WOOTTON PARK

FOUNDATION FOR GROWTH

'Ipsum quod faciendum est diutius'

Year 10 Knowledge Maps
With Separate Sciences
Term 5 and 6

Your Name	
Your Email Address	

Subject: English Language – Year 10	Term: 4	Topic: Paper 1 – Unseen Literature Revision

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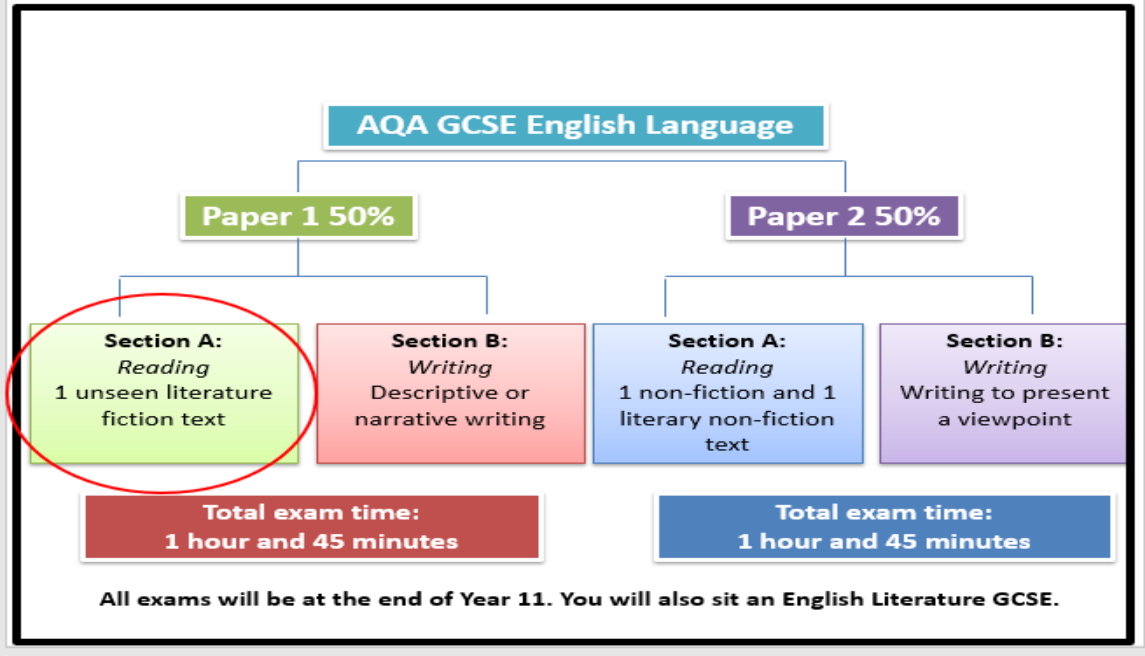
'Ipsum quod faciendum est diutius durant'



Support Websites:

GCSE Bitesize:

https://www.bbc.com/bitesize/examspecs/zcbchv4

AQA:

https://www.aqa.org.uk/subjects/english/gcse/english-language-8700

AQA GCSE English Language Assessment Objectives

AO1: **Identify** and understand **explicit** (obvious) and **implicit** (hidden) information and ideas. **Select** and **synthesize** (blend) evidence from different texts.

AO2: **Explain**, **comment** on and **analyse** how writers use **language and structure** to achieve effects and influence readers, using relevant subject terminology.

AO3: **Compare** writers' **ideas and perspectives**, as well as how these are conveyed, across two or more texts.

AO4: **Evaluate** texts **critically** and **support** this with appropriate **textual references**.

AO5: Communicate **clearly, effectively** and **imaginatively**, adapting **tone, style** and **register** for different TAP. **Organise information** & **ideas**, using **structural** and **grammatical** features.

AO6: Use a range of **vocabulary** and **sentence structures** for clarity, purpose and effect, with **accurate spelling** and **punctuation**.

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Paper 1, Section A:
First Responses to Unseen Prose

Meaning

- **what is the extract about?**
- what happens in the extract?
- **Theme(s)** of the extract - what is it really about?
- where does the extract "get to" from start to end?

Tone

- What is the mood and atmosphere of the extract? (angry, sad, nostalgic, bitter, humorous, frightening etc)

Imagery and Language

- **Alliteration** - the repeating of initial sounds.
- **Metaphor** - comparing two things by saying one is the other.
- **Simile** - comparing two things saying one is like or as the other.
- **Personification** - giving something non-human human qualities.
- **Onomatopoeia** - words that sound like the thing they describe.
- **Repetition** - does the writer repeat words or phrases?
- **What kinds of words are used?**
- **Connotation** - associations that words have
- **Ambiguity** - is the word or phrase deliberately unclear? Could it mean opposite things or many different things?
- **Word order** - are the words in an unusual order – why?
- **Adjectives** - what are the key describing words?
- **Slang or unusual words and misspellings** - Does the writer use slang or informal language?
- **Characters** - how do they speak? Do they all sound the same?

Character

- **who** is the telling the story?
- What is the **narrative voice**? Is it first or third person?
- What characters do we meet?
- How are the characters introduced?
- What do we learn about the characters that might be important?

Setting

- What **location** is described? How do you know?
- What is the **weather** like?
- What **time** of day is it?
- What **period** is it set in? How do you know?

Structure

- **Sentences**- what shapes, styles and patterns can you see?
  - Opening – how does the extract begin?
  - Ending – how does the extract finish? Is there a clear resolution?
- **Flashbacks** – are any included? What do they reveal?
- **Repetition** – are any ideas or patterns repeated? Why?
- **Connections** – how do the paragraphs link together?
- **Narrative perspective** – does this stay the same throughout?
- **Linear/non linear** – is there a clear order to the events?

Key Words

Imagery and Language	
Alliteration	Words in a sentence/passage that begin with the same letter or sound.
Plosive alliteration	Repetition of the B or P sound at the beginning of words.
Sibilance	Repetition of the S or SH sound at the beginning of words.
Metaphor	Comparing one thing to another by saying it is something else e.g. the tree was a mountain.
Simile	Comparing one thing to another using *like* or *as* e.g. the tree was like a mountain.
Personification	Giving an inanimate object human qualities.
Onomatopoeia	Words that sound like what they are e.g. *bang/crash/drip.*
Repetition	Repeating a word or idea more than once.
Adjective	A describing word.
Verb (dynamic/modal)	A doing word.
Noun (abstract/concrete)	A naming word.
Pronoun	I/You/He/She/They etc.
Adverb	Describes a verb, usually ends in –ly.
Connotation	The associated meanings of a word e.g. the connotations of red might be love/danger/anger etc.
Colloquial language	Informal or slang language.
Semantic field	A group of words suggesting a theme/topic e.g. a semantic field of war – guns/bullets/army/soldier

Character	
Narrative voice	The perspective from which the story is told.
Archetype	A familiar/traditional character used seen in many stories across different cultures e.g. the villain.
Protagonist	The main character.
Setting	
Pathetic fallacy	When the weather reflects the actions/mood of the story.
Structure	
Declarative sentence	A statement e.g. *The sky is blue.*
Imperative sentence	A command e.g. *Stop running.*
Interrogative sentence	A question.
Exclamative sentence	A sentence ending with a !
Linear narrative	Narrative that follows a straight line e.g. *beginning – middle – end.*
Non-linear narrative	Often starts in the middle of the story and then goes back to the beginning may involve flashbacks.
Cyclical narrative	A story that ends where it begins.
Motif	Reoccurring ideas and themes throughout the story.
Asyendetic list	A list without conjunctions or connectives.
Climax	The point of greatest tension in the story.
Foreshadowing	Hints of what is to come in the story.

These are the main techniques that you need to learn and remember for Paper 1, Section A.

