methane as the main constituent of natural gas •• Describe petroleum as a mixture of hydrocarbons and its separation into useful fractions by fractional distillation •• Describe the properties of molecules within a fraction •• Name the uses of the fractions as: — refinery gas for bottled gas for heating and cooking — gasoline fraction for fuel (petrol) in cars — naphtha fraction for making chemicals — kerosene/paraffin fraction for jet fuel — diesel oil/gas oil for fuel in diesel engines — fuel oil fraction for fuel for ships and home heating systems — lubricating fraction for lubricants, waxes and polishes — bitumen for making roads	Name and draw the structures of the unbranched alkanes, alkenes (not *cis-trans*), alcohols and acids containing up to four carbon atoms per molecule •• Name and draw the structural formulae of the esters which can be made from unbranched alcohols and carboxylic acids, each containing up to four carbon atoms Describe the general characteristics of a homologous series •• Recall that the compounds in a homologous series have the same general formula •• Describe and identify structural isomerism Describe substitution reactions of alkanes with Chlorine Describe the properties of alkenes in terms of addition reactions with bromine, hydrogen and steam

	Describe the concept of homologous series as a 'family' of similar compounds with similar chemical properties due to the presence of the same functional group Describe the properties of alkanes (exemplified by methane) as being generally unreactive, except in terms of burning •• Describe the bonding in alkanes •• Describe the manufacture of alkenes and of hydrogen by cracking •• Distinguish between saturated and unsaturated hydrocarbons: — from molecular structures — by reaction with aqueous bromine •• Describe the formation of poly(ethene) as an example of addition polymerisation of monomer units Describe the manufacture of ethanol by fermentation and by the catalytic addition of steam to ethene •• Describe the properties of ethanol in terms of burning •• Name the uses of ethanol as a solvent and as a Fuel Describe the properties of aqueous ethanoic acid Name some typical uses of plastics and of man-made fibres such as nylon and *Terylene* •• Describe the pollution problems caused by non-biodegradable plastics	Outline the advantages and disadvantages of these two methods of manufacturing ethanol Describe the formation of ethanoic acid by the oxidation of ethanol by fermentation and with acidified potassium manganate(VII) •• Describe ethanoic acid as a typical weak acid •• Describe the reaction of a carboxylic acid with an alcohol in the presence of a catalyst to give an ester Explain the differences between condensation and addition polymerisation •• Deduce the structure of the polymer product from a given alkene and *vice versa* •• Describe the formation of nylon (a polyamide) and *Terylene* (a polyester) by condensation polymerisation, the structure of nylon being represented as:

		 and the structure of *Terylene* as: 
	Natural polymers •• Name proteins and carbohydrates as constituents of food	Describe proteins as possessing the same (amide) linkages as nylon but with different units •• Describe the structure of proteins as:  •• Describe the hydrolysis of proteins to amino acids. (Structures and names are **not** required.) • Describe complex carbohydrates in terms of a large number of sugar units, considered as HO—□—OH, joined together by condensation polymerisation, e.g.  Describe the hydrolysis of complex carbohydrates (e.g. starch), by acids or enzymes to give simple sugars •• Describe the fermentation of simple sugars to produce

		ethanol (and carbon dioxide). (Candidates will **not** be expected to give the molecular formulae of sugars.) •• Describe, in outline, the usefulness of chromatography in separating and identifying the products of hydrolysis of carbohydrates and proteins REVISION
	REVISION	**REVISION**
	REVISION	**REVISION**

SUBJECT: ECONOMICS

Strand/Topics	Learning Objectives (CAIE expectations)	Learning Experiences/Engagements
Basic Economic Problem 1.1 The nature of the economic problem 1.2 The factors of production 1.3 Opportunity cost 1.4 Production possibility curve diagrams (PPC)	1.1.1 finite resources and unlimited wants 1.1.2 economic and free goods 1.2.1 definitions of the factors of production and their rewards 1.2.2 mobility of the factors of production 1.2.3 quantity and quality of the factors of Production 1.3.1 definition of opportunity cost 1.3.2 the influence of opportunity cost on decision making 1.4.1 definition of PPC 1.4.2 points under, on and beyond a PPC 1.4.3 movements along a PPC 1.4.4 shifts in a PPC	Probe students discussion with a case study "Government printing unlimited money" Supported with ppt on basic eco problem. Yoga activity and classification PPT , Textbook – Susan Grant Examples, ppt Video on Dinesh Bakshi Textual Activities, MCQ, four part questions.
2.2 The role of economic system 2.9 Market economic	2.2.1 the market system 2.2.2 key resources allocation decisions	PPT , Textbook – Susan Grant **Students debate on the best type of economic**

system 2.11 Mixed economic system 2.11.1 definition of the mixed economic system The role of markets in allocating resources 2.3 Demand 2.4 Supply 2.5 Price determination 2.6 Price changes	2.2.3 introduction to the price mechanism 2.3.1 definition of demand 2.3.2 price and demand 2.3.3 individual and market demand 2.3.4 conditions of demand 2.4.1 definition of supply 2.4.2 price and supply 2.4.3 individual and market supply 2.4.4 conditions of supply 2.5.1 market equilibrium 2.5.2 market disequilibrium 2.6.1 causes of price changes 2.6.2 consequences of price changes	**system** **PPT and textbook activities** **PPT and textbook activities**
2.7 Price elasticity of demand (PED)	2.7.1 definition of PED 2.7.2 calculation of PED 2.7.3 determinants of PED 2.7.3 determinants of PED 2.7.4 PED and total spending on a product/revenue 2.7.5 significance of PED	Ask learners to decide how they would react if the price of all chocolate bars (or equivalent product) were to increase by 30%. How would they react if their favourite type of chocolate bar were to increase by 30% whilst all other chocolate bars stayed unchanged? **PPT & TEXT BOOK**

2.8 Price elasticity of supply (PES)	2.8.1 definition of PES 2.8.2 calculation of PES 2.8.3 determinants of PES 2.8.4 significance of PES	
2.10 Market failure	2.10.1 definition of market failure 2.10.2 causes of market failure 2.10.3 consequences of market failure	**PPT & Textbook** **Case study on COST BENEFIT Analysis**
	EXAMS	
3.1 Money and banking 3.2 Households	3.1.1 money 3.1.2 banking 3.2.1 the influences on spending, saving and borrowing	**Group Activity & Group Discussion** **Case Study**
3.3 Workers	3.3.1 factors affecting an individual's choice of occupation 3.3.2 wage determination (including part of 2.11.2) 3.3.3 reasons for differences in earnings 3.3.4 division of labour/specialisation	Group Activity Graph representation
3.4 Trade unions	3.4.1 definition of a trade union 3.4.2 the role of trade unions in the economy 3.4.3 the advantages and disadvantages of trade union activity	**PPT**

3.5 Firms 3.6 Firms and production	3.5.1 classification of firms 3.5.2 small firms 3.5.3 causes and forms of the growth of firms 3.5.4 mergers 3.5.5 economies and diseconomies of scale 3.6.1 demand for factors of production 3.6.2 labour-intensive and capital-intensive Production 3.6.3 production and productivity	**PPT** **Textual Activities**
3.7 Firms' costs, revenue and objectives 3.8 Market structure	3.7.1 definition of costs of production 3.7.2 calculation of costs of production 3.7.3 definition of revenue 3.7.4 calculation of revenue 3.7.5 objectives of firms 3.8.1 competitive markets 3.8.2 monopoly markets	**PPT**
	REVISION EXAMS	

4.1 The role of government 4.2 The macroeconomic aims of government 4.3 Fiscal policy	4.1.1 the role of government 1 the macroeconomic aims of government 4.2.2 possible conflicts between macroeconomic aims 4.3.1 definition of the budget 4.3.2 reasons for government spending 4.3.3 reasons for taxation 4.3.4 classification of taxes 4.3.5 principles of taxation 4.3.6 impact of taxation 4.3.7 definition of fiscal policy 4.3.8 fiscal policy measures 4.3.9 effects of fiscal policy on government macroeconomic aims	**PPT** **Group Discussion on Government Budget**
4.4 Monetary policy 4.5 Supply-side policy	4.4.1 definition of money supply and monetary policy 4.4.2 monetary policy measures 4.4.3 effects of monetary policy on government macroeconomic aims 4.5.1 definition of supply-side policy 4.5.2 supply-side policy measures 4.5.3 effects of supply-side policy measures on	**PPT**

4.6 Economic growth	government macroeconomic aims 4.6.1 definition of economic growth 4.6.2 measurement of economic growth 4.6.3 causes and consequences of recession 4.6.4 causes of economic growth 4.6.5 consequences of economic growth 4.6.6 policies to promote economic growth	**PPT**
4.7 Employment and unemployment 4.8 Inflation and deflation	4.7.1 definition of employment, unemployment and full employment 4.7.2 changing patterns and level of employment 4.7.3 measurement of unemployment 4.7.4 causes/types of unemployment 4.7.5 consequences of unemployment 4.7.6 policies to reduce unemployment 4.8.1 definition of inflation and deflation 4.8.2 measurement of inflation and deflation 4.8.3 causes of inflation and deflation 4.8.4 consequences of inflation and deflation 4.8.5 policies to control inflation and deflation	Students Activity Examples of unemployed from Dan Moniyan Book Group Activity on students' Family's monthly expenditure Group Project

5.1 Living standards 5.2 Poverty	5.1.1 indicators of living standards 5.1.2 comparing living standards and income Distribution 5.2.1 definition of absolute and relative poverty 5.2.2 the causes of poverty 5.2.3 policies to alleviate poverty and redistribute income	
5.3 Population 5.4 Differences in economic development between countries 6.1 International specialisation	5.3.1 the factors that affect population growth 5.3.2 reasons for different rates of population growth in different countries 5.3.3 the effects of changes in the size and structure of population on different countries 5.4.1 differences in economic development between countries 6.1.1 specialisation at a national level 6.1.2 advantages and disadvantages of specialisation at a national level	Group Activity and Discussion on researching different indicators in few developed and developing countries. Group Activity – students Research on Major exports of few countries that they researched in Activity 1
6.2 Globalisation, free trade and protection	6.2.1 definition of globalisation 6.2.2 role of multinational companies (MNCs) 6.2.3 the benefits of free trade 6.2.4 methods of protection (including part of 2.11.2) 6.2.5 reasons for protection	Case study Debate on Free Trade and Protectionism

6.3 Foreign exchange rates 6.4 Current account of balance of payments	6.2.6 consequences of protection 6.3.1 definition of foreign exchange rate 6.3.2 determination of foreign exchange rate in foreign exchange market 6.3.3 causes of foreign exchange rate fluctuations 6.3.4 consequences of foreign exchange rate fluctuations 6.3.5 floating and fixed foreign exchange rates (including part of 2.11.2) 6.4.1 structure 6.4.2 causes of current account deficit and surplus 6.4.3 consequences of current account deficit and surplus 6.4.4 policies to achieve balance of payments stability REVISION through structured papers.	Graph and ppt on Exchange Rate Case study and Group Activity
	EXAMS	
	Feedback of Fist term Papers & Revision of past papers	
	Mock Examination	
	Feedback of Mock and paper solving	
	Study leave	
	FINAL EXAMIATION	

SUBJECT: BIOLOGY

Strand/Topics	Learning Objectives (CAIE expectations)	Learning Experiences/Engagements
Cells and cell processes 1.1 Characteristics of living organisms 1.2 Concept and use of a classification system 1.3 Features of organisms 1.4 Dichotomous keys	• Describe the characteristics of living organisms by defining the terms: Movement, Respiration, sensitivity, growth, reproduction, excretion, and nutrition. • State that organisms can be classified into groups by the features that they share • Define species as a group of organisms that can reproduce to produce fertile offspring • Define and describe the binomial system of naming species as an internationally agreed system in which the scientific name of an organism is made up of two parts showing the genus and species. • List the features in the cells of all living organisms, limited to cytoplasm, cell membrane and DNA as genetic material • List the main features used to place animals and plants into the appropriate kingdoms • List the main features used to place organisms into groups within the animal kingdom • List the main features used to place all organisms into one of the five kingdoms: Animal, Plant, Fungus, Prokaryote, Protoctist • List the main features used to place organisms into groups within the plant kingdom, limited to ferns and flowering plants (dicotyledons and monocotyledons) • List the features of viruses, limited to protein coat and genetic material • Construct and use simple dichotomous keys based on easily identifiable features. • State that the cytoplasm of all cells contains structures, limited to	The comparison of the characteristics of living organisms with those of non-living things – for example, what are the characteristics of life shown by a petrol engine. The comparison is clear when written in a table. The mnemonic, MRS GREN is useful to remember the seven characteristics. Learners should understand that single-celled organisms, plants and animals all have these characteristics. Activity: Presentation will be shown to students and they will be asked to list down the characteristics of living organism. And later discuss the answers with the class. Teacher will show the images to make students understand why classification is important How species diversity is there Binomial nomenclature of naming. Bird images: www.allaboutbirds.org/Page.aspx?pid=1189 Teacher will also pass handout for studenst to recognise genus and species name .

2.1 Cell structure and organisation 2.2 Levels of organisation	ribosomes on rough endoplasmic reticulum and vesicles • Describe and compare the structure of a plant cell with an animal cell, as seen under a light microscope, limited to cell wall, nucleus, cytoplasm, chloroplasts, vacuoles and location of the cell membrane • State that almost all cells, except prokaryotes, have mitochondria and rough endoplasmic reticulum • Identify mitochondria and rough endoplasmic reticulum in diagrams and images of cells • State that aerobic respiration occurs in mitochondria • State that cells with high rates of metabolism require large numbers of mitochondria to provide sufficient energy. • Define all level of orginisation	Images of the representative groups, preserved specimens will be shown to students To identify some of the main features and classify animals into their respective groups. Images of the representative groups, preserved specimens will be shown to students to observe some of the main features and classify plants into their respective groups. Specimens from each group of arthropod will be observed Observe and list out the characteristics of each one them in a tabular form. Video on difference between Dicot and monocot plants. Students will list down all the characteristics in a chart form Group activity: learners will make models of a plant cell and/or an animal cell to gain an idea of the orientation of the main structures of each type of cell. Lab Activity: Students will be taken to lab to make and observe their own onion cell and animal cell slides and observe the main parts of the cells under the microscope Students will learn to observe and draw diagram by observing through the microscope. Presentation will be shown to students with structure and function of each specialized cell.

		Students will make a table with all the specialized function of the cells.
Size of specimens	• Calculate magnification and size of biological specimens using millimetres and micrometres as units.	Practice sheet on calculating magnification and the actual size.
3 Movement in and out of cells 3.1 Diffusion	• Define diffusion as the net movement of particles from a region of their higher concentration to a region of their lower concentration down a concentration gradient, as a result of their random movement • Describe the importance of diffusion of gases and solutes. • Define osmosis as the net movement of water molecules from a region of higher water potential (dilute solution) to a region of lower water potential (concentrated solution), through a partially permeable membrane • Explain the effects on plant tissues of immersing them in solutions of different concentrations by using the terms turgid, turgor pressure, plasmolysis and flaccid • Explain the importance of water potential and osmosis in the uptake of water by plants and animal cells. • Explain how plants are supported by the turgor pressure within cells, in terms of water pressure acting against an inelastic cell wall. • Discuss the importance of active transport as a process for movement across membranes: – e.g. ion uptake by root hairs and uptake of glucose by epithelial cells of villi and kidney tubules • Explain how protein molecules move particles across a membrane during active transport. List the chemical elements that make up: – carbohydrates – fats –	Teacher Will show demonstration in the lab using a simple demonstration of diffusion, for example a potassium manganate(VII) crystal in a gas jar of water or a drop of methylene dye on gelatine solidified in a test-tube (diffusion of a solute) Bromine in a gas jar (carried out in a fume cupboard) can quickly show diffusion (gaseous diffusion). Emphasise the random motion of particles. Lab activity : Investigation of changes in mass or length of potato chips and dried raisins placed in a range of different concentrations of sugar solution provides a good opportunity for quantitative treatment of results, as well as enhancing understanding of osmosis.

3.2 Osmosis 3.3 Active transport 4 Biological	proteins • State that large molecules are made from smaller molecule • Describe the use of: – iodine solution to test for starch – Benedict's solution to test for reducing sugars – biuret test for proteins – ethanol emulsion test for fats and oils – DCPIP test for vitamin C. • Describe the structure of DNA. • Define the term catalyst as a substance that increases the rate of a chemical reaction and is not changed by the reaction • Define enzymes as proteins that function as biological catalysts • Explain enzyme action with reference to the active site, enzyme-substrate complex, substrate and product • Explain the specificity of enzymes in terms of the complementary shape and fit of the active site with the substrate • Explain the effect of changes in temperature on enzyme activity in terms of kinetic energy, shape and fit, frequency of effective collisions and denaturation. • Explain the effect of changes in pH on enzyme activity in terms of shape and fit and denaturation	Discuss differences in the effects of water uptake and loss on animal cells that lack a cellulose cell wall and plant cells that have a cellulose cell wall. Turgor as an important mechanism of support in plants could be discussed. Relate water uptake by osmosis to the structure of root hair cells covered earlier in this unit. Lab activity: Observation of Plasmolysed onion cell under the microscope Presentation for theory A simple explanation is climbing uphill. Presentation to make students understand better about the working of transport channel proteins. Using a powerpoint presentation A simple definition of an organic substance is one whose molecules contain carbon and hydrogen. Beads that string together will be used to illustrate the idea of small molecules joining together to make larger ones. Structure of DNA will be explained using presentation and

molecules 4.1 Biological molecules 5 Enzymes 5.1 Enzymes		animated video for complementary base pairing Lab test : Benedicts, biurrette, Emulsification test, Vit, c test Students will make a structure of DNA using various things available. Teacher will explain enzyme and substrate reaction using lock and key model Learners will draw conclusion on optimum temperature and pH after watching a presentation. Leaners will interpret the data given in the form of graph and analyse the optimum temperature and pH range.
Plant Nutrition 6.2 Leaf structure 6.3 Mineral requirements 6.1 Photosynthesis	• Explain how the internal structure of a leaf is adapted for photosynthesis • Explain the effects of nitrate ion and magnesium ion deficiency on plant growth. • State the balanced chemical equation for photosynthesis • 6CO2 + 6H2O light chlorophyll C6H12O6 + 6O2 • Explain that chlorophyll transfers light energy into chemical energy in molecules, for the synthesis of carbohydrates • Outline the subsequent use and storage of the carbohydrates made in photosynthesis • Define the term limiting factor as something present in the environment in such short supply that it restricts life processes • Identify and explain the limiting factors of photosynthesis in different environmental conditions • Describe the use of carbon dioxide enrichment, optimum light and	Images of the representative groups, preserved specimens will be shown to students to identify some of the main features and classify animals into their respective groups. Images of the representative groups, preserved specimens will be shown to students to observe some of the main features and classify plants into their respective groups. Specimens from each group of arthropod will be observed

	optimum temperatures in glasshouses in temperate and tropical countries • Use hydrogencarbonate indicator solution to investigate the effect of gas exchange of an aquatic plant kept in the light and in the dark. • State the functions of xylem and phloem • Identify the position of xylem and phloem as seen in sections of roots, stems and leaves, limited to non-woody dicotyledonous plants • Identify root hair cells, as seen under the light microscope, and state their functions • State the pathway taken by water through root, stem and leaf as root hair cell, root cortex cells, xylem and mesophyll cells • Investigate, using a suitable stain, the pathway of water through the above-ground parts of a plant. • State that water is transported from the roots to leaves through the xylem vessels • Define transpiration as loss of water vapour from plant leaves by evaporation of water at the surfaces of the mesophyll cells followed by diffusion of water vapour through the stomata.	Observe and list out the characteristics of each one them in a tabular form. Video on difference between Dicot and monocot plants. Students will list down all the characteristics in a chart form Powerpoint presentation will be used to explain structure and function of root , xylem and phloem. Adaptation of xylem for transport of water will also be explained in detail Learners will find the path taken by the Simple diagrams can be made of the transport system of a root and of a stem, showing the position of the xylem and phloem Lab activity: Large and semi-transparent stems, such as the leaf petioles

8 Transport in plants 8.1 Transport in plants 8.2 Water uptake 8.3 Transpiration		of celery, can be placed with their bases in a solution of a water-soluble dye (ink or food colouring). After a few days, the dye can be seen in. Slide observation of Xylem and phloem through the permanent slides. Powerpoint presentation to explain transpiration and transpiration pull. Students will draw pathway of water from the absorption to water through roots to the leaves including the vascular bundle. Group activity: Students will be listing down the factors affecting the rate of transpiration. ATP paper solving for investigation
8.4 Translocation	• Investigate and describe the effects of variation of temperature and humidity on transpiration rate • Define translocation in terms of the movement of sucrose and amino acids in phloem: – from regions of production (source) – to regions of storage OR to regions where they are used in respiration or growth (sink) • Explain that some parts of a plant may act as a source and a sink at different times during the life of a plant. • State what is meant by the term balanced diet for humans • Explain how age, gender and activity affect the dietary needs of humans including during pregnancy and whilst breast-feeding • Describe the effects of malnutrition in relation to starvation, constipation, coronary heart disease, obesity and scurvy • List the principal sources of, and describe the dietary importance. • Explain the causes and effects of vitamin D and iron deficiencies	PowerPoint presentation and video to explain the concept of source and sink. Students will understand detail about the requirement of the principle sources using a presentation. Activity Students will note down a diet plan of their own for a week. And discuss the nutrients they are taking and ones which are missing

Animal Nutrition 7.1 Diet 7.2	• Explain the causes and effects of protein-energy malnutrition, e.g. kwashiorkor and marasmus. • Define ingestion, digestion, absorption, assimilation, egestion, • Identify and state the functions of main regions of the alimentary canal and associated organs, limited to mouth, salivary glands, oesophagus, stomach, small intestine (duodenum and ileum), pancreas, liver, gall bladder and large intestine (colon, rectum, anus) • Identify the types of human teeth (incisors, canines, premolars and molars) • Describe the structure of human teeth, limited to enamel, dentine, pulp, nerves and cement, as well as the gums • Describe the functions of the types of human teeth in mechanical digestion of food • State the causes of dental decay in terms of a coating of bacteria and food on teeth, the bacteria respiring sugars in the food, producing acid which dissolves the enamel and dentine • Describe the proper care of teeth in terms of diet and regular brushing State the significance of chemical digestion in the alimentary canal in producing small, soluble molecules that can be absorbed. • Describe the digestion of starch, pepsin, lipase in the alimentary canal. • Explain the functions of the hydrochloric acid in gastric juice, limited to the low pH. • Outline the role of bile in neutralising the acidic mixture of food and gastric juices entering the duodenum from the stomach, to provide a suitable pH for enzyme action • Outline the role of bile in emulsifying fats to increase the surface area for the chemical digestion of fat to fatty acids and glycerol by lipase. • Identify the small intestine as the region for the absorption of digested food. • Explain the significance of villi and microvilli in increasing the internal surface area of the small intestine	Students will come a conclusion about the balanced diet Malnutrition and deficiency disorder's through a video and presentation Students will note down the summary of all the nutrients with their function and deficiency disorder in a table. Teacher will show a picture of alimentary canal to make students understand the position of organs in the body. Teacher will also discuss the 5 stages of nutrition and define each one of them with help of the diagram. Teacher will show the image of different types of teeth along with their function Students will also be shown the model of structure of teeth to make them understand different areas of teeth. Teacher will discuss how teeth and buccal cavity helps in mechanical digestion. Student will also be shown the model of structure of teeth to make them understand different areas of teeth.

7.3 Mechanical digestion 7.4 Chemical digestion 7.5 Absorption	• Describe the structure of a villus • Describe the roles of capillaries and lacteals in villi.	Teacher will discuss about the reason and occurrence of tooth decay. Learners will draw a spider diagram of the alimentary canal which will include where the enzymes are secreted and where they act on specific substrates. Teacher will discuss the importance of optimum pH and temperature should be emphasised, as well as the importance of enzymes in the whole process of digestion using presentation. Students will also list down in a table all the enzymes along with their products. Students will also discuss the working of enzyme at various pH. Teacher will display a picture of structure of villi and discuss the function of the same in process of absorption. Teacher will also discuss the detail structure of ciliated epithelial cells and mucus secreting cells. Students will list down the adaptation of villi for the process of absorption.
	• Exams	**Exams**

EXCRETION 13.1 Excretion in humans	• Explain how the structures of arteries, veins and capillaries are adapted for their functions • State the function of arterioles, venules and shunt vessels • Explain the need for excretion, limited to toxicity of urea and carbon dioxide • Outline the structure of the kidney, limited to the cortex, medulla and ureter • Outline the structure and functioning of a kidney tubule. • Explain dialysis in terms of salt balance, the maintenance of glucose concentration and the removal of urea • Describe the use of dialysis in kidney machines • Discuss the advantages and disadvantages of kidney transplants, compared with dialysis • List the components of blood as red blood cells, white blood cells, platelets and plasma • Identify red and white blood cells, as seen under the light microscope, on prepared slides and in diagrams and photomicrographs	Students will discuss and note down the definition of excretion. Teacher will display the excretory system and will ask students to identify the parts of the same. Teacher will also discuss the function of all organs with the students. Teacher will explain the structure of kidney , nephron in detail along with the major steps of excretion in detail using a PowerPoint presentation and a video, Using a video teacher will discuss the process of dialysis. Class activity: Students will discuss and note down advantages and dis advantages of dialysis and organ transplant. Lab activity: Dissection of sheep kidney to observe parts of kidney.
9 Transport in animals 9.4 Blood 9.1 Transport in animals	• Describe the circulatory system as a system of blood vessels with a pump and valves to ensure one-way flow of blood. • Describe the double circulation of a mammal • Explain the advantages of a double circulation. • Name and identify the structures of the mammalian heart, limited to the muscular wall, the septum, the left and right ventricles and atria, one-way valves and coronary arteries • State that blood is pumped away from the heart into arteries and returns to the heart in veins • State that the activity of the heart may be monitored by ECG, pulse rate and listening to sounds of valves closing • Investigate and state the effect of physical activity on the pulse rate • Describe coronary heart disease in terms of the blockage of coronary arteries and state the possible risk factors as diet, stress, smoking, genetic predisposition, age and gender	Structure of heart will explained to students using a diagram where the heart will be divided into four parts . Teacher will explain the structure of heart and along with the circulation of blood to the student using a video

9.2 Heart 9.3 Blood and lymphatic vessels	• Explain how the structures of arteries, veins and capillaries are adapted for their functions • State the function of arterioles, venules and shunt vessels • Outline the lymphatic system in terms of lymphatic vessels and lymph nodes • Describe the function of the lymphatic system in the circulation of body fluids and the protection of the body from infection.	Lab activity: Dissection of a lamb heart . Teacher will discuss the reasons of coronary heart diseases. Students will be asked to do mini research on the various reasons of heart failure and the causing them. Students will observe from the image and note down the difference between arteries, veins and capillaries. Teacher will display the image of the circulatory system and lymphatic system to make students understand the flow of lymph. students will also understand formation of blood clots with the help of a video.
11 Gas exchange in humans 11.1 Gas exchange in humans	• List the features of gas exchange surfaces in humans, limited to large surface area, thin surface, good blood supply and good ventilation with air • Name and identify the lungs, diaphragm, ribs, intercostal muscles, larynx, trachea, bronchi, bronchioles, alveoli and associated capillaries • State the differences in composition between inspired and expired air, limited to oxygen, carbon dioxide and water vapour	Teacher will display the image of respiratory system and ask students to label parts of the same. Students will be shown a video on inspiration and expiration and will be asked to list down movement of parts of the system during inspiration and expiration.

12 Respiration	• Use limewater as a test for carbon dioxide to investigate the differences in composition between inspired and expired air • Investigate and describe the effects of physical activity on rate and depth of breathing. • Explain the differences in composition between inspired and expired air • Explain the link between physical activity and rate and depth of breathing in terms of the increased carbon dioxide concentration in the blood, detected by the brain, causing an increased rate of breathing • Explain the role of goblet cells, mucus and ciliated cells in protecting the gas exchange system from pathogens and particles • State the uses of energy in the body of humans: muscle contraction, protein synthesis, cell division, active transport, growth, the passage of nerve impulses and the maintenance of a constant body temperature • State that respiration involves the action of enzymes in cells. • Define aerobic respiration as the chemical reactions in cells that use oxygen to break down nutrient molecules to release energy • State the word and chemical equation for aerobic respiration as glucose + oxygen → carbon dioxide + water • Investigate the uptake of oxygen by respiring organisms, such as arthropods and germinating seeds • Investigate the effect of temperature on the rate of respiration of germinating seeds. • Define anaerobic respiration as the chemical reactions in cells that break down nutrient molecules to release energy without using oxygen • State the word equations for anaerobic respiration in muscles during vigorous exercise (glucose → lactic acid) and the microorganism yeast (glucose → alcohol + carbon dioxide) • State that lactic acid builds up in muscles and blood during vigorous exercise causing an oxygen debt • Outline how the oxygen debt is removed during recovery,	Teacher will discuss in detail about the structure , function and adaptation of alveoli for exchange of gases. Giving reference of circulatory system. Lab activity: Exhaled air contained CO_2 turns lime water milky.