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FOUNDATION FOR GROWTH

'Ipsum quod faciendum est diutius durant'

AO2

Question Two

WOOTTON PARK
'Ipsum quod faciendum est diutius durant'

WOOTTON PARK
'Ipsum quod faciendum est diutius durant'

10 Minutes **8 Marks**

How does the writer use language to ….?

You could include the writer's choice of:

- Words and phrases
- Language features and techniques
- Sentence forms

- You must focus on the **effect** of the language. What **impact** does it have on the **reader**?
- Select quotations with **precision** – focus on the impact of **specific words.**
- Pay attention the section of the extract you have been asked to read.

x4

Point — 1) Use your topic sentence to make a **point** relevant to the question.

Evidence — 2) Select **evidence** from the text – pick out a key quotation.

Explain — 3) **Explain** the evidence – this should be the longest part of the paragraph.

Link — 4) Finish the paragraph by establishing a **link** back to the question.

Emotive language	Metaphor	Personification	Noun	(Dynamic) Verb
Semantic field	Simile	Asyndetic list	Adjective	Adverb

AO2

Question Three

WOOTTON PARK
'Ipsum quod faciendum est diutius durant'

WOOTTON PARK
'Ipsum quod faciendum est diutius durant'

10 Minutes **8 Marks**

x4

You now need to think about the whole of the text.

How does the writer structure the text to interest you as a reader?

- You must focus on the **effect** of the structure. What **impact** does it have on the **reader**?
- Select quotations with **precision** – focus on the impact of **specific words.**
- You must think about the **whole** of the text. Where does it get to from the beginning to end?

Point — 1) Use your topic sentence to make a **point** relevant to the question.

Evidence — 2) Select **evidence** from the text – pick out a key quotation.

Explain — 3) **Explain** the evidence – this should be the longest part of the paragraph.

Link — 4) Finish the paragraph by establishing a **link** back to the question.

Beginning	Whose views?	Where am I?	Middle	Who is here?	What's it made of?	Ending

AO4

Question Four

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'Ipsum quod faciendum est diutius durant'

20 Minutes | **20 Marks**

This question will ask you **to what extent you agree with a statement**. You will need to **evaluate the text** in the light of your opinion on it. You will need to **support your opinion with detailed analysis and reference to the text.**

Mini introduction → **Evaluation**

Evaluation

Evaluation

Evaluation → **Mini Conclusion**

Level 4	**16-17-18-19-20**	▪ Critically evaluates the text in a detailed way ▪ Offers examples to explain views convincingly ▪ Analyses effects of a range of writer's choices ▪ Selects a range of relevant quotations

Point — 1) Use your topic sentence to make a **point** relevant to the question.

Evidence — 2) Select **evidence** from the text – pick out a key quotation.

Explain — 3) **Explain** the evidence – this should be the longest part of the paragraph.

Link — 4) Finish the paragraph by establishing a **link** back to the question.

Subject: **English (Year 10)**	Term: **4**	Topic: **English Language Paper 1 Section B Revision**

WOOTTON PARK

'Ipsum quod faciendum est diutius durant'

English Language Paper 1 Section B
Descriptive and Narrative Writing

In Section B of the English Language Paper 1, you will be asked to write either a DESCRIPTIVE or NARRATIVE based piece. This is worth 50% of marks for the paper and will last for 45 minutes.

Example Question:
Write a description of a scene inspired by this image.

Assessment Criteria (AO5 & AO6)

AO5 Content and Organisation

Level 4	24 23 22 21 20 19	**Content** • Communication is convincing, compelling • Tone, style, register assuredly matched to PAF • Extensive and ambitious vocabulary with sustained crafting of linguistic devices **Organisation** • Highly structured ,developed writing, a range of integrated and complex ideas • Varied and inventive use of structural features
Level 3	18 17 16 15 14 13	**Content** • Communication is consistently clear & effective • Tone, style and register matched to purpose, form and audience • Increasingly sophisticated vocabulary and phrasing , chosen for effect with a range of appropriate linguistic devices **Organisation** ▪ Writing is engaging with a range of detailed connected ideas ▪ Effective use of structural features
Level 2	12 11 10 9 8 7	**Content** • Communication is mostly successful • Sustained attempt to match purpose, form and audience; some control of register • Conscious use of vocabulary with some use of linguistic devices **Organisation** • Increasing variety of linked and relevant ideas • Some use of structural features
Level 1	6 5 4 3 2 1	**Content** • Simple success in communication of ideas • Simple awareness of purpose, form and audience; limited control of register • Simple vocabulary; simple linguistic devices **Organisation** • One or two relevant ideas, simply linked • Random paragraph structure • Evidence of simple structural features

AO6 Technical Accuracy

Level 4	16 15 14 13	• Sentence demarcation is consistently secure and accurate • Wide range of punctuation is used with a high level of accuracy • Uses a full range of appropriate sentence forms for effect • Uses Standard English consistently and appropriately • High level of accuracy in spelling, including ambitious vocabulary • Extensive and ambitious use of vocabulary
Level 3	12 11 10 9	• Sentence demarcation is mostly secure and accurate • Range of punctuation is used, mostly with success • Uses a variety of sentence forms for effect • Mostly uses Standard English appropriately • Generally accurate spelling, including complex and irregular words • Increasingly sophisticated use of vocabulary
Level 2	8 7 6 5	• Sentence demarcation is usually secure • Some control of a range of punctuation • Attempts a variety of sentence forms • Some use of Standard English with some control of agreement • Some accurate spelling of more complex words • Varied use of vocabulary
Level 1	4 3 2 1	• Occasional use of sentence demarcation • Some evidence of conscious punctuation • Simple range of sentence forms • Occasional use of Standard English with limited control of agreement • Accurate basic spelling • Simple use of vocabulary

Websites:

GCSE Bitesize:
https://www.bbc.com/bitesize/guides/zy47xsg/revision/1

AQA:
https://www.aqa.org.uk/subjects/english/gcse/english-language-8700

Subject: **English (Year 10)**	Term: **4**	Topic: **English Language Paper 1 Section B Revision**

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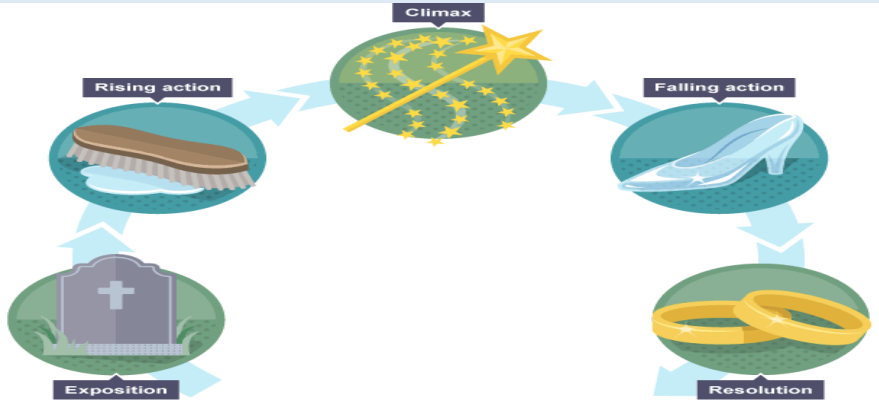
English Language Paper 1 Section B
Descriptive and Narrative Writing

The key to great descriptive and narrative writing is PLANNING! You can use some of these tips to help you plan a great creative response.