12.1 Respiration 12.2 Aerobic respiration 12.3 Anaerobic respiration 10 Diseases and immunity	• Define pathogen as a disease-causing organism • Define transmissible disease as a disease in which the pathogen can be passed from one host to another • State that the pathogen for a transmissible disease may be transmitted either through direct contact, e.g. through blood or other body fluids, or indirectly, e.g. from contaminated surfaces or food, from animals, or from the air • State that the body has defences: – mechanical barriers, limited to skin and hairs in the nose – chemical barriers, limited to mucus and stomach acid – cells, limited to phagocytosis and antibody production by white blood cells – which can be enhanced by vaccination Supplement • State that antibodies lock on to antigens leading to direct destruction of pathogens, or marking of pathogens for destruction by phagocytes • Explain how each pathogen has its own antigens, which have specific shapes, so specific antibodies which fit the specific shapes of the antigens are needed • Define active immunity as defence against a pathogen by antibody production in the body • Explain that active immunity is gained after an infection by a pathogen, or by vaccination • Explain the process of vaccination: • Explain the role of vaccination in controlling the spread of diseases • Explain that passive immunity is short-term defence against a pathogen by antibodies acquired from another individual, e.g. mother to infant • State that memory cells are not produced in passive immunity • Explain the importance of passive immunity for breast-fed infants • State that some diseases are caused by the immune system targeting and destroying body cells, limited to Type 1 diabetes	With the help of presentation teacher will discuss and derive equation for aerobic respiration. Group activity: Students will observe and investigate the rate of change in breathing patterns Depending on the physical activity.

10.1 Diseases and immunity		Teacher will discuss the process of respiration: anaerobic respiration. Students will understand the production of lactic acid in muscles and the reason for cramps. As a continuation to investigation breathing rate students will also observe the rate of formation of lactic acid while physical activity. Students will plot a graph and not down the observation Teacher will discuss with students in group about transmissible diseases and non-transmissible diseases. Students will also discuss the types of vectors and how do they spread disease. Teacher will discuss with students in group about transmissible diseases and non-transmissible diseases. Students will also discuss the types of vectors and how do they spread disease. Teacher with the help of video will make students understand the antigen antibody interaction and how antibodies destroys an antigen. Teacher will also explain the different types of lymphocytes

		along with their function. Students will list down the difference between active and passive immunity with their examples after watching a video. Teacher will explain the concept of vaccination with the help of the presentation. Teacher also discussed the concept of autoimmunity by explain example of diabetes
14 Coordination and response 14.1 Nervous control in humans	• Describe a nerve impulse as an electrical signal that passes along nerve cells called neurones • Describe the human nervous system in terms of: – the central nervous system consisting of brain and spinal cord – the peripheral nervous system – coordination and regulation of body functions • Identify motor (effector), relay (connector) and sensory neurones from diagrams • Describe a simple reflex arc in terms of receptor, sensory neurone, relay neurone, motor neurones and effector • Describe a reflex action as a means of automatically and rapidly integrating and coordinating stimuli with the responses of effectors (muscles and glands) • Define a synapse as a junction between two neurones • Distinguish between voluntary and involuntary actions • Describe the structure of a synapse, including the presence of neurotransmitter containing vesicles, the synaptic cleft and neurotransmitter receptor molecules • Describe how an impulse triggers the release of a neurotransmitter from vesicles into the synaptic gap and how the neurotransmitter diffuses across to bind with receptor molecules, in the membrane of the neurone after the synaptic gap, causing the impulse to continue • State that in a	Students will differentiate between voluntary and involuntary action based on their prior knowledge. Teacher will explain the structure of a neurone along with its function with the help of an image displayed. Teacher will Demonstrate reflex actions – pupil/iris reflex, blinking, etc. and explain how reflex arc is formed. Students will make diagram of the reflex arc including sensory and motor neurone.

	reflex arc the synapses ensure that impulses travel in one direction only • State that many drugs, e.g. heroin, act upon synapses • Define sense organs as groups of receptor cells responding to specific stimuli: light, sound, touch, temperature and chemicals • Identify the structures of the eye, limited to cornea, iris, pupil, lens, retina, optic nerve and blind spot • • Describe the function of each part of the eye, limited to: – cornea – refracts light – iris – controls how much light enters pupil – lens – focuses light onto retina – retina – contains light receptors, some sensitive to light of different colours – optic nerve – carries impulses to the brain • • Explain the pupil reflex in terms of light intensity and pupil diameter only Supplement • Explain the pupil reflex in terms of light intensity and antagonistic action of circular and radial muscles in the iris • Explain accommodation to view near and distant objects in terms of the contraction and relaxation of the ciliary muscles, tension in the suspensory ligaments, shape of the lens and refraction of light • State the distribution of rods and cones in the retina of a human • Outline the function of rods and cones, limited to greater sensitivity of rods for night vision and three different kinds of cones absorbing light of different colours for colour vision •Identify the position of the fovea Cambridge • • Define a hormone as a chemical substance, produced by a gland and carried by the blood, which alters the activity of one or more specific target organs • Identify specific endocrine glands and their secretions, limited to adrenal glands and adrenaline, pancreas and insulin, testes and testosterone and ovaries and oestrogen •Describe adrenaline as the hormone secreted in 'fight or flight' situations and its effects, limited to increased breathing and pulse rate and widened pupils •Give examples of situations in which adrenaline secretion increases • State the functions of insulin, oestrogen and testosterone Supplement • Discuss the role of the hormone	Teacher will explain with the help of video the working of synapse, conduction of a nerve impulse , role of neurotransmitter.

14.2 Sense organs 14.3 Hormones in humans	adrenaline in the chemical control of metabolic activity, including increasing the blood glucose concentration and pulse rate • Compare nervous and hormonal control systems in terms of speed and • Define homeostasis as the maintenance of a constant internal environment • Name and identify on a diagram of the skin: hairs, hair erector muscles, sweat glands, receptors, sensory neurones, blood vessels and fatty tissue • Describe the maintenance of a constant internal body temperature in humans in terms of insulation, sweating, shivering and the role of the brain (limited to blood temperature receptors and coordination) Explain that homeostasis is the control of internal conditions within set limits • Explain the concept of control by negative feedback • Describe the control of the glucose concentration of the blood by the liver and the roles of insulin and glucagon from the pancreas • Outline the symptoms and treatment of Type 1 diabetes (detail of β cells is not required) • Describe the maintenance of a constant internal body temperature in humans in terms of vasodilation and vasoconstriction of arterioles supplying skin surface capillaries • Define gravitropism as a response in which parts of a plant grow towards or away from gravity • Define phototropism as a response in which parts of a plant grow towards or away from the direction from which light is coming • Investigate gravitropism and phototropism in shoots and roots Supplement • Explain phototropism and gravitropism of a shoot as examples of the chemical control of plant growth • Explain the role of auxin in controlling shoot growth, limited to: – auxin made in shoot tip (only) – auxin spreads through the plant from the shoot tip – auxin is unequally distributed in response to light and gravity – auxin stimulates cell elongation • Describe the use in weedkillers of the synthetic plant hormone 2,4-D 15	With the help of a presentation and the model, teacher will explain different parts and function of an eye. Teacher with the help of video and presentation will explain how the image is formed.

14.4 Homeostasis 14.5 Tropic responses		Teacher will explain the reflex in pupil and accommodation of lens in detail. Teacher will discuss the secretion and role of hormones with the help of a body model. Students will make a differentiating table between hormonal and nervous system. Teacher will discuss the tropism shown by plants. And behaviour on growth of plant in presence of auxin. Teacher will display and discuss the various parts of the skin along with its function. Students will understand and not down various impacts and changes in our body to maintain the internal temperature under different external temperatures Negative feedback mechanism will be explained to students using a flow chart of pancreas and insulin. **Videos, presentation, Demonstration** **Flow chart**
15.1 Drugs	• Define a drug as any substance taken into the body that modifies or affects chemical reactions in the body • 15.2 Medicinal drugs Core • Describe the use of antibiotics for the treatment of bacterial infection • State that some bacteria are resistant to antibiotics which reduces the effectiveness of antibiotics	Teacher will discuss uses of medicinal drugs Teacher will also discuss the use of antibiotic for treatment

	• State that antibiotics kill bacteria but do not affect viruses Supplement • Explain how development of resistant bacteria such as MRSA can be minimised, limited to using antibiotics only when essential and ensuring treatment is completed • Explain why antibiotics kill bacteria, but do not affect viruses • Describe the effects of excessive alcohol consumption and abuse of heroin, limited to: – powerful depressant drugs – effect on reaction times and self-control – addiction and withdrawal symptoms – negative social implications, e.g. crime • State that injecting heroin can cause infections such as HIV • State that excessive alcohol consumption can cause liver damage • State that tobacco smoking can cause chronic obstructive pulmonary disease (COPD), lung cancer and coronary heart disease • Describe the effects on the gas exchange system of tobacco smoke and its major toxic components, limited to carbon monoxide, nicotine and tar • •State that the liver is the site of break down of alcohol and other toxins • Explain how heroin affects the nervous system, limited to its effect on the function of synapses • Discuss the evidence for the link between smoking and lung cancer • Discuss the use of hormones to improve sporting performance, limited to testosterone and anabolic steroids. • State that bacteria are useful in biotechnology and genetic engineering due to their rapid reproduction rate and their ability to make complex molecules Supplement • Discuss why bacteria are useful in biotechnology and genetic engineering, limited to: – lack of ethical concerns over their manipulation and growth – genetic code shared with all other organisms – presence of plasmids • Describe the role of anaerobic respiration in yeast during	and how resistance is observed by demonstration of antibiotic resistant practical. Teacher with the help of presentation will discuss effect of depressant on the nervous system and synapse. Teacher with the help of the video discuss various types of drug abuse and its withdrawal symptoms. With the help of the presentation teacher will discuss the complication and various lung diseases due to smoking.
15.3 Misused		

drugs 20 Biotechnology and genetic engineering 20.1 Biotechnology and genetic	production of ethanol for biofuels • Describe the role of anaerobic respiration in yeast during bread-making • Investigate and describe the use of pectinase in fruit juice production • Investigate and describe the use of biological washing powders that contain enzymes • Investigate and explain the use of lactase to produce lactose-free milk • Describe the role of the fungus Penicillium in the production of the antibiotic penicillin • Explain how fermenters are used in the production of penicillin • Define genetic engineering as changing the genetic material of an organism by removing, changing or inserting individual genes • State examples of genetic engineering: – the insertion of human genes into bacteria to produce human insulin – the insertion of genes into crop plants to confer resistance to herbicides – the insertion of genes into crop plants to confer resistance to insect pests – the insertion of genes into crop plants to provide additional vitamins Supplement • • Outline genetic engineering using bacterial production of a human protein as an example, limited to: – isolation of the DNA making up a human gene using restriction enzymes, forming sticky ends – cutting of bacterial plasmid DNA with the same restriction enzymes, forming complementary sticky ends – insertion of human DNA into bacterial plasmid DNA using DNA ligase to form a recombinant plasmid – insertion of plasmid into bacteria (specific detail is not required) – replication of bacteria containing recombinant plasmids which make human protein as they express the gene • Discuss the advantages and disadvantages of genetically modifying crops.	Teacher will discuss and explain the students various uses of enzymes and bacteria in biotechnology. Students will discuss how bacteria and yeast helps in production of various products using a presentation. Teacher will explain the genetic modification involves numerous stages, using animation. Teacher will explain that DNA can be cut in certain places using different restriction enzymes to select the correct gene. If the same restriction enzyme is used to cut the bacterial DNA then the ends of the human and bacterial DNA will stick together Using a clay model.

engineering		
	• Revision	
APRIL	• EXAMS	
MAY 19 Organisms and their environment	• Define a food chain as showing the transfer of energy from one organism to the next, beginning with a producer • State that energy is transferred between organisms in a food chain by ingestion • Construct simple food chains. • Describe how energy is transferred between trophic levels • Define trophic level as the position of an organism in a food chain, food web, pyramid of numbers or pyramid of biomass • Explain why the transfer of energy from one trophic level to another is inefficient • Explain why food chains usually have fewer than five trophic levels • Define a food web as a network of interconnected food chains • Define producer as an organism that makes its own organic nutrients, usually using energy from sunlight, through photosynthesis • Define consumer as an organism that gets its energy by feeding on other organisms • State that consumers may be classed as primary, secondary and tertiary according to their position in a food chain • Define herbivore as an animal that gets its energy by eating plants • Define carnivore as an animal that gets its energy by eating other animals • Define decomposer as an organism that gets its energy from dead or waste organic material • Interpret food chains and food webs in terms of identifying	Students will Explore a natural area locally and identify the feeding relationships of the organisms which can be seen and construct food chains depending on it. With help of various ecosystem examples students will make foodchains and foodwebs. Teacher will explain using the food chain examples pyramids of number and biomass to the students. Teacher will also discuss the reason for the shape of the pyramid and how energy is being transferred from on trophic level to the other. Teacher will also discuss how and where energy is wasted in the environment.

19.3 Nutrient cycles	producers and consumers • Use food chains and food webs to describe the impacts humans have through over-harvesting of food species and through introducing foreign species to a habitat • Draw, describe and interpret pyramids of numbers Supplement • Explain why there is a greater efficiency in supplying plants as human food, and that there is a relative inefficiency in feeding crop plants to livestock that will be used as food • Identify producers, primary consumers, secondary consumers, tertiary consumers and quaternary consumers as the trophic levels in food webs, food chains, pyramids of numbers and pyramids of biomass • Draw, describe and interpret pyramids of biomass • Discuss the advantages of using a pyramid of biomass rather than a pyramid of numbers to represent a food • Describe the carbon cycle, limited to photosynthesis, respiration, feeding, decomposition, fossilisation and combustion • Discuss the effects of the combustion of fossil fuels and the cutting down of forests on the carbon dioxide concentrations in the atmosphere • • Describe the water cycle, limited to evaporation, transpiration, condensation and precipitation • Describe the nitrogen cycle in terms of: – decomposition of plant and animal protein to ammonium ions – nitrification – nitrogen fixation by lightning and bacteria – absorption of nitrate ions by plants – production of amino acids and proteins – feeding and digestion of proteins – deamination – denitrification • State the roles of microorganisms in the nitrogen cycle, limited to decomposition, nitrification, nitrogen fixation and denitrification (generic names of individual bacteria, e.g. Rhizobium, are not required) Core • Define population as a group of organisms of one species, living in the same area, at the same time • Identify and state the factors affecting the rate of population growth for a population of an organism, limited to food supply, predation and disease	Teacher will also discuss how and where energy is wasted in the environment. Students will draw a carbon cycle using flash cards . Students will also discuss various impact on carbon cycle in context to pollution. Students will draw a water cycle using flash cards. Learners will be given cards or statements describing stages of the nitrogen cycle and will be asked to arrange them into a complete cycle. Students will define population, species based on their previous knowledge. The class will discuss how populations grow. Simple sketch graphs should be drawn to illustrate population growth, and discuss the possible factors that might cause a levelling off in population growth should be considered.