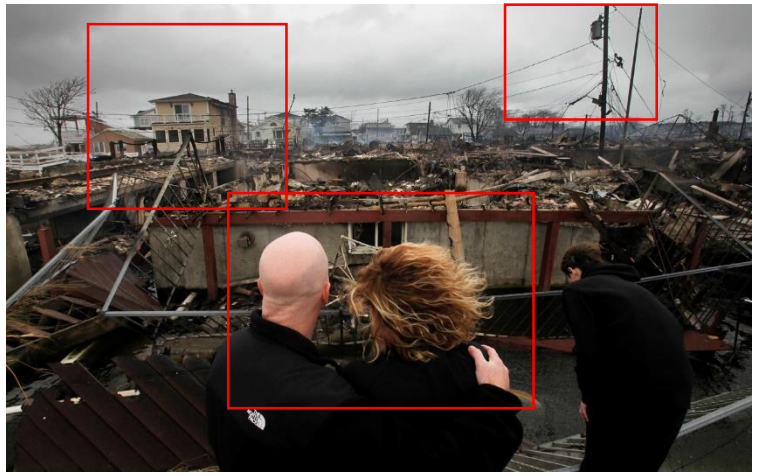
1) Structuring a Story

Most fictional (and non-fictional) stories follow a recognisable pattern. One pattern that is familiar to readers is the five-stage story arc. This structure is also used in films and television shows.
A five-stage story arc takes the reader through the following stages:
exposition - an opening that hooks the reader and sets the scene
rising action - builds tension
climax, or turning point - the most dramatic part of the story
falling action - realises the effects of the climax
resolution - the story is concluded
Think back to the last book you read - where were the five points to the story?



2. Box Planning

When exploring the image in the question, you could use box planning to help focus your descriptions or narratives on different elements or focus areas



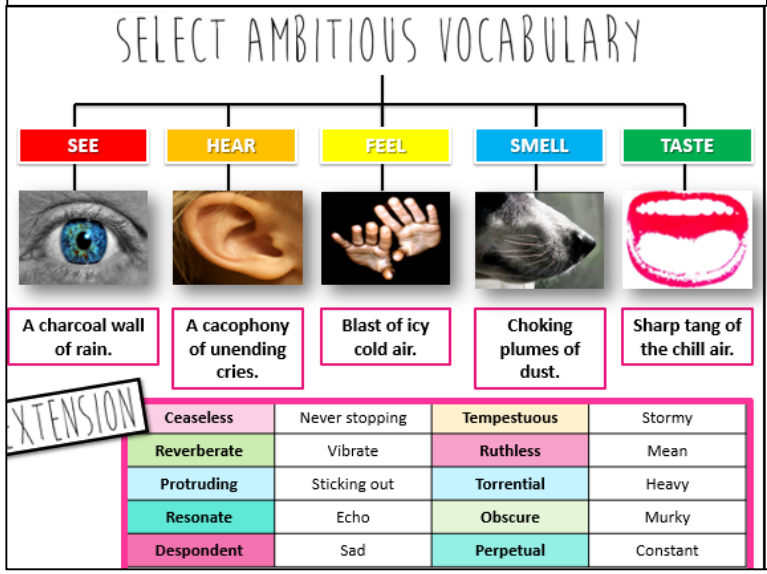
3) Selecting your Vocabulary Carefully

Linguistic Devices:

Metaphor
Simile
Personification
Allusion
Figurative language
Imagery
Sensory detail
Alliteration
Sibilance
Assonance

Structural Devices:

Simple/complex sentences
Foreshadowing
Flashback
Temporal shifts
Macro/Micro focus
Paragraphing for effect



Subject: **English (Year 10)**	Term: **4**	Topic: **English Language Paper 1 Section B Revision**

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English Language Paper 2 Section B
Discursive Writing

The key to great discursive writing is PLANNING! You can use some of these tips to help you plan a great response.

Introduction to writing non-fiction

Texts that deal with facts, opinions and the real world are usually described as non-fiction. Different text types, or forms of non-fiction have particular **conventions**. These are the typical or expected features of a form and include structure, language and tone. For example, a newspaper article usually has a headline, uses formal language and takes a serious tone. A political speech usually addresses the audience directly, includes persuasive language and often has a rousing tone.

With all writing tasks it is important to consider:

- the conventions of the form
- your intended audience (reader)
- the purpose of your writing

Example Question

Trump has stated that he believes a fifth of teachers should carry weapons and be trained in marksmanship to combat school shootings.

Write a **letter** to **Donald Trump**, **arguing your point of view on this statement.**

Success Criteria

- Persuasive techniques
- Interesting structural features
- Matched to the TAP
- Engaging vocabulary
- Engaging writing
- Discourse markers
- Language techniques
- Personality comes through
- Paragraphs

- Sentence starters
- A **range** of punctuation
- Paragraphs
- Variety of sentence types/lengths
- Standard English
- Accurate spelling
- Sophisticated vocabulary

LANGUAGE EXAMPLES	STRUCTURE EXAMPLES
Word classes (verbs, adverbs, adjectives, nouns, pronouns)	Juxtaposition/ Contrasts
Imagery (olfactory, gustatory, auditory, visual, tactile, kinaesthetic, colour, nature)	Tension
Metaphor	Narrative Voice
Simile	Suspense
Personification	Punctuation
Alliteration	Paragraphing
Tense (past, present, future)	Sentence Types (simple, compound, complex)
Irony	Sentence Functions (declarative, interrogative, imperative, exclamative)
Hyperbole	Lists
Dialogue	Sentence Lengths
Statistics/Facts	Semantic Fields
Emotive Language	Repetition
Triplets	Cliff-hanger
Anecdotes	Cyclical structure
Rhetorical Questions	Expert Opinions
Puns	

Subject: English – Year 10	Term: 4	Topic: English Language Paper 2 – Writers' Viewpoints and Perspectives

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Reading 2 Non-Fiction Texts

15 min

- One 19th century text
- One modern text

Read exam questions first and highlight key words.
What are both texts about? What facts and opinions can you identify?
At the top of each extract write the **type of text** (article, letter, ect.), **audience** and **purpose**.

Q1 Tests your *understanding* of the unseen text.

5 min

Answer this question as you read the text for the 1st time

- Select 4 TRUE statements from the list of 8
- **Always tick 4 boxes** – if you aren't sure, at least have a guess!
- **Check your answer** by reading the section of the text you are directed to – the facts might be obvious or you may have to infer meaning

Q3 – 12 marks

15 min

Language analysis – focus on 1 text

3 paragraphs following this structure:

- The writer has used technique + critical verb + effect (linked to question)
- Quote(s)
- Single word analysis

Top Tips:

- Select sophisticated techniques e.g. juxtaposition & sibilance
- Identify ***a range*** of language features – do not only pick out verbs for example.

Metaphor, simile, personification, alliteration, onomatopoeia, semantic field, sibilance, hyperbole, verbs, adjectives, adverbs, ect.

Q4 – 16 marks Analysing different perspectives in 2 texts

20

1. **Highlight the key words in the question** – it is asking you to compare each writer's attitude to what?
2. **Read text A and B and highlight quotes that reveal the writer's attitude/opinion/view on the topic** – remember, quotes with language techniques are best and you should label these
3. **Plan your response using this table:**

Point about writer's different thoughts / opinions / experiences	Source A Quote	Language feature	Source B Quote	Language feature

3 Paragraphs following this structure:

The writer of source A views ____ as + quote + *The writer has used* technique + critical verb + effect (linked to point)
*comparative connective **the writer of source B thinks ____ is** + quote + *The writer has used* technique + critical verb + effect (linked to point)

Q2 – 8 marks Summarising the differences between 2 texts

10

1. **Highlight the key words in the question** – what is it asking you to compare?
2. **Read text A and B and highlight quotes that are relevant to the question** *e.g. if the question asks you to compare 2 characters, highlight where the character is described.*

2 Paragraphs following this structure:

Point about Source A (linked to question) Quote Inference	Point about Source B (linked to question) Quote Inference
Comparative sentence – how is this **different** to Source B?	Comparative sentence – how is this **different** to Source A?