19.3 Food chains and food webs 19.4 Population size	• Discuss the increase in human population size over the past 250 years and its social and environmental implications • Interpret graphs and diagrams of human population growth • Define community as all of the populations of different species in an ecosystem Define ecosystem as a unit containing the community of organisms and their environment, interacting together, e.g. a decomposing log, or a lake • Identify the lag, exponential (log), stationary and death phases in the sigmoid population growth curve for a population growing in an environment with limited resources • Explain the factors that lead to each phase in the sigmoid curve of population growth, making reference, where appropriate, to the role of limiting factors.	Students will make and understand the growth curve and various factors affecting the rate of population Students also understand sigmoid curve in terms of fungi growth in fermenter and factors affecting them.
16 Reproduction 16.1 Asexual reproduction 16.2 Sexual reproduction	• The structure and function of the parts of a flower. • Pollination and fertilisation in flowers • Difference between sexual and asexual reproduction. • Conditions that affect germination of seeds	Teacher will explain students using presentation asexual reproduction in bacteria, yeast and in plants Based on the knowledge o the methods learners can make a table to list the main points to compare asexual and sexual reproduction. Teacher will define and explain the process of sexual reproduction and fusion of gametes. A table can be drawn up to compare asexual with sexual reproduction. Learners will look closely at the structure of a simple, radially symmetrical, insect-pollinated flower by dissecting a shoe flower to identify the different parts, using a light microscope or a

16.3 Sexual reproduction in plants		hand lens. Annotate the diagrams to understand how the structure is adapted to its function. Learners will discuss the function of each part in the class and list them down. With the help of a video learners will able to differentiate between the insect and wind pollinated flowers Learners will observe and note down the difference in flowers in a tabular form. formation of pollen tube and fertilization process. Teacher will also discuss the structure of seed and requirements of germination of seeds. With the help of a presentation and a video teacher will explain the process of pollination, Diagrams and models to illustrate the structure of the male and female reproductive systems. Learners should be able to interpret either front or side views.
16.4 Sexual reproduction in humans	• The structure and function of the male and female reproductive system. • Fertilization and development of the Embryo. • The roles of the placenta	With the help of the presentation and video teacher will explain the process of fertilization, implantation, foetal

16.5 Sex hormones in humans	• Ante natal care • The menstrual cycle • Oestrogen, progesterone, and testerone functions • Changes at puberty.	development, Amniotic sac development With the help of presentation and image teacher will discuss in detail about the formation of placenta and exchange through placenta and umbilical cord. Learners will be able to explain Puberty is when the sex organs become mature and start to produce hormones as well as gametes. Based on their previous knowledge Learners will make a table to compare the secondary sexual characteristics as shown by males and females Teacher will explain the role of various hormones during menstrual cycle with the help of a graph. With the help of a video and presentation teacher will explain various staged of the menstrual cycle and feedback mechanism of the hormones. Teacher will discuss various types of birth control measures with the help of the images and presentation Teacher will discuss the use of contraceptive pills and hormonal changes in the body. Teacher will explain Artificial insemination and IVF with the help of the presentation and video. With the help of presentation teacher will discuss various

		STI, how one can prevent ad control it.
16.6 Methods of birth control in humans 16.7 Sexually transmitted infections (STIs)	• Methods of Birth control • Outline the use of hormones in contraception and fertility treatments • • Outline artificial insemination (AI) • Outline in vitro fertilisation (IVF) • Discuss the social implications of contraception and fertility treatments. • Define sexually transmitted infection as an infection that is transmitted via body fluids through sexual contact • State that human immunodeficiency virus (HIV) is an example of an STI • Explain how the spread of STIs is controlled • Describe the methods of transmission of HIV • State that HIV infection may lead to AIDS	Detail about HIV, its spread will also be discussed.
17 Inheritance 17.1 Inheritance 17.2 Chromosomes, genes and proteins	• Define inheritance as the transmission of genetic information from generation to generation • The structure of DNA • Definition of gene. Chromosome, proteins. • the same genes, but many genes in a particular cell are not expressed because the cell only makes the specific proteins it needs • Define a haploid nucleus as a nucleus containing a single set of unpaired chromosomes, e.g. in gametes • Define a diploid nucleus as a nucleus containing two sets of chromosomes, e.g. in body cells • State that in a diploid cell, there is a pair of each type of chromosome and in a human diploid cell there are 23 pairs	Learners will come upto the definition of inheritance by discussion. Teacher will explain with the help of a chart the formation of chromosome from DNA,DNA packaging, Define gene. With the help of a video teacher will explain the process of

	• Define mitosis as nuclear division giving rise to genetically identical cells (details of stages are not required) • State the role of mitosis in growth, repair of damaged tissues, replacement of cells and asexual reproduction • Define meiosis as nuclear division giving rise to cells that are genetically different (details of stages are not required) • State that meiosis is involved in the production of gametes • Explain co-dominance by reference to the inheritance of ABO blood groups – phenotypes being A, B, AB and O blood groups and alleles being IA , IB and IO • Define a sex-linked characteristic as a characteristic in which the gene responsible is located on a sex chromosome and that this makes it more common in one sex than in the other • Describe colour blindness as an example of sex linkage • Use genetic diagrams to predict the results of monohybrid crosses involving co-dominance or sex linkage and calculate phenotypic ratios	meiosis and how chromosomes split to form a haploid nucleus. Teacher with the help of cross will explain sex by showing the possibilities.
17.3 Mitosis	• Continuous and discontinuous variation • Mutation and what causes it. • Describe the symptoms of sickle-cell anaemia • Explain how a change in the base sequence of the gene for haemoglobin results in abnormal haemoglobin and sickle-shaped red blood cells • Use genetic diagrams to show how sickle-cell anaemia is inherited • State that people who are heterozygous (HbS HbA) for the sickle-cell allele have a resistance to malaria • Explain the distribution of the sickle-cell allele in human populations with reference to the distribution of malaria • Define adaptive feature as the inherited functional features of an organism that increase its fitness • Define fitness as the probability of an organism surviving and	Using video and presentation mitosis and meiosis will be explained to the students.

17.4 Meiosis 17.5 Monohybrid inheritance	reproducing in the environment in which it is found • Explain the adaptive features of hydrophytes and xerophytes to their environments Natural selection Selective breeding	Teacher will explain the important term using a monohybrid cross of a pea. Learners will make their own monohybrid crosses taking up the traits. Using the genetic diagram Learners will predict the phenotype and genotype results of the crosses. Learners will understand the use of test cross by a making a genetic diagram. Learners will learn to use punnett square and criss cross method while making a genetic cross. Learners will construct various genetic crosses taking different example of sex linked disorders and understand the concept of carrier and diseased Learners will use genetic diagrams to predict the results of monohybrid crosses involving co-dominance or sex linkage and calculate phenotypic ratios Teacher with the help of various examples will differentiate between continuous and discontinues variation. With the help of video teacher will introduce the concept of mutations and how its alters the DNA

18 Variation and selection 18.1 Variation 18.2 Adaptive features 18.3 Selection		Teacher will discuss the genetic reason of sickle cell anaemia using string model and a video. Learners will study various data and understand the relationship between occurrence of sickle cell and malaria resistance. Teacher will also discuss the genetic defect leading to down syndrome. Learners will be shown a video and based on it they will asked to list down the adaptive features of a range of animals and plants living in a variety of habitats In case of xeropytes and hydrophytes. Learners will play a game to understand the laws of natural selection. Learners will discuss and understand various concept of evolution. Teacher will explain with examples of adaptation plays a major role in the evolution and variation.

		Teacher will explain the process of selective breeding. Learners will discuss the reasons, advantages and disadvantages of selective breeding.
21 Human influences on ecosystems 21.1 Food supply 21.2 Habitat destruction	• State how modern technology has resulted in increased food production. • Describe the negative impacts to an ecosystem of large-scale monocultures of crop plants • Describe the negative impacts to an ecosystem of intensive livestock production. • Describe the reasons for habitat destruction, limited to: – increased area for food crop growth, livestock production and housing – extraction of natural resources – marine pollution • State that through altering food webs and food chains, humans can have a negative impact on habitats • List the undesirable effects of deforestation as an example of habitat destruction, to include extinction, loss of soil, flooding and increase of carbon dioxide in the atmosphere. • land and water, e.g. rivers, lakes and the sea, by insecticides, herbicides and by nuclear fall-out • • State the sources and effects of pollution of water (rivers, lakes and the sea) by chemical waste, discarded rubbish, untreated sewage and fertilisers • State the sources and effects of pollution of the air by methane and carbon dioxide, limited to the enhanced greenhouse effect and climate change. • Define a sustainable resource as one which is produced as rapidly as it is removed from the environment so that it does not run out • Explain the need to conserve non-renewable resources, limited to fossil fuels • State that some resources can be maintained, limited to forests and fish stocks • State that products can be reused or recycled, limited to paper,	Learners will research and discuss about the various techniques used to increase the food production. Learners will also discuss and list down the negative impact on the ecosystem. videos and will be asked to list down various reasons of habitat destruction . Learners will also understand the adverse effect of deforestation on habitat desstuction, catastrophic effect on foodchain and foodweb.

21.3 Pollution 21.4 Conservation	glass, plastic and metal • Outline how sewage is treated to make the water that it contains safe to return to the environment or for human use • Explain why organisms become endangered or extinct, limited to climate change, habitat destruction, hunting, pollution and introduced species • Describe how endangered species can be conserved, limited to monitoring and protecting species and habitats, education, captive breeding programmes and seed banks.	Learners will be shown videos on water pollution, air pollution of different types of pollution and their effects. Learners will be divided into groups to list down the effects of pollution in terms of eutrophication, destruction of habitat, coral ecosystem. Learners will make a presentation on how air pollution leads to global warming, acid rain and explain it in the class. Learners will form groups and make presentation on conservation techniques. They will discuss each of their techniques in the class.
	• Revision, past paper solving.	.

SUBJECT: ACCOUNTING

Strand/Topics	Learning Objectives (CAIE expectations)	Learning Experiences/Engagements
The purpose of accounting The double entry system of book-keeping	State the purposes of learning accounts as a future career prospects. understand and explain the difference between book-keeping and accounting explain the meaning of assets, liabilities and owner's equity explain and apply the accounting equation	Use of PPT to explain the accounting terminologies. Asking students to inform what are the general requirement to start up a business. Interactive session (action song) to learn the accounting rules.
Double Entry Bookkeeping Trial Balance	outline the double entry system of book-keeping process accounting data using the double entry system prepare ledger accounts post transactions to the ledger accounts balance ledger accounts as required and make transfer to financial statements interpret ledger accounts and their balances	Outlining the format of ledger account for Sales Ledger ,Purchase Ledger and Nominal Ledger accounts. Solving & explaining how entries are posted in the ledger accounts. Analyse what each balance state of the respective ledger accounts. Solving textual and few past paper problems. Helping learners engage by giving abbreviation to remember the accounting concepts applied. Types of Errors not affecting trial Balance explaining and solving

Petty Cash Book		textual problems. Asking learners to give examples to verify their understanding of the concepts. Visiting the accounts department of the school to help students understand and get analyse how are accounts maintained. And also gives them a brief understanding of petty expenses done in an education organisation.
Business Documents **Books of Prime Entry** **Financial Statements**	complete pro-forma business documents understand the use of business documents as sources of information: Explain the advantage of using various books of prime entry explain the use of and process accounting data in the books of prime entry explain the importance of preparing income statements and statements of financial position	Teacher and the learners brainstorm on the documents which may be issued during the purchase and sale of goods. Encourage learners to bring documents they or their family may have obtained during the course. Explain any business documents which are not familiar to learners Specially Statement of account and Credit note. Explain any business documents which are not familiar to learners. Explaining Income statement in form of a story of an visitor to your home and how does mom does arrangement for him to provide him with hospitality. Learn the format in short by writing it on the white board.

Financial Statements **Revision**	explain the difference between a trading business and a service business prepare income statements for trading businesses businesses and for service	Solving problems from the text and past papers for clear understanding. Revising all the chapters. Assessing students knowledge by asking questions while doing revision. Solving MCQ questions from worksheet. Clearing students doubts and solving past paper questions. **Exams**
Exams		**Exams & Diwali Vacation**
Accounting Rules	Understand and explain Accounting rules& Accounting objectives to the learners. Business Entity, Historical Cost, prudence, Accruals ,Consistency etc. understand the basis of the valuation of inventory at the lower of cost and net realisable value Capital & Revenue Expenditure	With reference to the text students will read each accounting rule during the class. Discuss and explain all the accounting rules and objectives with help of respective examples. check learners understanding by asking them to brainstorm on different examples of their own. Demonstrate the ledger entries to record a prepaid expense and an accrued expense. Repeat using a similar exercise but inviting individual learners to make entries on the board. Demonstrating short cuts for remembering the outline of

Other Payables & Receivables	recognise the important of matching costs and revenues prepare ledger accounts and journal entries to record accrued and prepaid expenses prepare ledger accounts and journal entries to record accrued and prepaid incomes	accruals & prepayments. Following a similar pattern for a prepaid and an accrued item of income and ask learners to complete exercises to record accrued and prepaid income and expenses in the ledger.
Depreciation & Disposal of NCA.	define depreciation explain the reasons for accounting for depreciation name and describe the straight-line, reducing balance and revaluation methods of depreciation prepare ledger accounts and journal entries to record the sale of non-current assets, including the use of disposal accounts	Brainstorming with learners on why non-current assets lose value and compile a list on the board. Asking the learners which accounting rule will match the topic. Introduce the main methods of calculating depreciation and demonstrating it with all the three methods on the board. Demonstrating and explaining the journal entries and ledgers affecting depreciation and problem solving.
Depreciation & Disposal of NCA. **BadDebts & Provision for Doubtful Debts**	understand the meaning of irrecoverable debts and recovery of debts written off prepare ledger accounts and journal entries to record irrecoverable debts prepare ledger accounts and journal entries to record recovery of debts written off explain the reasons for maintaining a provision for doubtful debts prepare ledger accounts and journal entries to record the creation or, and adjustments to, a provision for doubtful debts	Solving problems from text and past paper for all the methods Explanation of the meaning of the term irrecoverable debts. Demonstrating and explaining the journal entries and ledgers affecting baddebts and provision for doubtful debts. Solving MCQ & Problems from the text.

Bank Reconciliation Statement. Control Accounts	understand the use and purpose of a bank statement update the cash book for bank charges, bank interest paid and received correction of errors, credit transfers, direct debits, dividends and standing orders understand the purpose or and prepare a bank reconciliation statement to include bank errors, uncredited deposits and unpresented cheques understand the purposes of purchases ledger and sales ledger control accounts identify the books of prime entry as sources of information for the control account entries prepare purchases ledger and sales ledger control accounts to include credit purchases and sales, receipts and payments, cash discounts, returns	A general discussion on visit to bank by the learners and asking them about their experiences. Introducing bank statement and its recording. Revise cash book exercises involving updating the cash book and preparing a bank reconciliation statement. These can get progressively more difficult such as including overdrawn balances Complete a brainstorming session with learners about the purposes of control accounts. Build up a list on the board. Prepare cards containing items which may be found in a control account. In pairs or small groups learners name the control account in which the item would appear and whether it is a debit or a credit entry. The information on the cards and the learners' lists can then be used to demonstrate the preparation of a purchases ledger and a sales ledger control account. Individual learners can be invited to make entries on the board. Re-visit the preparation of books of prime entry. Discuss with the class the advantages of obtaining the information from these books rather than the ledger accounts
Revision		Revising all the chapters. Assessing students' knowledge by asking questions while doing revision.