Critical Verbs

Suggests
Symbolises
Highlights
Portrays
Emphasises
Demonstrates
Evokes
Illustrates
Infers
Implies
Connotes
Alludes to
Arouses

*Comparative connectives

- In comparison
- Juxtaposing this
- On the other hand
- In contrast
- However
- In opposition to this
- Whereas

Subject: English – Year 10	Term: 4	Topic: English Language Paper 2 Section B (Writing)

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English Language Paper 2 Section B
Writing to present a Viewpoint

In Section B of the English Language Paper 2, you will be asked to write a discursive based piece. This is worth 50% of marks for the paper and will last for 45 minutes.

Assessment Criteria (AO5 & AO6)

AO5 Content and Organisation

Level 4	24 23 22 21 20 19	**Content** • Communication is convincing, compelling • Tone, style, register assuredly matched to PAF • Extensive and ambitious vocabulary with sustained crafting of linguistic devices **Organisation** • Highly structured ,developed writing, a range of integrated and complex ideas • Varied and inventive use of structural features
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Websites:

GCSE Bitesize:
https://www.bbc.com/bitesize/guides/zy47xsg/revision/1

AQA:
https://www.aqa.org.uk/subjects/english/gcse/english-language-8700

Subject: English (Year 9)	Term: 4	Topic: English Language Paper 2 Section B (Writing)

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English Language Paper 2 Section B
Discursive Writing

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With all writing tasks it is important to consider:

- the conventions of the form
- your intended audience (reader)
- the purpose of your writing

Example Question

Trump has stated that he believes a fifth of teachers should carry weapons and be trained in marksmanship to combat school shootings.

Write a letter to Donald Trump, **arguing your point of view on this statement.**

Success Criteria

- Persuasive techniques
- Interesting structural features
- Matched to the TAP
- Engaging vocabulary
- Engaging writing
- Discourse markers
- Language techniques
- Personality comes through
- Paragraphs

- Sentence starters
- A **range** of punctuation
- Paragraphs
- Variety of sentence types/lengths
- Standard English
- Accurate spelling
- Sophisticated vocabulary

LANGUAGE EXAMPLES	STRUCTURE EXAMPLES
Word classes (verbs, adverbs, adjectives, nouns, pronouns)	Juxtaposition/ Contrasts
Imagery (olfactory, gustatory, auditory, visual, tactile, kinaesthetic, colour, nature)	Tension
Metaphor	Narrative Voice
Simile	Suspense
Personification	Punctuation
Alliteration	Paragraphing
Tense (past, present, future)	Sentence Types (simple, compound, complex)
Irony	Sentence Functions (declarative, interrogative, imperative, exclamative)
Hyperbole	Lists
Dialogue	Sentence Lengths
Statistics/Facts	Semantic Fields
Emotive Language	Repetition
Triplets	Cliff-hanger
Anecdotes	Cyclical structure
Rhetorical Questions	Expert Opinions
Puns	

Subject: Maths – 10 C (Higher)	Term:5 and 6	Topic: Year 10 Units 11 - 14

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Overview

In this term, learners will be studying up to two units which will include the topics of trigonometry and further statistics.

Key skills:

11 Multiplicative reasoning
Prior knowledge check
11.1 Growth and decay
11.2 Compound measures
11.3 More compound measures
11.4 Ratio and proportion

12 Similarity and congruence
Prior knowledge check
12.1 Congruence
12.2 Geometric proof and congruence
12.3 Similarity
12.4 More similarity
12.5 Similarity in 3D solids

13 More trigonometry
Prior knowledge check
13.1 Accuracy
13.2 Graph of the sine function
13.3 Graph of the cosine function
13.4 The tangent function
13.5 Calculating areas and the sine rule
13.6 The cosine rule and 2D trigonometric problems
13.7 Solving problems in 3D
13.8 Transforming trigonometric graphs 1
13.9 Transforming trigonometric graphs 2

14 Further statistics
Prior knowledge check
14.1 Sampling
14.2 Cumulative frequency
14.3 Box plots
14.4 Drawing histograms
14.5 Interpreting histograms
14.6 Comparing and describing populations

Subject: Maths – 10 C (Higher)	Term: 5 and 6	Topic: Year 10 Units 11 - 14

Key Terms:

Unit 11
Annually
Compound interest
Depreciation
Ratio
Proportion
Direct proportion
Inverse proportion
Speed, distance and time
Mass, density and volume
Force, pressure and area

Unit 12
Congruence
Similar shapes
Scale factor
Area
Volume

Unit 13:
Sine
Cosine
Tangent
Sine rule
Cosine rule

Unit 14:
Stratified sampling
Bias
Population
Census
Cumulative frequency
Upper bound
Lower bound
Median
Frequency density
Interquartile range
Box plot
Histogram
Outliers

Websites and further reading

- Pearson Active Learn: http://pearsonactivelearn.com
- Maths Watch: http://mathswatch.co.uk/
- BBC Bitesize: http://www.bbc.co.uk/education/subjects/zqhs34j
- Numeracy and Foundation level practice questions and answers: https://corbettmaths.com/5-a-day/gcse1/
- Maths quiz: http://www.educationquizzes.com/ks3/maths/
- KS3 online tests: http://www.romsey.hants.sch.uk/maths/ks3onlinetests.htm
- Maths genie: www.mathsgenie.co.uk

Subject: Maths – 10 C (Higher)	Term: 5 and 6	Topic: Year 10 Units 11 - 14

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'Ipsum quod faciendum est diutius durant'

Unit 11:

Q1a hint 100% + 30% = 130%
130% = ☐ as a decimal number

Q1b hint 100% – 14% = ☐%
☐% = ☐ as a decimal number

Q9 communication hint In **compound interest** the interest earned each year is added to money in the account and earns interest the next year. Most interest rates are compound interest rates.

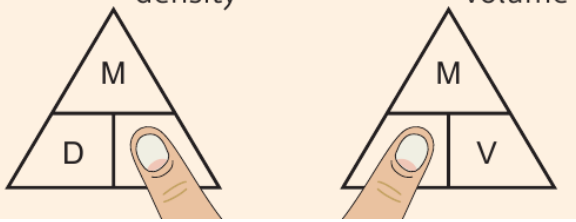
A man walks at an average speed of 5.4 km/h. What is his average speed in m/s?

5.4 km/h → 5400 m/h → 90 m/min → 1.5 m/s

- Convert to km/h to m/h × 1000
- Convert m/h to m/min ÷ 60
- Convert m/min to m/s ÷ 60

Q3 hint Mass = density × volume

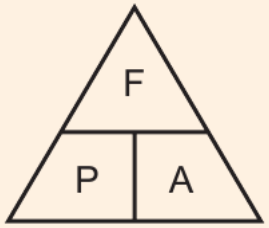
Volume = $\frac{\text{mass}}{\text{density}}$ Density = $\frac{\text{mass}}{\text{volume}}$



Q6a hint Converting smaller to bigger ÷
Converting bigger to smaller ×

Distance	Time
miles	hours
× 5280	÷ ☐
feet	minutes
× 12	÷ ☐
inches	seconds

Q4 hint



Cover the quantity you want to find.

Q4a hint $A:B = 3:5$ so $\frac{A}{B} = \frac{3}{5}$
Rearrange to find A.

Q2 hint Speed = $\frac{\text{distance}}{\text{time}}$

Q12 hint Total interest = amount in the account at the end of the investment – amount invested

Subject: Maths – 10 C (Higher)	Term: 5 and 6	Topic: Year 10 Units 11 - 14

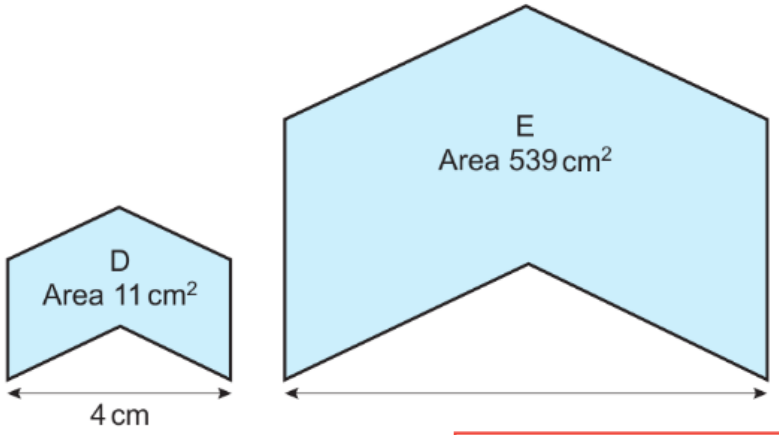
Unit 12:

Key point 1

Congruent triangles have exactly the same size and shape. Their angles are the same and corresponding sides are the same length.

Example 3

Shape D is similar to shape E.
Calculate the length of shape E.



Area scale factor $= \frac{539}{11} = 49 = k^2$

In an enlargement by scale factor k, the area is enlarged by scale factor k^2.

$k = \sqrt{49} = 7$

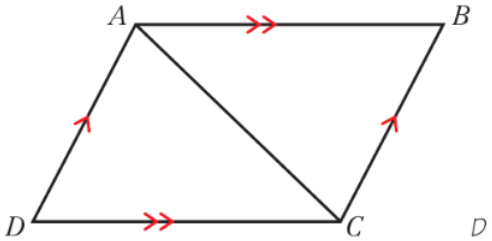
k is the linear scale factor.

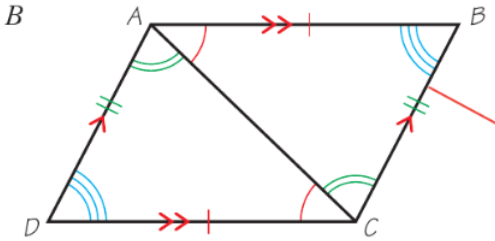
Shape E has length $7 \times 4 = 28$ cm

Q10 hint Make sure you only use known facts to justify your argument. Don't assume something if it has not been stated to be true.

Example 1

$ABCD$ is a parallelogram. Prove triangle ABC is congruent to ADC.





Mark all equal angles and sides.

Length AB = length CD because opposite sides in a parallelogram are equal.

State why $AB = CD$

Length BC = length AD because opposite sides in a parallelogram are equal.

State why $BC = AD$

Length AC is common to both triangles.

So triangle ABC is congruent to triangle ADC (SSS).

State the condition used to prove congruence.

Key point 2

Two triangles are congruent when one of these conditions of congruence is true.
SSS (all three sides equal)
SAS (two sides and the included angle are equal)
AAS (two angles and a corresponding side are equal)
RHS (right angle, hypotenuse and one other side are equal)

Key point 4

When a shape is enlarged by linear scale factor k, the volume of the shape is enlarged by scale factor k^3.

Subject: Maths – 10 C (Higher)	Term: 5 and 6	Topic: Year 10 Units 11 - 14

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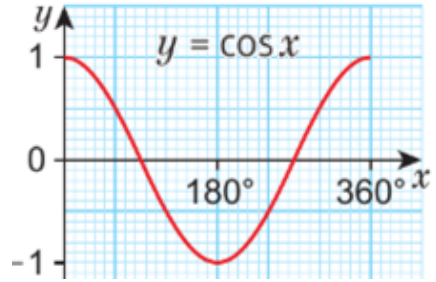
Unit 13:

Key point 9

The graph of $y = f(-x)$ is the reflection of the graph of $y = f(x)$ in the y-axis.

Key point 8

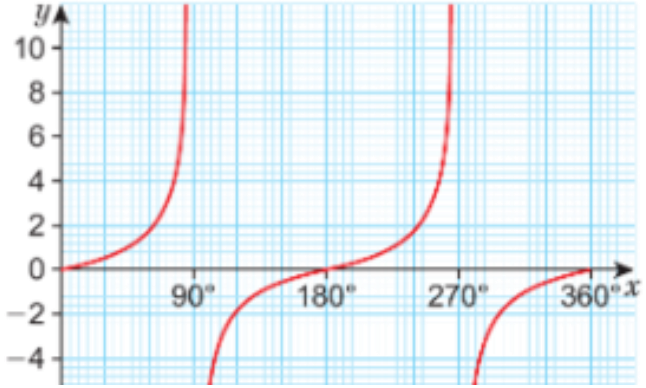
The graph of $y = -f(x)$ is the reflection of the graph of $y = f(x)$ in the x-axis.



Key point 13

The graph of $y = a\,f(x)$ is a vertical stretch of the graph of $y = f(x)$, with scale factor a, parallel to the y-axis.

Here is the graph of $y = \tan x$ for $0° \leqslant x \leqslant 360°$.



Key point 14

The graph of $y = f(ax)$ is a horizontal stretch of the graph of $y = f(x)$, with scale factor $\frac{1}{a}$, parallel to the x-axis.

Key point 11

The graph of $y = f(x) + a$ is the translation of the graph of $y = f(x)$ by $\begin{pmatrix} 0 \\ a \end{pmatrix}$

The **cosine rule**

$a^2 = b^2 + c^2 - 2bc\cos A$ Use this to calculate an unknown *side*

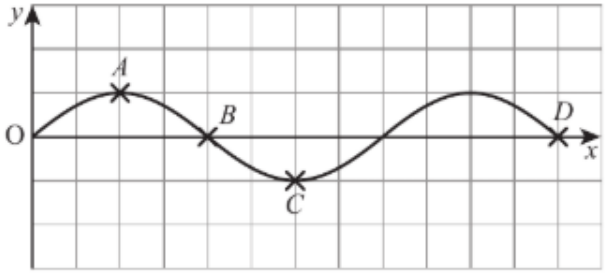
$\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$ Use this to calculate an unknown *angle*.

The **area** of this triangle $= \frac{1}{2}ab\sin C$.

a is the side opposite angle A.

b is the side opposite angle B.

Here is a sketch of $y = \sin x$.



Write down the coordinates of each of the labelled points.

Subject: Maths – 10 C (Higher)	Term: 5 and 6	Topic: Year 10 Units 11 - 14

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Unit 14:

Key point 1

A **population** is the set of items that you are interested in.
A **census** is a survey of the whole population.
A **sample** is a smaller number of items from the population. A sample of at least 10% is considered to be a good-sized sample.

Key point 3

In a **random** sample each item has the same chance of being chosen.

$$\text{Frequency density} = \frac{\text{frequency}}{\text{class width}}$$

Key point 14

The median and interquartile range are not affected by extreme values or **outliers**.

Q8 strategy hint
Compare the medians and interquartile ranges.

Key point 4

A population may divide into groups such as age range or gender. These groups are called **strata**.
In a **stratified sample**, the number of people taken from each group is proportional to the group size.

the estimate for the **upper quartile** (UQ) is the $\frac{3n}{4}$th value

the estimate for the **lower quartile** (LQ) is the $\frac{n}{4}$th value

the **interquartile range** (IQR) = UQ – LQ

Key point 5

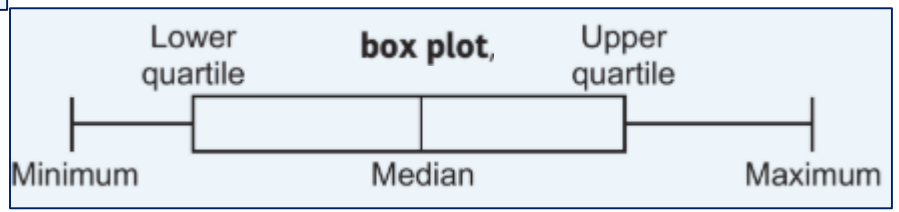
To estimate the size of the population N of an animal species:

- Capture and mark a sample size n.
- Recapture another sample of size M. Count the number marked (m).

$$\frac{n}{N} = \frac{m}{M}$$

So, $N = \frac{n \times M}{m}$

This is the capture–recapture method.