		Solving MCQ questions from worksheet. Clearing student's doubts and solving past paper questions.
Exams		
Manufacturing Accounts		
Manufacturing Accounts	distinguish between direct and indirect costs understand direct material, direct labour, prime cost and factory overheads prepare manufacturing accounts, income statements and statement of financial position make adjustments to financial statements explain the advantages and disadvantages of forming a partnership outline the importance and contents of a partnership agreement prepare income statements, appropriation accounts and statements of financial positon explain the uses of and difference between capital and	Introduce the topic by asking learners to name any manufacturing businesses they have heard of Learners brainstorm in groups various expenses to be incurred by a manufacturing business. Explaining the format of manufacturing accounts and different types of Inventory a manufacturing business has. Solving the MCQ and problems from the text Discussion & Solving problems of manufacturing from past papers. Learners are asked to list the advantages & Disadvantages of partnership on the board. Solving the MCQ and problems from the text. Discussion & Solving problems of Partnership based on Current

Partnership Accounts	current accounts draw up partners' capital and current accounts in ledger account form and as part of a statement of financial positon	Account from past papers.
Incomplete Records Clubs & Societies	explain the disadvantages of not maintaining a full set of accounting records prepare opening and closing statements of affairs calculate profit or loss for the year from changes in capital over time calculate sales, purchases, gross profit, trade receivables and trade payables and other figures from incomplete information prepare income statements and statements of financial position form incomplete records make adjustments to financial statements as detailed in 5.2 (sole traders) apply the techniques of mark-up, margin and inventory turnover to arrive at missing figures distinguish between receipts and payments accounts and income and expenditure accounts prepare receipts and payments accounts prepare accounts for revenue-generating subscriptions prepare income and expenditure accounts and statements of financial position make adjustments to financial statements as	Learners are given an example of Grocery shop business who does not maintain any accounting documents apart from few bills and credit customers and suppliers. Learners are asked how you would help the owner to maintain his record and know the estimated profit or Loss of the business. After brainstorming, learners understand and answer few ways to find out the performance. Asking one student to complete the capital account format by outlining t on the white board. Students note down all the formulas & format of statement of affairs. Solving textual & Past paper problems.

Limited Company Clubs & Society Analysis & Interpretation of Data	explain the advantages and disadvantages of operating as a limited company understand the meaning of the term limited liability understand the meaning of the term equity understand the capital structure of a limited company comprising preference share capital, ordinary share capital, general reserve and retained earnings understand and distinguish between issued, called-up and paid-up share capital understand and distinguish between share capital (preference shares and ordinary shares) and loan capital (debentures) prepare income statements, statements of changes in equity and statements of financial positon make adjustments to financial statements as detailed Calculation and understanding of accounting ratios • Gross margin • Profit margin • Return on capital • employed (ROCE) Current ratio • Liquid (acid test) ratio • Rate of inventory turnover (times) • Trade receivables	

Correction of Journal Entries **Revision**	explain the use of a suspense account as a temporary measure to balance the trial balance correct errors by means of suspense accounts adjust a profit or loss for an accounting period after the correction of errors understand the effect of correction of errors on a statement of financial position	
	EXAMS	
	Feedback of Fist term Papers & Revision of past papers	
	Mock Examination	
	Feedback of Mock and paper solving	
	Study leave	
	FINAL EXAMIATION	

SUBJECT: BUSINESS STUDIES

Strand/Topics	Learning Objectives (CAIE expectations)	Learning Experiences/Engagements
Location	Learners should be able to recommend and justify an appropriate location for a business in given circumstances.	Textual Activities
Operations / Production The meaning of production Production Main methods of production 4.2 Costs, scale of production and break-even analysis 4.3 Achieving quality production	Explain the importance managing resources effectively to produce goods and services. Explain the difference between production and productivity. Explain the benefits of increasing efficiency and how to increase it. Explain why businesses hold inventories. Explain the concept of lean production, how to achieve it and the benefits of lean production. Learners should be able to explain the main features, benefits, and limitations of job, batch and flow production, and recommend and justify an appropriate production method for a given situation. Learners should be able to identify and classify costs and use cost data to help make simple cost-based decisions Explain how technology has changed production methods.	PPTS Video on Mc Donald's Production process PPT Textual activities Group Activity on identification and classification of different types of costs. Textual activities & worksheet on past paper questions.

	Learners should understand why quality is important and how quality production might be achieved.	
6.1 Economic issues: Business cycle 6.1 How government control over the economy affects business activity and how businesses may respond	Understand the main stages of the business cycle. Identify government economic objectives, e.g. increasing Gross Domestic Product (GDP). Explain the impact on business of changes in employment levels, inflation and Gross Domestic Product. Explain the impact of changes in taxes and Government spending. Explain the impact of changes in interest rates can affect business activity. Explain how businesses might respond to these changes.	PPT Textual activities
6.2 Environmental and ethical issues 6.3 Business and the international economy 6.3 Impact of exchange rate	Environmental concerns and ethical issues as both opportunities and constraints for businesses. Learners should be able to understand the importance of globalisation and explain the opportunities and threats of globalisation for businesses. Learners should be able to identify and explain the reasons for the importance and growth of multinational companies (MNCs). Depreciation and appreciation of an exchange rate. How exchange rate changes can affect businesses	Video on Coco – Cola Textual Activities

changes	as importers and exporters of products, e.g. prices, competitiveness, profitability. REVISION of Paper 2	
	EXAMS	
	Feedback of Fist term Papers & Revision of past papers	
	Mock Examination	
	Feedback of Mock and paper solving	
	Study leave	
	FINAL EXAMINATION	

SUBJECT: GLOBAL PERSPECTIVES		
Strand/Topics	**Learning Objectives (CAIE expectations)**	**Learning Experiences/Engagements**
Global Perspectives **Topic: Migration**	Analyse and evaluate the types of migration and its effects on host and departure country Collaboration	Conduct and interview with people who are residing in your locality to find out the number of families migrate from different part of the country. Work with students of different grade to compare the effect anti-migration sentiment in the community. Research and interpret data on migration and criminality and present information on maps and graphically Conduct a survey in teams to derive possible solutions for managing migration
Global Perspectives **Topic: Law and Criminality**	Analyse and evaluate the process of law making Collaboration Explore and Reflect on personal perspectives about law Analyse the causes of crime and the effectiveness of measures to protect people Collaboration	Group activity to understand the need of laws Work with students from different grades to understand the laws that affect teenagers Read and discuss the article at www.bbc.co.uk/news/uk-15574189 Investigate the incidence of a particular crime in two different countries and evaluate responses to it Conduct a survey for the causes of crime figures for particular offences in your locality and devise strategies to reduce it

Global Perspectives **Topic: Law and Criminality**	Analyse the causes of crime and the effectiveness of measures to protect people Collaborate with others to plan and carry out a project with a clear outcome	Research and present national/local crime figures using published data; Consider the reliability of the data. Use graphs, tables, maps to show information for locality. Interview a local police officer on measures used to protect people locally from crime. Survey friends, relatives, and local people of their experience of crime and methods to prevent it. Summarize the results and evaluate whether protection measures are working. Work with students from another school to compare crime figures for particular offences in their locality. Investigate the causes of the crime and devise some strategies that may be used to reduce the incidences of the offence in each place.
Global Perspectives **Topic: Law and Criminality**	**Evaluation on various laws created to prevent crime**	Survey friends, relatives, and local people of their experience of crime and methods to prevent it. Summarize the results and evaluate whether protection measures are working.
Global Perspectives **Topic: Employment**	Analyze and evaluate the role of fairness and equality in employment Collaboration Reflect on local ,national global perspective about the causes for unemployment and globalisation on job creation	Research and interpret data on the working population of the different countries and compare it with your own country's data Conduct and interview with working people in your society to understand the attitude of people as How job serves as an identity to their life? Compare the nature and impacts of and perspectives of unemployment and job creation in own country with that of

		another. Produce a presentation on similarities and differences
Global Perspectives **Topic: Employment**	Analyse and evaluate the local, national and global perspective Research and understand the concept of job creation and how job serves as an identity to an individual worldwide	Compare the nature and impacts of and perspectives of unemployment in own country with that of another. Produce a presentation on similarities and differences Prepare a mind map of your findings on the concept of job creation and job as an identity at global level.
Global Perspectives **Topic: Transport System**	Reflect on local ,national global perspective on aging transport system Reflect on local ,national global perspective about the environmental issues in connection to transportation	Investigate and compare different developing countries to understand the causes and effects of aging transportation Present a brief summary about the effects of effects on transportation on environment and produce a reflection paper on it
Global Perspectives **Topic: Transport System**	Understand and analyse the difference between public and private mode of transport	Students analyse a range of published materials about from local and private mode of transport describing it in their area or country. The aim is to learn about and summarize the transport available at local level
Global Perspectives **Topic: Transport System**	Collaborate with others to plan and carry out a project with a clear outcome	Work with students from another school to compare the strengths and weaknesses of transport system in own and second country. Propose ways in which the systems could improve. Evaluate the strengths and weaknesses of transport infrastructure of the country

Global Perspectives **Topic: Globalisation**	Analyse and evaluate different views economic, cultural, political and social globalisation Explore and Reflect on personal perspectives about law. Analyse and evaluate the concept of core and periphery countries in globalisation	Compare people's views via internet about the effect of globalisation on their culture, society, politics and economy Produce a documentary about the situation in developing and developed countries about globalisation and inequality Interview a local representative to understand the role of national governance on trade due to globalisation PPT presentation on core and periphery globalisation

2019-2020

Strand/Topics	**Learning Objectives (CAIE expectations)**	**Learning Experiences/Engagements**
Global Perspectives **Topic: Demographic changes**	Analyze and evaluate the role of aging population in the country Collaboration Analyse and evaluate local, national and global consequence of demographic health and fewer children Collaboration	Conduct and interview with elderly people to understand their contribution to the community Work with students of different grade to compare the effect of more single people in the country Research and interpret census data on local families and present information on maps and graphically Work with students of different grades to understand the to understand the issues around population explosion in developing countries Research and interpret data on migration and criminality and present information on maps and graphically Conduct a survey in teams to derive possible solutions for managing migration. Work with students from different grades to provide possible solutions for infinite demands and finite resources

Global Perspectives **Topic: Energy and Fuel**	Explore and Reflect on personal perspectives about Climate Change, Fuel Poverty and access to energy Analyse the concept of sustainability and inequity Analyse and evaluate the importance of fossil fuels and renewable energy Collaboration	Carry out a survey and interview people about their attitudes on climate change, fuel poverty and access to energy and prepare a presentation on different findings Compare via internet the approach of more and less economically developed countries on the issue of sustainability and inequity Work with students from different grades to provide possible solutions for infinite demands and finite resources
Global Perspectives **Topic: Fuel and Energy**	Analyze and evaluate the role of aging population in the country Collaboration Analyse and evaluate local, national and global consequence of demographic health and fewer children Collaboration	Conduct and interview with elderly people to understand their contribution to the community Work with students of different grade to compare the effect of more single people in the country Research and interpret census data on local families and present information on maps and graphically Work with students of different grades to understand the to understand the issues around population explosion in developing countries Research and interpret data on migration and criminality and present information on maps and graphically Conduct a survey in teams to derive possible solutions for managing migration
Global Perspectives **Topic: Education**	Analyse and evaluate different views about the purpose and benefits of education Collaboration Explore and Reflect on personal perspectives about law	Watch inspirational teacher movie clips on www.youtube.com/watch?v=crGnmbILQFQ Compare people's experience of school in different countries via

	Analyse and evaluate local, national and global attitude towards education and preferred learning styles Collaboration	internet Use a life map, outlining the view of own future life and reflect on how far education can support these goals. www.vark-learn.com/english/page.asp?=questionaire to know examples of learning styles Investigate barriers to education in different countries and evaluate different policies to improve access to education
Global Perspectives		Feedback on First Term Examination and solving past papers
Global Perspectives		Revision and Mock Examination
Global Perspectives		Revision and Mock Examination
Global Perspectives		Study Leave
Global Perspectives		Final Examination

SUBJECT: ICT

Strand/Topics	Learning Objectives (CAIE expectations)	Learning Experiences/Engagements
1. Types and components of computer systems 1.1 Hardware and software	• Define hardware as consisting of physical components of a computer system • Identify internal hardware devices (e.g. motherboards, random access memory (RAM), read-only memory (ROM), video cards, sound cards and internal hard disk drives) • Identify external hardware devices and peripherals (such as monitors, keyboards, mice, printers as input and output devices and external storage devices in general) • Identify and define the two types of software – applications software and systems software	Ask learners to look around the classroom and observe as many external hardware devices that they can. They could compete to see who can note down the most correct external hardware device in one minute. Demonstrate the use of an operating system to crate folders, save work, sort files. Demonstrate different types of application software such as word-processor, database, spread sheet and DTP
1.2 The main components of computer systems	• Describe the central processing unit (CPU) including its role • Describe internal memory, i.e. ROM and RAM and the differences between them • Define input and output devices and describe the difference between them • Define secondary/backing storage	Ask learners to produce a diagrammatic representation of the workings of a computer. They must research the roles of the CPU, ROM, RAM and represent how data is processed and stored.
1.3 Operating systems	Describe the differences, including the benefits and drawbacks, between operating systems which contain a CLI and those which contain a GUI	. It would be best to represent this through the use of Windows for a GUI and the command line in Windows for CLI.
1.4 Types of	Describe the characteristics of a personal/desktop computer, laptop and tablet and its uses, both as a standalone and networked	Ask learners to think of tasks they perform everyday on their smartphones. Ask them to think about how these

computer	computer	tasks were carried out before we had smartphones, then expand this to before we had mobile phones. **(I)**
1.5 Impact of emerging technologies	Describe how emerging technologies are having an impact on everyday life (e.g. artificial intelligence biometrics, vision enhancement, robotics, quantum cryptography, computer-assisted translation, 3D and holographic imaging, virtual reality)	Give learners a case study about the benefits and drawbacks of 3D printing and discuss as a whole class, e.g. prosthetic/artificial limbs. **Extension activity:** Ask learners to research the Edward Snowdon case and the exposure of encryption keys being forced to be revealed. Ask them to discuss in groups how they feel about this and do they agree with it.
2. Input and output devices 2.1 Input devices and their uses	Identify input devices and their uses, e.g. keyboard, numeric keypad, pointing devices (such as mouse, touchpad, tracker ball), remote control, joystick/driving wheel, touch screen, scanners, digital cameras, microphone, sensors (general), temperature sensor, pressure sensor, light sensor, graphics tablet, video camera, web cam	As an introduction and to elicit the devices from the learners, ask learners (in pairs) to make a list of as many input and output devices they can think of. Learners talk to other pairs of learners to compare their lists. Alternatively, mix up the two lists and ask the learners to list which ones are input and which are output devices.
2.2 Output devices and their uses	Identify output devices and their uses, e.g. CRT monitor, TFT/LCD monitor, IPS/LCD monitor, LED monitor, touch screen (as an output device), multimedia projector, laser printer, inkjet printer, dot matrix printer, wide format printer, 3D printer, speakers, motors, buzzers, heaters, lights/lamps	Learners can start by listing the advantages and disadvantages of four or five devices per group. Each group then presents their findings to the whole class.
2.3 Direct data entry and associated devices	Describe direct data entry and associated devices, e.g. magnetic stripe readers, chip and PIN readers, Radio Frequency Identification (RFID) readers, Magnetic Ink Character Reader (MICR), Optical Mark Reader (OMR), Optical Character Reader (OCR), bar code reader Identify the advantages and disadvantages of any of the above devices in comparison with others	Ask learners to discuss why the speed of data entry is important and how each of the given devices improves data entry. Ask learners to think about what would be the alternative if that device did not exist.