Key point 6

A **cumulative frequency table** shows how many data values are less than or equal to the **upper class boundary** of each data class.
The **upper class boundary** is the highest possible value in each class.

Subject: Maths – 10 DAB (Higher)	Term:5 and 6	Topic: Year 10 Units 15 - 18

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Overview

In this term, learners will be studying up to two units which will include the topics of trigonometry and further statistics.

Key skills:

15 Equations and graphs
- Prior knowledge check
- 15.1 Solving simultaneous equations graphically
- 15.2 Representing inequalities graphically
- 15.3 Graphs of quadratic functions
- 15.4 Solving quadratic equations graphically
- 15.5 Graphs of cubic functions

16 Circle theorems
- Prior knowledge check
- 16.1 Radii and chords
- 16.2 Tangents
- 16.3 Angles in circles 1
- 16.4 Angles in circles 2
- 16.5 Applying circle theorems

17 More algebra
- Prior knowledge check
- 17.1 Rearranging formulae
- 17.2 Algebraic fractions
- 17.3 Simplifying algebraic fractions
- 17.4 More algebraic fractions
- 17.5 Surds
- 17.6 Solving algebraic fraction equations
- 17.7 Functions
- 17.8 Proof

18 Vectors and geometric proof
- Prior knowledge check
- 18.1 Vectors and vector notation
- 18.2 Vector arithmetic
- 18.3 More vector arithmetic
- 18.4 Parallel vectors and collinear points
- 18.5 Solving geometric problems

Subject: Maths – 10 DAB (Higher)	Term:5 and 6	Topic: Year 10 Units 15 - 18

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Key Terms:

Unit 15:	**Unit 16:**	**Unit 17:**	**Unit 18:**
Solve	Circle	Rearrange	Vectors
Simultaneous	theorems	Formula	Vector arithmetic
Linear	Proof	Fractions	Addition
Graphically	Tangent	Simplify	Subtraction
Inequalities	Radius	Surds	Parallel vectors
Quadratic	Chord	Solving	Co-linear vectors
Cubic	Justify	Algebraic proof	
Functions			

Websites and further reading

- Pearson Active Learn: http://pearsonactivelearn.com
- Maths Watch: http://mathswatch.co.uk/
- BBC Bitesize: http://www.bbc.co.uk/education/subjects/zqhs34j
- Numeracy and Foundation level practice questions and answers: https://corbettmaths.com/5-a-day/gcse1/
- Maths quiz: http://www.educationquizzes.com/ks3/maths/
- KS3 online tests: http://www.romsey.hants.sch.uk/maths/ks3onlinetests.htm
- Maths genie: www.mathsgenie.co.uk

Subject: Maths – 10 DAB (Higher)	Term: 5 and 6	Topic: Year 10 Units 15 - 18

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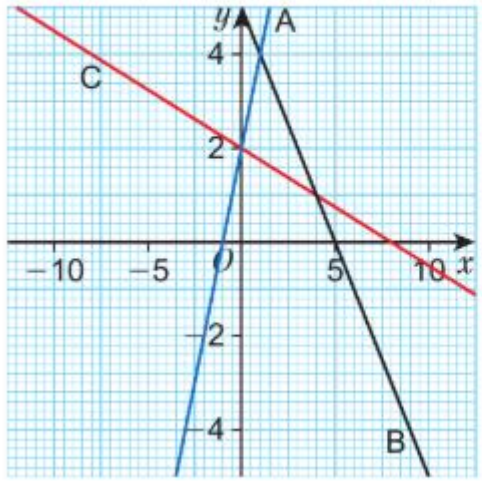
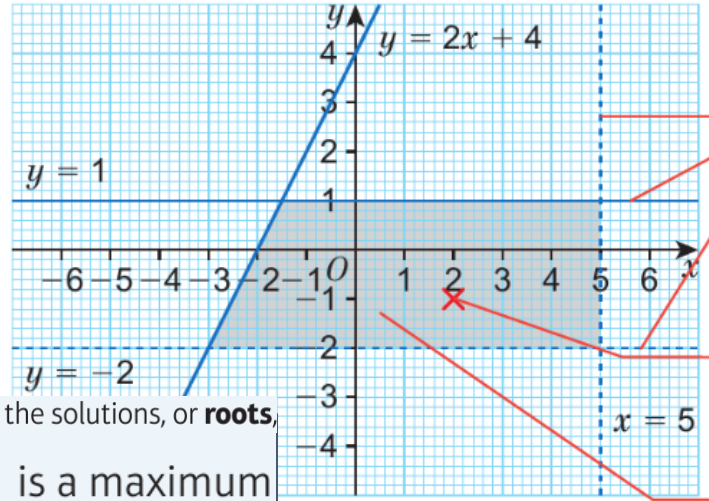
Unit 15:

Reasoning a Match the equations to the three lines A, B and C shown.

i $x + y = 5$ ii $y = 2x + 2$ iii $8 = 4y + x$



On a coordinate grid, shade the region that satisfies the inequalities $x < 5$, $y \leqslant 2x + 4$, $y \leqslant 1$ and $y > -2$



Draw dotted lines $x = 5$ and $y = -2$
Draw solid lines $y = 2x + 4$, $y = 1$

Test a point. For (2, −1)
$y \leqslant 1$ and $y > -2$: the y-coordinate is −1
$x < 5$: the x-coordinate is 2
$2x + 4 = 8$: y-coordinate $\leqslant 8$

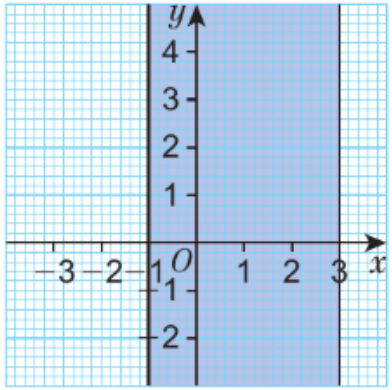
Shade the required region.

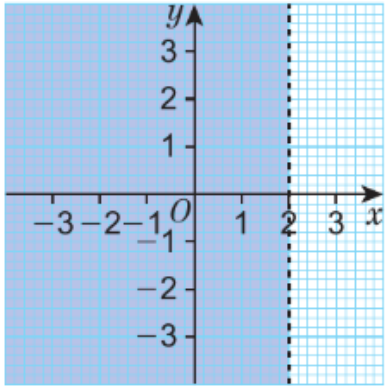
The x-values where the graph intersects the x-axis are the solutions, or **roots**,


is a minimum,

is a maximum

2 a Write down the inequalities represented by the shaded regions.





Expand and simplify.

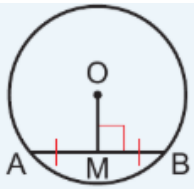
a $(x + 3)(x + 7)$
c $(x - 3)(x - 2)$
e $(2x + 3)(x + 5)$
g $(3x + 1)(3x - 1)$

Sketch the graphs,

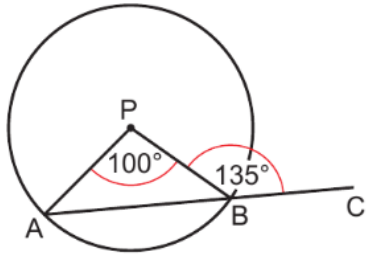
a $y = (x - 3)(x + 2)(x - 1)$
b $y = x(x + 1)(x - 4)$

Unit 16:

A **chord** is a straight line connecting two points on a circle.
The perpendicular from the centre of a circle to a chord bisects the chord and the line drawn from the centre of a circle to the midpoint of a chord is at right angles to the chord.