4. Networks and the effects of using them 4.1 Networks	Understand how a router works and its purpose	Explore TCP/IP routers: www.dummies.com/how-to/content/exploring-tcpip-routers.html **Extension activity:** Using a trace route (there are various websites that allow you to demonstrate this), show learners how routers pass data packets toward their destination. One of the best examples is to see how many routers a packet would go through between the UK and a destination in the USA. This is a site that can be used for doing a trace route: http://tracert.com/
	Understand the use of other common network devices, including: network interface cards, hubs, bridges, switches, modems	Give learners a set of flash cards with network components and definitions on them. Ask them to match the definition to the component.
	Understand the use of WiFi and Bluetooth in networks	Comparison of Bluetooth and Wifi: www.diffen.com/difference/Bluetooth_vs_Wifi
	Understand how to set up and configure a small network, including: access to the internet, the use of a browser, the use of email, access to an ISP	Learners should follow the instructions and are then asked to put to use what they have learned and create a network. (This is a freely available simulation.)
	Understand the characteristics and purpose of common network environments, such as intranets and the internet	**Extension activity:** Ask learners to create a diagram of their own school LAN and how it connects to a WAN. **(I)**
4.2 Network issues and communication	Security issues regarding data transfer	How biometric devices work: www.howstuffworks.com/biometrics.htm
5. The effects of using IT 5.1 Effects of IT on employment	• Describe how there has been a reduction of employment in offices, as workers' jobs have been replaced by computers in a number of fields (e.g. payroll workers, typing pools, car production workers) • Describe how there has been an increase in employment in other fields (e.g. website designers, computer programmers, delivery drivers in retail stores)	BBC Bitesize pages on impact of ICT on work patterns: www.bbc.co.uk/education/guides/z9fbkqt/revision

5.2 Effects of IT on working patterns within organisations	• Describe how the use of computers has led to a number of employees changing their working patterns (e.g. part-time working, flexible hours, job sharing, compressed hours) • Describe what is meant by part-time working, flexible hours, job sharing, compressed hours	Ask learners to imagine they want to set up a company and have a choice between having an office or working from home. Ask learners to draw up a table of pros and cons of working from home and how might the pros /cons be different if they were in an office.
5.3 Microprocessor-controlled devices in the home	• Describe the positive effects microprocessors have on aspects of lifestyle (e.g. the amount and use of leisure time, the degree of social interaction, the ability to leave the home) • Describe the negative effects microprocessors have on aspects of lifestyle (e.g. lack of exercise)	Ask learners to name 10 devices in their home that contain a microprocessor. Pick out a few different devices that learners identify and ask them what tasks these devices would be able to perform without the microprocessor.
5.4 Potential health problems related to the prolonged use of IT equipment	• Describe repetitive strain injury (RSI) and what causes it • Identify other health issues (e.g. back problems, eye problems, headaches) • Describe some simple strategies for preventing these problems • Evaluate the use of IT equipment and develop strategies to minimise the health risks	Ask learners in pairs (or individually) to create a guide that could be given to staff in an organisation for avoiding health issues when using a computer – this could be a leaflet or by using presentation software. Learners present to the whole class. **(I)**
6. ICT applications 6.1 Communication applications	• Describe a range of communication applications (e.g. newsletters, websites, multimedia presentations, music scores, cartoons, flyers and posters) • Describe the use of mobile phones for communication (e.g. text messaging, phone calls, accessing the internet) • Describe the use of internet telephony, including Voice Over Internet Protocol (VOIP) • Describe applications for publicity and corporate image publications (e.g. business cards, letterheads, flyers and brochures)	Learners research what applications are available and how they are used.

6.2 Data handling applications	• Describe the use of a range of data handling applications (e.g. surveys, address lists, clubs and society records, school reports and school libraries)	**Extension activity:** Learners research what data handling applications are used in their school environment, e.g. in the school library or administration office. **(I)**
6.3 Measurement applications	• Describe a range of measurement applications (e.g. scientific experiments, weather stations) • Explain the difference between analogue data and digital data • Explain the need for conversion between analogue and digital data • Describe the use of microprocessors and computers in a number of applications (e.g. pollution monitoring, intensive care units in hospitals) • Discuss the advantages and disadvantages of using computers in measurement rather than humans	Ask learners to produce a diagram or table that represents data being obtained through the use of an analogue device and the process it goes through to become digital data. **(I)** Ask learners to accompany the above diagram with a description of why this process is needed.
6.7 School management systems	• Describe how systems are used to manage learner registration and attendance • Describe how systems can be used to record learner performance • Describe how systems can be used for organising examinations, creating timetables and managing teaching cover/substitution	Discuss with learners what content linked to them goes into a school management system and what that data is used for.
6.8 Booking systems	• Identify areas where booking systems are used (e.g. travel industry, theatre and cinemas) • Describe the online processing involved in booking tickets	Ask learners to try using an online booking system to the point of making a payment (there are a few that will ask for payment last). Ask learners to make a note of the features of the booking system that they come across.

6.9 Banking applications	• Describe the computer processing involved in Electronic Funds Transfer (EFT) • Describe the computer processing involved in using automatic teller machines (ATM) (e.g. withdrawing cash, depositing cash or cheques, checking account balance, mini statements, mobile/cell phone recharge/top up, bill paying, money transfers, ordering paper-based goods) • Describe the use of processing credit/debit card transactions • Describe the clearing of cheques • Describe phone banking • Describe internet banking, and discuss the advantages and disadvantages of it	Ask learners to produce a flowchart to illustrate how an ATM machine works. **(I)** Discuss with learners how banking was done before ATM machines, telephone banking and internet banking existed. Discuss issues such as how cash was withdrawn and how bills were paid.
6.11 Computers in libraries	• Describe the files used in libraries (e.g. records of books and borrowers) • Describe the computer processing involved in the issue of books, including the use of direct data entry methods • Describe the automatic processing involved in issuing reminders for overdue books	Ask learners to identify how many different processes can be performed just through scanning a barcode on a book in a library. They should identify process such as it inputs the details of the book, it can then say that book is now unavailable as it is checked out if another person comes in for it, it can record how many times that book is checked out.
6.12 Expert systems	• Identify a range of applications which use expert systems (e.g. mineral prospecting, car engine fault diagnosis, medical diagnosis, chess games) •	Ask learners to use an example of an experts system e.g. WebMD and ask them to identify how it is giving a diagnosis. Ask them to identify the different elements that allow this to happen.
6.15 Monitoring and tracking systems	• Describe how a workforce or member of the public can be monitored or logged • Describe how the use of cookies can be used to monitor a person's internet activity	A class debate could be set up to discuss the how tracking systems benefit and intrude in people's lives.

	• Describe the use of key-logging • Describe how worker/employee call monitors can be used Describe the use of automatic number plate recognition q	
6.16 Satellite systems	• Describe the use of different satellite systems (e.g. Global Positioning Systems (GPS), satellite navigation, Geographic Information System (GIS), media communication systems)	Learners research how car satellite navigation systems work (through Global Positioning Systems (GPS)). Why might they go wrong? (Cars going into rivers etc.) **Extension activity:** Discuss a news story about a missing plane or boat, e.g. Malaysian missing plane in 2014. Ask learners to research this case and write a report on how it was tracked through GPS and other satellite data.
8. Safety and security 8.1 Physical safety	• Describe common physical safety issues and what causes them, e.g. electrocution from spilling drinks, fire from sockets being overloaded or equipment overheating, tripping over trailing cables • Describe some simple strategies for preventing these issues	Ask learners to produce a poster for classroom display to warn other learners about the safety hazards that can arise when using ICT. **(I)** Look at the classroom code of conduct or rules, if they are available, and ask learners if any of the safety issues that they have included on their poster are identified in that.
8.2 e-safety	• Explain what is meant by personal data • Explain why personal data should be confidential and protected • Explain how to avoid inappropriate disclosure of personal data including: own name, address, school name, a picture in school uniform • Discuss why e-safety is needed • Describe measures which should be taken when playing games on the internet (including not using real names)	Display a fictitious mock-up profile, from a social networking site, that includes seemingly innocent information. Ask learners what they can find out about this person just through matching up information on their profile. Ask learners to now identify how the profile could be made safer.

8.3 Security of data	• Effective security of data ○ define the term hacking and describe its effects ○ explain what is meant by the term hacking and the measures that must be taken in order to protect data. ○ explain what is meant by the terms user id and password stating their purpose and how they are used to increase the security of data explain what is meant by the terms biometric data and why biometric data is used	Ask learners to visit a password checker site e.g. www.passwordmeter.com and see how secure their passwords really are. If they find that they are not that secure, ask learners to consider what they could do to increase the security of their password. Ask learners to consider the privacy issues involved in biometric data. How do they feel about biological information being stored about their body for identification purposes? Why are biometrics become so popular? What are the alternatives?
9. Audience 9.1 Audience appreciation	• Show a clear sense of audience when planning and creating ICT solutions • Analyse the needs of an audience • Explain why solutions must meet the needs of the audience	Ask learners to compare two different news websites, e.g. Newsround, BBC or CNN news. Ask them to look at what makes them different and if this is done for audience purposes.
9.2 Legal, moral, ethical and cultural appreciation	• Explain the need for copyright legislation and the principles of copyright relating to computer software (e.g. software piracy) • Describe methods that software producers employ to prevent software copyright being broken • Discuss the legal, moral, ethical and cultural implications of creating an ICT solution • Create ICT solutions that are responsive to and respectful of the needs of the audience • Discuss why the internet is not policed (although legislation is enforced in some countries) and the effects of this, including the existence of inappropriate sites	Copyright definition: the legal protection given to the creators of text, images, music and software to prevent their work being used illegally. Present the rules of software copyright and discuss as a class or in small groups. 'Should the internet by policed?' – Class discussion or learners could produce a table or advantages and disadvantages
File management	• Identify different file types and their use/s, for example: css, csv, gif, htm, jpg, pdf, png, rtf, txt, zip	Create a task for learners that requires them to do the following:

11.1 Manage files effectively	• Locate stored files • Open and import files of different types • Save files in a planned hierarchical directory/folder structure • Save files using appropriate file names • Save and print files in a variety of formats, including: a draft document, final copy, email, file attachment, screen shots, database reports, data table, graph/chart, a web page in browser view, a web page in HTML view • Save and export data into file formats for your applications packages, e.g. .doc, .docx, .xls, .sdb, .sdc, .rtf, .ppt •	• locate an image from a shared area. The image should be in one type of image format and called pic1 • ask learners to import the image into an image program and then compress the image and save it as a different file extension, one appropriate for viewing the image in many different image programs • the image also needs to be given a sensible name based on its content • the image should then be saved back into a certain folder in a shared area.
11.2 reduce file sizes for storage or transmission	• Explain the need to reduce file sizes for storage or transmission • Identify where it will be necessary to reduce file sizes for storage or transmission • Reduce file sizes using file compression	Discuss with learners why an image file would be compressed.
12 Images	• Use software tools to place and edit an image to meet the requirements of its intended application and audience • Know when it is necessary to edit an image and can appropriately: ○ place an image with precision ○ resize an image ○ maintain or adjust the aspect ratio of an image, or distort an image where appropriate ○ crop an image ○ rotate an image	Give learners a brief that requires them to edit an image using all of the editing points listed in the learning objectives column opposite.

	○ reflect an image (flip an image horizontally and/or vertically) ○ adjust the colour depth of an image ○ adjust the brightness of an image ○ adjust the contrast of an image ○ understand the need to reduce image resolution to increase transmission speed ○ reduce the resolution of an image to reduce file size	
13. Layout	• Use software tools to prepare a basic document to match the purpose and target audience ○ create a new document or, where appropriate, open an existing document ○ enter text and numbers ○ use editing techniques to manipulate text and numbers, including: highlight, delete, move, cut, copy, paste, drag and drop ○ place objects into the document from a variety of sources, including: text, image, screen shot, spreadsheet extract, database extract, clip art or chart ○ create a table with a specified number of rows and columns ○ format a table and its contents ○ place text or objects in a table • wrap text around a table, chart or image, including: above, below, square and tight • Use software tools to use headers and footers appropriately within a range of software packages • Create headers and footers • Align consistently within a document the contents of the header and footer including: to left margin, right margin and centre of the page • Place automated objects in headers and footers, including: automated file	Use a previously prepared excerpt of text (which is two or three A4 pages in length) saved as a .txt file and image file. It would be best if this were based around a topic such as the solar system. Ask the learners to: • open a word processor and import the text • identify the main title and make it bold and size 14 • identify the subtitles and make them bold and size 12 • make sure the main body of text is size 11 • all text should be Arial • move the second paragraph of text to the end of the document • convert a section e.g. a list of facts about the solar system, into a table with the correct number of columns and rows • make sure the table column headings are bold • insert the image into the text and wrap a section of text around it.

14. Styles	• Understand the purpose of a corporate house style and ensure that all work produced matches this
	  ○ produce documents which conform to a corporate house style
	• explain what is meant by corporate branding/house style
	• Apply styles to ensure consistency of presentation
	  ○ explain why consistent styles are required
	  ○ apply consistent styles using a variety of application packages
	  ○ ensure that page/slide layout is consistent, including: font styles, text alignment, spacing between lines, spacing between paragraphs, spacing before and after headings
	  ○ create and apply an appropriate style, including: font type (serif, sans-serif), point size, font colour, alignment, line spacing, style of bullets, text alignment to the left, right, centre or fully justified
	  ○ select an appropriate font style for a task, taking into account the audience
	  ○ use text enhancement, including: bold, underline, italic, highlight
	• create and apply paragraph style(s) with a new style name to match the corporate house style.
		Look at various company leaflets and documents and ask learners to focus on house style differences, e.g. use of caps, spelling, colours, font style and size, text justification.
		
		Using the document created in Unit 13, provide learners with a house style brief and ask learners to edit the document to conform to the house style brief.
		
		Ask learners to design a house style for a given organisation.

15. Proofing
 	
15.1 Software tools
	• Use software tools to ensure that all work produced contains as few errors as possible
	  ○ explain why the automated suggestions given by spell check software do not always give the correct response
	  ○ use automated tools, including spell check facilities, to remove errors
	  ○ use validation routines to minimise errors
	• explain why validation checks must be appropriate to the data that is being checked
		Learners list proofing software tools that they have used and know about, e.g. spell-check software, Research what is available.

15.2 Proofing techniques	• Accuracy of data entry ○ describe the importance of accuracy and the potential consequences of data entry errors	Prepare documents containing both spelling errors which the spell-check will locate and errors which could only be corrected through proofreading. Ask learners to identify

	○ correct errors in data entry, including: transposed numbers, spelling, consistent character spacing, consistent case and factual errors (following proofreading by a third party) • check to ensure consistent line spacing, to remove blank pages/slides, remove widows/orphans, ensure that tables and lists are not split over columns or pages/slides	all the errors. Provide learners with a table of fields that are to be entered into a database. Ask them to identify any appropriate validations that can be assigned to them.
	• Verification ○ define the term verification ○ describe visual verification (i.e. visual comparison of data entered with a data source) ○ describe double data entry (i.e. entering data twice and the computer compares the two sets of data, either by comparing them after data has been entered or by comparing them during data entry) •	Discuss with learners the need for verification as well as validation.
16. Graphs and charts	• Produce a graph or chart from the given data ○ select data to produce a graph/chart, including: using continuous data, non-continuous data, and specified data ranges where necessary ○ select the graph or chart type to match the required purpose and meet the needs of the audience ○ label the graph or chart, including: chart title, legend, sector labels, sector values, segment labels, segment values, percentages, category axis title, value axis title, category axis labels, value axis labels, scales ○ add a second data series to a chart, as necessary ○ add a second axis to a chart, as necessary ○ change the maximum and minimum values of an axis scale to appropriate values • enhance the appearance of a graph or chart, including: changing the colour scheme or fill patterns, extracting a pie chart sector to meet the needs of the audience	Provide learners with a set of sales figures for a computer company. The sales figures should show the sales of their best product over the last 12 months. Ask learners to carry out the following tasks: • copy the sales figures into a spread sheet • select a suitable graph/chart to represent the trend for sales for a sales report • add a second data series to the graph/chart to show last year's sales figures too • make sure all elements of the graph are formatted correctly and are appropriate for the purpose.
17. Document production	Document production • Format text and organise page layout	Prepare a new document with about two pages of text (preferably about hardware and software). Save this as a .txt for the learners to access.

	○ set page size ○ set page orientation ○ set page and gutter margins ○ set the number of columns ○ set the column width and spacing between columns ○ define the terms widow and orphan ○ explain why it is necessary to use page, section and column breaks, to adjust pagination and to avoid widows and orphans ○ set and remove page, section and column breaks ○ set line spacing, including: single, 1.5 times, double, multiple, spacing before and after paragraphs ○ set tabulation settings, including: indented paragraphs, hanging paragraphs ○ format text as bulleted or numbered lists to meet the needs of the audience • use software tools to edit tables ○ edit a table structure, where necessary, to include: insert row(s), delete row(s), insert column(s), delete column(s), merge cells ○ set horizontal cell alignment: left, right, centre, fully justified ○ set vertical cell alignment: top, centre, bottom ○ format cells and the cell contents, including: show gridlines, hide gridlines, wrap text within a cell, shading/colouring cells • mail merge a document with a data source ○ explain why mail merged documents are created ○ edit a master document to insert appropriate fields from a data source ○ insert special fields such as date ○ select records to merge ○ merge a document with selected fields ○ save and print merge master document save and print selected merged documents as appropriate	Ask learners to carry out the following: • set the page size to A4 and the orientation to portrait • set the top and bottom margins to 2.5 cm • make the right and left margins fully justified • insert page numbers at the foot of the page. These should start at number one and be printed from the first page. The page numbers should be aligned to the right • the font size should be set at 14 point • set line spacing to 1.5 • key in the following text at the end of the document:

18. Data manipulation
 	
18.1 Create a database structure
	• Design and use suitable software tools to create an appropriate database record structure
	  ○ define the terms flat-file database and relational database
	  ○ explain where it would be appropriate to select a flat-file database or a relational database
	  ○ assign appropriate data types to fields, including: text, numeric, (integer, decimal, percentage, currency), date/time, Boolean/logical (–1/0, yes/no, true/false)
	  ○ explain that other field types like placeholders for media, including images, sound-bites and video clips are used in commercial databases
	  ○ use short, meaningful file and field names
	  ○ format fields and identify sub-types, including: specifying the number of decimal places, specifying a particular currency
	  ○ identify the structure of external data with different file types, including: .csv, .txt, .rtf
	  ○ locate, open and import data from an existing file
	  ○ define and understand the terms primary key and foreign key and their role in a relational database
	  ○ create a relationship between two or three tables
	• discuss the advantages and disadvantages of using relational tables rather than a flat file database
		Ask learners to import the.csv file into a database.
		
		Ask learners to assign appropriate data types to the given fields.
		
		Ask learners to create a primary key for the table

	• Design and use suitable software tools to create a data entry form appropriate to purpose and audience.
	  ○ understand the key features of form design
	  ○ create a data entry form to meet the needs of the audience
	  ○ create a data entry form with all fields included to match the purpose of the task
	• create an appropriate data entry form, including: appropriate font styles and sizes, spacing between fields, character spacing of individual fields, use of white space, radio buttons, drop down menus, highlighting key fields
		Ask learners to create two data entry forms. One to enter new staff into the staff table and one to enter new products into the product tables. Existing staff and products should also be able to be viewed through the forms.

18.2 Manipulate data	• Use arithmetic operations or numeric functions to perform calculations within a database ○ create a calculated field ○ perform calculations at run time using formulae and functions, including: addition, subtraction, multiplication, division, sum, average, maximum, minimum, count • Use suitable software tools to sort data appropriately in a database ○ sort data using a single criterion and using multiple criteria where necessary, into ascending or descending order • Use suitable software tools to search a database to select subsets of data ○ perform suitable searches using a single criterion and using multiple criteria, on different field types like alphanumeric, numeric, Boolean ○ perform searches using a variety of operators including: AND, OR, NOT, LIKE, >, <, =, >=, <=, <> • perform searches using wildcards, as appropriate •	ask learners to search and select all the staff older than 30 (if this isn't too sensitive subject). Within the query, learners should add a calculated field called TOTAL which is the COST multiplied by SOLD. Within the query, learners should be able to search a staff member by surname too.
18.3 Present data	• Use suitable software tools to produce reports to display data appropriate to purpose and audience	Ask learners to produce a report on the staff query created in topic 18.2. The report should count the number of people in the report, calculate the maximum, minimum and average cost and sort the staff in ascending order of age.
19. Presentations	• Use a master slide to appropriately place objects and set suitable styles to meet the needs of the audience ○ identify the need for consistency of presentation, in terms of styles, point sizes, colour schemes, transitions and animations ○ use the master slide to place objects appropriately, including: images, text, logos, slide footers, automated slide numbering	Learners should follow the brief given to create a presentation. Ask learners to set up a master slide for the presentation. The master slide should include a logo, a navigation bar with links for the home page, a resorts and locations general page (there are links off this page to each resort

	○ use the master slide to set font styles, heading styles and colour schemes as required by the audience • manipulate and use specified areas for headings, subheadings bullets, images, charts, colours, text boxes, presenter notes, audience notes as appropriate • Use suitable software tools to create presentation slides to meet the needs of the audience •	and location learners wish to add.) and a contact us page. Learners should look to insert a chart into the resorts and location page to show which are their most popular reports and locations. Learners should look to add slide transitions between each slide and animated elements where appropriate on the slides.
20. Data analysis 20.1 Create a data model	• Create and edit a data model ○ define the terms: cells, rows, columns, sheets, tabs, pages, charts ○ explain the importance of accurate data entry in spreadsheets ○ enter data with 100% accuracy ○ edit the structure of an existing model, including: inserting cells, deleting cells, inserting rows, deleting rows, inserting columns, deleting columns ○ define the terms: formula, function, absolute reference, relative reference, ranges, named cell, named range, nested formulae/functions explain the difference between a formula and a function ○ explain the order in which mathematical operations are performed and use brackets to make sure that formulae work ○ use mathematical operators, including: add, subtract, multiply, divide, indices, where necessary ○ explain the function of, and use, absolute and relative referencing, as appropriate, when formulae are to be replicated ○ use absolute and relative references, named cells, named ranges and nested formulae, as appropriate • use functions, including: sum, average, maximum, minimum, integer, rounding, counting, LOOKUP, VLOOKUP, HLOOKUP, IF and nested functions, when necessary	learners will set up a model for a product.

20.2 Test the data model	• Devise suitable test plans and test the data to demonstrate that the model works
	  ○ define the terms: testing, test data, expected outcome, actual outcome, normal data, abnormal data, extreme data
	  ○ explain the need to test a model before it is used
	  ○ select appropriate test data to thoroughly test a data model
	  ○ justify the choice of test data
	  ○ calculate the expected outcomes before testing the model
	  ○ test the model, correcting errors and re-testing, where appropriate
	• test the model by the use of what it is	

20.3 Manipulate data	• Use search tools in spreadsheet software to select subsets of data •	Use function to find the total the sales value Use formatting features to enhance the spreadsheet.
20.4 Present data	• Use software tools to adjust the display features in a spreadsheet	Create a sample data spread sheet with a variety of column and width sizes for the learners to format and present in a more attractive fashion.
Strand :-Web Authoring. 21.1 Web development layers	• Identify and describe the three web development layers • Understand the function of: content layer to enter the content and create the structure of a web page; presentation layer to display and format elements within a web page; behaviour layer to enter scripting language to elements within a web page	Select a suitable website and ask learners to view the source code. Ask learners to identify which parts of the code are the content layer, the presentation layer and the behaviour layer. create a website for a local shop. Your website needs to have at least three different pages, and should advertise the shop and the products that they sell. Create styles for headings, paragraphs and bulleted lists.
21.2 Create a web page	• Use software tools to create the content layer of a web page to meet the needs of the audience	Learners should look to pick out things like the title is placed in the header along with any attached style sheets and identification of the use of a scripting language.

		Apply the style sheet to all pages as you create them. Make sure it is placed in the correct section. Tag the text on each page with the appropriate text style, e.g. h1, h2, h3, h, li. Learners could look to include the following content and styling to their website, to exercise the extent of the skills they need to be able to demonstrate
	• Use software tools to appropriately place the content in a web page •	Learners need to look to add at least one movie clip and one sound clip into their website. They could look to include an audio welcome message, or jingle for the website, and use this as a sound clip.
	• Use software tools to create navigation within a web page and between web pages •	Discuss with learners that webpages can be set up in different ways. Show learners a webpage that has individual pages that are linked using navigation links. Create links on this page back to the index page and the second page.
7. System Life Cycle 7.1 Analysis	• Methods of researching an existing system • identify and describe methods of researching an existing system (e.g. observation, interviews, questionnaires and examination of existing documents) discuss the disadvantages and advantages of the different methods.	Provide a flow chart to show the stages in systems analysis, starting with analysis and finishing with evaluation and review. This will provide a clear picture of systems analysis and design.
7.4 Implementation	• Different methods of system implementation • describe the four methods of implementation (direct changeover, parallel running, pilot running, phased implementation)	. Ask learners to choose an appropriate method of installation for each and justify their choice. Learners can discuss the advantages and disadvantages for the four methods of implementation and when it would be appropriate to use them. Learners make notes of their thoughts and share them with the rest of the class.

7.5 Documentation	• Technical documentation for an information system explain the need for technical documentation • identify the components of technical documentation	Ask learners to identify what they would expect to find in a user manual for a system. Learners may look at different types of technical documentation used.
7.6 Evaluation	Describe the need to evaluate a solution in terms of the efficiency of the solution, the ease of use of the solution, and the appropriateness of the solution	Give learners a list of requirements and a solution e.g. a spreadsheet model. Ask learners to evaluate how closely (or not) the model meets the requirements.
Storage devices and media	• Identify storage devices and their uses, ○ optical backing storage media ○ solid state backing storage: solid state drives, memory sticks/pen drives, flash • Describe the advantages and disadvantages of the above devices	Give learners a table with storage devices in and ask them to compare them for use, size, advantages and disadvantages. Students will present a PowerPoint
Communication Communicate with other ICT users using email	• Describe the constraints that affect the use of email, including: the laws within a country, acceptable language, copyright, local guidelines set by an employer, the need for security, netiquette, password protection • Define the term spam • Explain why spam needs to be prevented • Describe the methods which can be used to help prevent spam Explain why email groups are used	• Discuss software copyright laws and why they are required. Learners will know of issues concerning the music industry and how they are affected by illegal downloads (online piracy). Internet streaming music software, e.g. 'Spotify' can be researched and discussed. • Learners may create a glossary of terms where they can write their own definitions and information about each term which is listed in the learning objectives column and learners are required to learn. **(I)** • Learners compile a list of advantages and disadvantages of using the internet.
10.2 Effective use of the internet	• Fundamentals of the internet • Advantages and disadvantages of using the internet	• Learners may create a glossary of terms where they can write their own definitions and information about each term which is listed in the learning objectives column and learners are required to learn.

		• Learners list the uses of social networking and describe their own experiences of using it. Issues may be discussed.
Networks: Network issues and communication	• Network communication	• Ask learners to compare and contrast the use of fax and email and consider how they are similar and how they differ. • Ask learners to consider what pros and cons are of email and video conference each method. • How biometric devices work: www.howstuffworks.com/biometrics.htm
ICT applications 6.4 Microprocessors in control applications	• Describe the role of a microprocessor or computer in control applications, including the role of the pre-set value • Describe the use of computer control in applications (e.g. turtle graphics, automatic washing machines, automatic cookers, computer controlled central heating systems, burglar alarms, computer controlled glasshouse)	Ask learners to create a flowchart to represent the control system involved in a burglar alarm.
6.5 Modelling applications	• Describe the use of computer modelling in spreadsheets (e.g. for personal finance)	Ask learners to consider the impact of not modelling the budget for an event e.g. a concert, on a spreadsheet. They should be raising issues such as not knowing what to effectively charge as a ticket price.
6.6 Applications in manufacturing industries	• Describe a range of computer controlled applications (e.g. robotics in manufacture and production line control) • Discuss the advantages and disadvantages of using computer controlled systems rather than humans	**Extension activity:** Learners in small groups investigate a range of computer controlled applications and report to the rest of the class.
6.10 Computers in medicine	• Describe the contents of information systems in medicine (including patient records, pharmacy records, monitoring and expert systems for diagnosis)	**Extension activity:** Ask learners to research a news story about 3D printing in medicine. Ask learners as a group to give a presentation about what they have

	• Describe how 3D printers can be used in producing medical aids (e.g. surgical and diagnostic aids, development of prosthetics and medical products, tissue engineering, artificial blood vessels and the design of medical tools and equipment)	discovered.
6.12 Expert systems	• Identify a range of applications which use expert systems (e.g. mineral prospecting, car engine fault diagnosis, medical diagnosis, chess games) • Identify the components of an expert system (e.g. interactive user interface, inference engine, rules base, knowledge base) • Describe how an expert system is used to suggest diagnoses	Ask learners to use an example of an experts system e.g. WebMD and ask them to identify how it is giving a diagnosis. Ask them to identify the different elements that allow this to happen.
6.13 Computers in the retail industry	• Describe the use of point of sale (POS) terminals, how the stock file is updated automatically, and how new stock can be ordered automatically • Describe the use of electronic funds transfer at point of sale (EFTPOS) terminals (e.g. the checking of the validity of cards, the use of chip and PIN, the communication between the supermarket computer and the bank computer) • Describe internet shopping • Discuss the advantages and disadvantages of internet shopping	. Ask learners to then investigate an online supermarket to see if what they thought matches up to what they find.
6.14 Recognition systems	• Describe how recognition systems work (e.g. Magnetic Ink Character Recognition (MICR), Optical Mark Recognition (OMR) and Optical Character Recognition (OCR), Radio Frequency Identification Device (RFID)) • Describe how number plate recognition systems work • Describe the processing of cheques	• Provide a list of types of recognition systems and ask the learners to think about where they would be used, e.g. Magnetic Ink Character Recognition (MICR) is commonly used in the banking industry. • Learners list and discuss applications for Optical Mark Recognition (OMR), and feedback to the rest of the class.