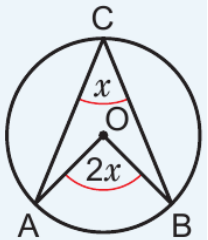


Reasoning Bill says that P is the centre of this circle.
Explain how you know Bill must be wrong.



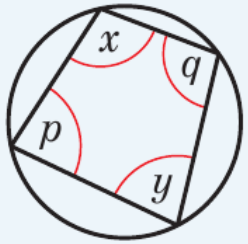
Key point 4

Circle theorem: The angle at the centre of a circle is twice the angle at the circumference when both are subtended by the same arc.



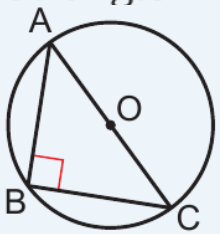
Key point 8

Opposite angles of a cyclic quadrilateral add up to 180°:
So, $x + y = 180°$ and $p + q = 180°$.



Key point 5

The angle in a semicircle is a right angle.
So angle ABC = 90°.



Exam-style question

B, C and D are points on the circumference of a circle, centre O.
ABE and ADF are tangents to the circle.
Angle $DAB = 40°$
Angle $CBE = 75°$
Work out the size of angle ODC.

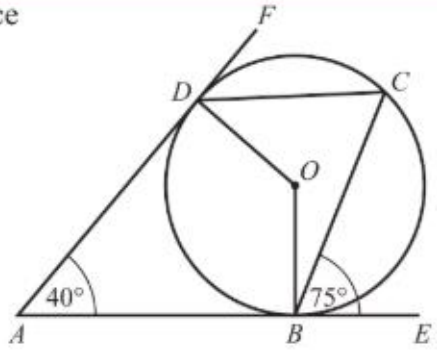


Diagram **NOT** accurately drawn

(3 marks)

Exam hint
Remember that reasons are always words and not calculations.

Key point 9

An exterior angle of a cyclic quadrilateral is equal to the opposite interior angle.

Subject: Maths – 10 DAB (Higher)	Term: 5 and 6	Topic: Year 10 Units 15 - 18

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Unit 17:

Example 1

Make x the subject of the formula $P = d\sqrt{\frac{x}{y}}$

$\frac{P}{d} = \sqrt{\frac{x}{y}}$ — Divide both sides by d.

$\frac{P^2}{d^2} = \frac{x}{y}$ — Square both sides.

$\frac{yP^2}{d^2} = x$ or $x = \frac{yP^2}{d^2}$

Write as a single fraction in its simplest form.

a $\frac{x}{2} \times \frac{x}{3} = \frac{x \times x}{2 \times 3} =$

b $\frac{2x}{5} \times \frac{3y}{4}$

Exam-style question

Simplify fully

$$\frac{x^2 + 14x + 49}{x^2 - 49}$$

(3 marks)

Exam-style question

Make k the subject of the formula $t = \frac{k}{k-2}$ **(4 marks)**

Exam-style question

Write as a single fraction in its simplest form

$$\frac{x+6}{2} + \frac{2x-3}{5}$$

(3 marks)

Key point 2

You may need to factorise before simplifying an algebraic fraction:

(1) Factorise the numerator and denominator.

(2) Divide the numerator and denominator by any common factors.

Exam-style question

Expand $(5 - \sqrt{5})^2$. Write your answer in the form $a + b\sqrt{c}$, where a, b and c are integers. **(2 marks)**

Key point 4

To rationalise the fraction $\frac{1}{a\sqrt{b}}$, multiply by $\frac{\sqrt{b}}{\sqrt{b}}$

To rationalise the fraction $\frac{1}{a \mp \sqrt{b}}$, multiply by $\frac{a \pm \sqrt{b}}{a \pm \sqrt{b}}$

Key point 10

A **proof** is a logical argument for a mathematical statement. To prove a statement is true, you must show that it will be true in *all* cases.

To prove a statement is not true you can find a **counter-example** – an example that does not fit the statement.

Key point 5

A function is a rule for working out values of y for given values of x.

For example, $y = 3x$ and $y = x^2$ are functions. The notation f(x) is read as 'f of x'. f is the function.

f(x) = $3x$ means the function of x is $3x$.

Subject: Maths – 10 DAB (Higher)	Term: 5 and 6	Topic: Year 10 Units 15 - 18

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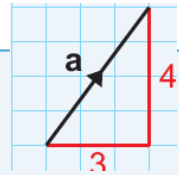
Unit 18:

Key point 2

The displacement vector from A to B is written $\overrightarrow{AB}$.
Vectors are written as **bold** lower case letters: **a**, **b**, **c**
When handwriting, <u>underline</u> the letter: <u>a</u>, <u>b</u>, <u>c</u>

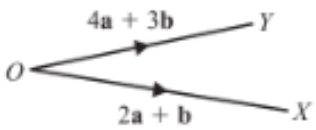
Key point 1

A **vector** is a quantity that has magnitude and direction.
The **magnitude** of a vector is its size.
Displacement is change in position. A displacement can be written as $\begin{pmatrix}3\\4\end{pmatrix}$ where 3 is the x component and 4 is the y component.
Examples of vectors are force (5 N acting vertically upwards) and velocity (15 km/h due north).



Exam-style question

$\overrightarrow{OX} = 2\mathbf{a} + \mathbf{b}$ and $\overrightarrow{OY} = 4\mathbf{a} + 3\mathbf{b}$



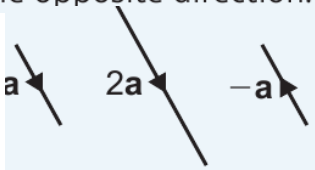
a Express the vector $\overrightarrow{XY}$ in terms of **a** and **b**. Give your answer in its simplest form. **(2 marks)**

Key point 13

$\overrightarrow{PQ} = k\overrightarrow{QR}$ shows that the lines PQ and QR are parallel. Also they both pass through point Q so PQ and QR are part of the same straight line. P, Q and R are said to be **collinear** (they all lie on the same straight line).

Key point 6

2**a** is twice as long as **a** and in the same direction.
–**a** is the same length as **a** but in the opposite direction.



Key point 4

The magnitude of the vector $\begin{pmatrix}x\\y\end{pmatrix}$ is its length, i.e. $\sqrt{x^2 + y^2}$
|a| means the magnitude of vector **a**. |OA| means the magnitude of vector $\overrightarrow{OA}$.

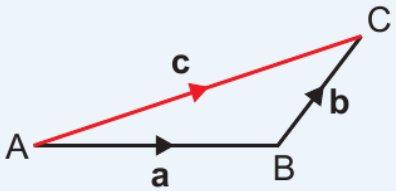
Key point 8

The two-stage journey from A to B and then from B to C has the same starting point and the same finishing point as the single journey from A to C. So A to B followed by B to C is equivalent to A to C.

$\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}$

Triangle law for vector addition

Let $\overrightarrow{AB} = \mathbf{a}$, $\overrightarrow{BC} = \mathbf{b}$ and $\overrightarrow{AC} = \mathbf{c}$.
Then $\mathbf{a} + \mathbf{b} = \mathbf{c}$ forms a triangle.



Exam-style question

A is the point (3, 4) and B is the point (–3, 0).

a Write $\overrightarrow{AB}$ as a column vector.

b Find the length of vector $\overrightarrow{AB}$.