	• Describe the processing of OMR media (e.g. school registers, multiple choice examination papers) • Describe how RFID is used in a range of applications (e.g. tracking stock, passports, automobiles, contactless payment)	• Discuss with learners about how MICR is used in a bank. • Discuss with learners about how Radio Frequency Identification Device (RFID) tags are used in an airport.
System Life Cycle: **7.2 Design**	• Describe how it is necessary to design documents, files, forms/inputs, reports/outputs and validation • Produce designs to solve a given problem • Design data capture forms and screen layouts • Design report layouts and screen displays • Design validation routines (including length check, type check, format check, presence check, check digit) • Design the required data/file structures (e.g. field length, field name, data type)	• Ask learners to design a data capture form for signing up to a social networking site. Ask them to consider a logical layout and validation methods in their design. • Present the most common methods of validation to the class, with descriptions and examples – learners should make notes and add these to their glossary of terms.
7.2 Development and testing	• Describe how it is necessary to design documents, files, forms/inputs, reports/outputs and validation • Produce designs to solve a given problem • Design data capture forms and screen layouts • Design report layouts and screen displays • Design validation routines (including length check, type check, format check, presence check, check digit) • Design the required data/file structures (e.g. field length, field name, data type)	Present the most common methods of validation to the class, with descriptions and examples – learners should make notes and add these to their glossary of terms.

7.3 Development and testing	• Testing designs describe how data/file structures are created and tested describe how validation routines are created and tested describe how input methods are created and tested describe how output formats are created and tested • Testing strategies describe the need to test each module describe the need to test the whole system describe testing using normal data including definition and examples describe testing using live data including definition and examples describe testing using abnormal data including definition and examples describe testing using extreme data including definition and examples • Improvements needed as a result of testing describe how it may be necessary to improve the system and make changes (e.g. data/file structures, validation routines, input methods, output formats may need to be amended/improved)	The designers will have to be sure that they have designed appropriate validation routines that will test the data input to a system. Review the range of validation checks.
8. Safety and security 8.3 Security of data	• Security of data online ○ explain what is meant by the term digital certificate and its purpose ○ explain what is meant by the term Secure Socket Layer (SSL) ○ the subject of fraud when using a credit card online ○ explain the issues related to security of data in the cloud ○ explain the concept of a firewall and why it is used ○ discuss the effectiveness of different methods of increasing security	• Show learners a sample phishing email. Ask them to determine why it is a phishing email: Dear customer (as opposed to your name), spelling/punctuation mistakes, asking you to click on a link to verify your account, links that are not related to the supposed sender, etc. • A quiz or true/false activity can summarise and consolidate knowledge and understanding of terms. Learners may provide questions to ask other learners in the class. • Learners should add key terms and make notes to their glossary of terms so that they can refer to them

		easily. **Extension activity:** Learners create a poster, presentation or leaflet about internet security. Alerting people to the threats and suggesting how to avoid them. **(I)**
21. Website authoring 21.3 Use style sheets	• Use software tools to create the presentation layer of a web page	• . Demonstrate to learners how to apply formatting to text using the style attribute within the tag, and then how to apply the same formatting using a style sheet and classes. Ask learners if they can see any benefits and drawbacks of each method.

SUBJECT: ART		
Strand/Topics	**Learning Objectives (CAIE expectations)**	**Learning Experiences/Engagements**
Understanding the Course outline, assessment objectives and requirements of the two components	Understanding the demands and requirements of the course.	Course outline Student will be made acquainted with the Yearly planning of the syllabus Requirements of each of the components will be explained. Students will go through the syllabus for more information. Introduction to Component 1 Requirements of Component 1 will be explained and also they'll be explained that it is made up of two parts: the portfolio and the final outcome. Student will select a theme for their coursework on the basis of their technical skills in art and their own interest. Students will select their best works from both of these coursework as well as the class work assignments to form their Component 1 Coursework and submit this to Cambridge International. The assessment objectives Students will be Introduced to the assessment objectives (AO1–AO4). AO1 Record ideas observations and insights relevant to intentions as work progresses AO2 Explore and select appropriate resources, media, materials, techniques and processes AO3 Develop ideas through investigation, demonstrating critical understanding AO4 Present a personal and coherent response that realises intentions and demonstrates an understanding of visual

		language.
Elements of Art	-To be able to identify & assess the elements of art in artwork and the environment -To be able to use the elements of art intentionally & effectively for creating the artwork -to be able to Understand what the visual elements refer to in order to develop aesthetic awareness. To gain language which they can use to describe the real, imagined, visual and tactile worlds. In order to be able to use this vocabulary to discuss features of their work and progress.	Students will be creating an assignment based on their previous knowledge where they had been introduced to the Seven elements of art and how effectively they could be used to create the artwork. Student will demonstrate thoughtful use of seven elements of art I.e. Line Texture Colour Shape Form Space Value in various boxes along with the Artist's reference showing the intentional use of these elements of art to create an effective piece of artwork
Shopping bag with some of its content spilling out	-to be able to create their own primary source with appropriate light and shade by clicking the images of the object. -To be able to record observations from primary source in drawing as well as painting. -Draw and paint the objects as accurate to the still life as possible. Find relationships between objects.	Student will be demonstrated how to draw the group of objects (i.e. arrangement of vegetables coming out from a shopping bag) based on which they'll make their own initial sketches of various compositions from various angles from the primary sources created by themselves. After the completion of initial sketches of those compositions they'll select one of those sketches to create their final drawing to complete it along with painting and pencil rendering.
Trash or Treasure	-to be able to develop an idea around a give theme to create an artwork -gather information from a range of sources to inform their	Student will do the mind mapping to find out various possibilities they can explore for the given theme. They'll be gathering information relevant to their theme and create their own primary sources (i.e. clicking photographs of old toys, collection of old

	thinking -to be able to manipulate the images in their work to represent their ideas -To be able to able to use the elements of art effectively to present the theme given -to be able to make personal collections to inspire ideas - to be able to annotate drawings and make written notes related to their work to inform about their work	coins ,stamps , pressed flowers and leaves etc.) according to the selected topic. Student will be making initial sketches and compositions from the primary sources they have created. Based on these initial sketches where they'll try various possibilities to depict their theme, they'll create a final drawing which will show the development from the previous sketches. They'll complete the same by making planned use of line, texture, colours and values to represent their theme effectively. In preparatory work they'll write the annotations to explain their theme as well as to explain why and how elements of art have been used intentionally
Coursework assignment	-To be able to apply their experience of materials and processes, including drawing, to develop their control of tools and techniques	Students will apply their past experience of materials (i.e. Poster colours, water colours, colour pencils, charcoal etc.) And processes (e.g. creating a background with collage or texture relevant to their theme and then creating their final work on it), including drawing, to develop their control of tools and techniques (e.g. various techniques to use watercolours, different ways of pencil rendering etc.)
Clothes hanging on the back of the chair	-to be able to arrange the objects to create a still life for their own primary sources. - To be able to record observations of clothes from primary source in drawing as well as painting.	Student will be demonstrated how to draw the details (Such as texture of clothes, folded parts) of the clothes based on which they'll make their initial sketches from various angles from the primary sources created by themselves. After the completion of initial sketches and compositions they'll select one of those sketches to create their final drawing to complete it along with painting.

		Students will make use of various textures to create a realistic work based on their primary sources
Changing times	- To be able to develop an idea with the help of mind mapping around a given theme to create an artwork - To be able to use a variety of methods and approaches to communicate observations, ideas and feelings, and to make images and artwork - To be able to explore materials and processes used in artwork and how these can be matched to ideas and intentions	Student will do the research on the given theme, along with gathering the relevant information and images and will create the primary sources by clicking pictures of various objects (such as old toys- new gadgets to represent symbolically the changing time) . They will make initial sketches and compositions from the primary sources they have created. Based on these initial sketches where they'll try various possibilities to depict their theme, they'll create a final drawing which will show the development from the previous sketches. -students will create a background by crumpling and sticking the old newspapers and then creating the final drawing on top of it They'll complete the same by making planned use of line, texture, colours and values to represent their theme effectively. In preparatory work they'll write the annotations to explain their theme as well as to explain why and how elements of art have been used intentionally
A branch with blossom and leaves	-to be able to create their own primary source with appropriate light and shade by clicking the images of the natural object. -To be able to record observations from primary source in drawing as well as painting.	Student will be demonstrated how to draw the intricate details (Such as stem, veins of leaves etc) of the plant based on which they'll make their initial sketches from various angles from the primary sources created by themselves. After the completion of initial sketches they'll select one of those

		sketches to create their final drawing to complete it with water colours.
Torn Apart	-to be able to develop an idea around a give theme to create an artwork -gather information from a range of sources to inform their thinking -to be able to manipulate the images in their work to represent their ideas - to be able to create various textures necessary to represent their theme -to be able to make personal collections to inspire ideas -to be able to annotate drawings and make written notes	Student will discuss the theme amongst themselves and will come up with different ways of representing a given theme in their work according to which they'll create their primary sources .using these sources they'll make initial sketches. Based on these initial sketches where they'll try various possibilities to depict their theme, they'll create a final drawing which will show the development from the previous sketches. They'll complete the same by making thoutful use of line, texture, colours and values to represent their theme effectively. In preparatory work they'll write the annotations to explain their theme as well as to explain why and how elements of art have been used intentionally
Coursework assignment	Use a variety of methods and approaches to communicate observations, ideas and feelings, and to design and make images and artefacts.	Students will Use a variety of methods (e.g. using symbolism or using surrealist devices etc.) and approaches to communicate observations, ideas and feelings, and to design and make images and artefacts.
Coursework assignment	apply their experience of materials and processes, including drawing, developing their control of tools and techniques	Students will apply their past experience of materials (i.e. Poster colours, water colours, colour pencils, charcoal etc.) and processes(e.g. creating a background with collage or texture relevant to their theme and then creating their final work on it), including drawing, developing their control of tools and techniques (e.g. various techniques to use watercolours, different types of pencil rendering etc.)

Open box of chocolates	-to be able to create their own primary source with appropriate light and shade by clicking the images of group of manmade objects. -To be able to record observations from primary source in drawing as well as painting. -To be able to Draw and paint the objects as accurate to the still life as possible. Find relationships between objects and try to convey meaning through it.	Student will be demonstrated how to draw the group of manmade objects with its characteristics (such as the folds on the wrapping paper , typography on the chocolate box etc.) of the plant based on which they'll make their initial sketches from various angles from the primary sources created by them. After the completion of initial sketches they'll select one of those sketches to create their final drawing to complete it along with painting.
Metamorphosis	-to be able to develop an idea around a give theme to create an artwork -gather information from a range of sources to inform their thinking -to be able to manipulate the images in their work to represent their ideas - to be able to draw the human faces (with basic knowledge of the structure of it) with expressions -make personal collections to inspire ideas annotate drawings and make written notes	Student will study various stages of caterpillar transforming into a butterfly by making initial sketches from the secondary sources they have gathered. Based on these initial sketches where they'll try various possibilities to depict their theme, they'll create a final drawing which will show the development from the previous sketches. They'll complete the same by making planned use of line, texture, colours and values to represent their theme effectively. In preparatory work they'll write the annotations to explain their theme as well as to explain why and how elements of art have been used intentionally
In disguise	-to be able to develop an idea around a give theme to create an artwork -gather information from a range of sources to inform their thinking -to be able to manipulate the images in their work to represent	Student will study the structure of a human face by making initial sketches and compositions from the primary sources they have created. Based on these initial sketches where they'll try various possibilities to depict their theme, they'll create a final drawing

	their ideas - to be able to draw the human faces (with basic knowledge of the structure of it) with expressions -make personal collections to inspire ideas annotate drawings and make written notes	which will show the development from the previous sketches. They'll complete the same by making planned use of line, texture, colours and values to represent their theme effectively. Students will make use of watercolours and inks to paint their artwork. In preparatory work they'll write the annotations to explain their theme as well as to explain why and how elements of art have been used intentionally
A hair dryer brush mirror and towel	-to be able to arrange the objects to create a still life for their own primary sources. - to be able to arrange a still life with certain objects to convey ideas and meanings - To be able to record observations of a group of objects from primary source in drawing as well as painting.	Student will arrange their own group of objects to create their own still life set up. They'll create primary sources from various angles and with appropriate use of light and shade. They'll make their initial sketches of various compositions from various angles from the primary sources created. After the completion of initial sketches and compositions they'll select one of those sketches to create their final drawing to complete it along with painting as well as colour pencil.
Distorted reflections	-to be able to develop an idea by discussing with other students , mind mapping and by researching the theme around a give theme to create an artwork -gather information from a range of sources to inform their thinking -to be able to manipulate the images in their work to represent their ideas - to be able to draw the human faces (with basic knowledge of	Students will study the structure of a human face by making initial sketches and compositions from the primary sources (such as reflections on various surfaces e.g. mirror, water, steal vessels) they have created. Based on these initial sketches where they'll try various possibilities to depict their theme, they'll create a final drawing which will show the development from the previous sketches. They'll complete the same by making thoughtful use of line,

	the structure of it) with expressions -make personal collections to inspire ideas annotate drawings and make written notes	texture, colours and values to represent their theme effectively. In preparatory work they'll write the annotations to explain their theme as well as to explain why and how elements of art have been used intentionally
A person sitting on the edge of a table	-To be able to draw the human figure in a particular posture with basic knowledge of human anatomy -to be able to create a primary source for drawing human figure in a given posture	Student will create primary sources for their observational assignment by arranging the model in a given posture and by clicking the images from various angles and light Before starting the actual drawing student will study the structure of a human body with the help of anatomical drawings by other artists to prepare for the final work Student will make initial sketches (from various angles) and compositions from observation of their primary sources.
Items on a shelf	-to be able to arrange the objects to create a still life for their own primary sources. - to be able to arrange a still life with certain objects to convey ideas and meanings - To be able to record observations of a group of objects from primary source in drawing as well as painting.	Student will arrange their own group of objects to create their own still life set up. They'll create primary sources from various angles and with appropriate use of light and shade. They'll make their initial sketches of various compositions from various angles from the primary sources created. After the completion of initial sketches and compositions they'll select one of those sketches to create their final drawing to complete it along with painting as well as colour pencil.
Final Outcome	Student will create their final outcome for their coursework according to their selected theme.	Student will create their final outcome for their coursework which will show the gradual development of the theme they have selected at the start of this course. For which they'll be using the media they are well versed with.