Subject: Maths – 10E (Foundation)	Term: 5&6	Topic: Units 16 & 17

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Quadratic equations and graphs

Prior knowledge check
Expanding double brackets
Plotting quadratic graphs
Using quadratic graphs
Factorising quadratic expressions
Solving quadratic equations algebraically

Perimeter, area and volume 2

Prior knowledge check
Circumference of a circle 1
Circumference of a circle 2
Area of a circle
Semicircles and sectors
Composite 2D shapes and cylinders
Pyramids and cones
Spheres and composite solids

Key Terms – Can you add the definitions (meanings)?

Expanding: _____

Quadratic: _____

Factorise: _____

Solving: _____

Parabola: _____

Websites and further reading

- Pearson Active Learn: http://pearsonactivelearn.com
- Maths Watch: http://mathswatch.co.uk/
- BBC Bitesize: http://www.bbc.co.uk/education/subjects/zqhs34j
- Numeracy and Foundation level practice questions and answers: https://corbettmaths.com/5-a-day/gcse1/

Key Terms – Can you add the definitions (meanings) and complete the formulae?

Circumference: _____

Area: _____

Semi-circle: _____

Sector=_____

Composite= _____

Subject: Maths – 10E (Foundation)	Term: 5&6	Topic: Units 16 & 17

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Unit 16:

Expand and simplify $(x + 2)(x + 6)$.

FOIL: Firsts, Outers, Inners, Lasts

$(x+2)(x+6) = x^2 + 6x + 2x + 12$

$= x^2 + 8x + 12$

Grid method

$(x + 2)(x + 6)$

×	x	+2
x	x^2	$+2x$
+6	$+6x$	$+12$

$= x^2 + 2x + 6x + 12$

$= x^2 + 8x + 12$

$x^2 + 8x + 10$

squared term | term with power 1 | constant term

The **difference of two squares** is a quadratic expression with two squared terms, and one term is subtracted from the other. For example $x^2 - 25$

x^2 5^2

Example 2

For the graph of $y = x^2 - 6x + 5$ write down

a the equation of the line of symmetry

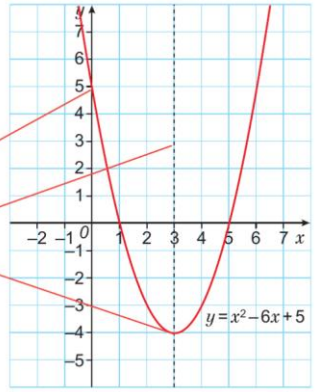
b the turning point

c the coordinates of the y-intercept.

The y-intercept is the point where the graph crosses the y-axis.

Sketch in the **line of symmetry**. Write its equation.

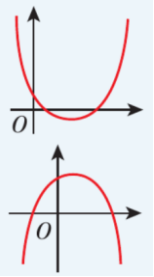
Write down the coordinates of the point where the curve turns.



a line of symmetry $x = 3$

b turning point $(3, -4)$

c y-intercept $(0, 5)$



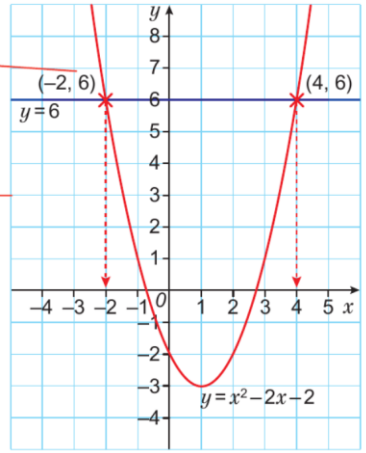
To solve the equation $ax^2 + bx + c = 0$, read the x-coordinates where the graph crosses the x-axis. The values of x that satisfy the equation are called **roots**

Solve the equation $x^2 - 2x - 2 = 6$

This means $y = 6$

Plot the function $y = x^2 - 2x - 2$

Draw the line $y = 6$ on the graph.



The solutions to the equation are $x = -2$ and $x = 4$

Write down the x-**coordinates** where the line and curve cross.

The turning point of the curve is where it turns in the opposite direction.

Solve $x^2 + 2x - 15 = 0$

$x^2 + 2x - 15 = 0$

$(x + 5)(x - 3) = 0$ — Factorise the quadratic expression.

$x + 5 = 0$ or $x - 3 = 0$ — As the two expressions multiply to make 0, at least one of them must equal zero.

$x = -5$ or $x = 3$ — Solve both equations.

Factorise $x^2 + 5x + 6$

$x^2 + 5x + 6$

$(x \quad)(x \quad)$ — Write a pair of brackets with x in each one. This gives the x^2 term when multiplied.

Work out all the factor pairs of 6, the number term.

$1 \times 6 \qquad 2 \times 3$

$1 + 6 = 7 \qquad 2 + 3 = 5$ — Work out which factor pair will **add** to give 5, the number in the x term.

Then write each number in each of the brackets with x

$(x + 2)(x + 3)$

Check: $(x + 2)(x + 3) = x^2 + 5x + 6$ — The expression is now factorised. Expand the brackets to check it is correct.

Subject: Maths – 10E (Foundation)	Term: 5&6	Topic: Units 16 & 17

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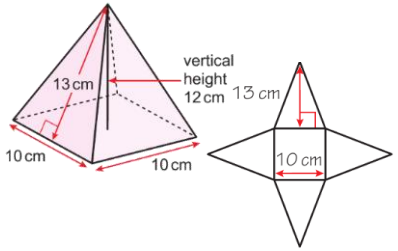
Unit 17:

$C = 2\pi r.$

$A = \pi r^2$



The circumference of a circle is 60.8 cm. Work out the radius of the circle.

$C = 2\pi r$

$60.8 = 2\pi r$ — Substitute the values that you know.

$\frac{60.8}{2\pi} = r$ — Rearrange to make r the subject.

$r = 9.676\,620\,54$ — Enter $\frac{60.8}{2\pi}$ as a fraction on your calculator.

radius = 9.7 cm (to 1 d.p.) — Write the answer to the same degree of accuracy as the measurement given. Remember to include the units.

For a sector of a circle with an angle of $x°$ and radius r:

Arc length $= \frac{x}{360} \times 2\pi r$

Area of sector $= \frac{x}{360} \times \pi r^2$

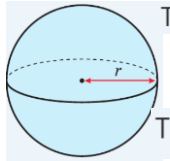
A circle has a radius of 6.4 cm.
Work out the area of the circle. Give your answer correct to 3 significant figures (3 s.f.).

$A = \pi r^2$

$= \pi \times 6.4^2$ — Write the substitution. Input it into your calculator.

$= 128.679\,635\,1$ — Write down all the figures on the calculator display.

$= 129\ cm^2$ (to 3 s.f.) — Round the answer to the required accuracy. Remember the units.



The surface area of a sphere $= 4\pi r^2$

The volume of a sphere $= \frac{4}{3}\pi r^3$

The **circumference** is the **perimeter** of a circle.

A **chord** is a line that touches the circumference at each end.

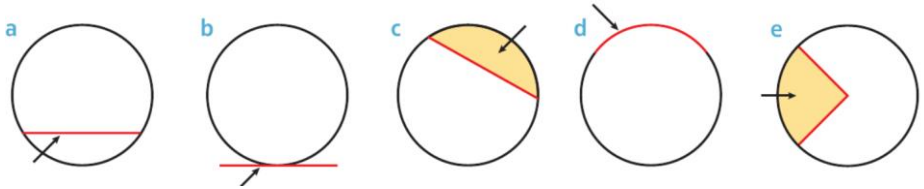
An **arc** is a part of the circumference of a circle.

A **segment** is a part of a circle between an arc and a chord.

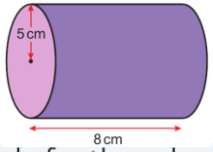
A **sector** is a slice of a circle between an arc and two radii.

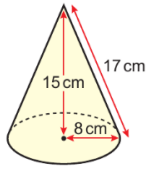
A **tangent** is a line outside a circle that touches the circle at only one point.

Copy these diagrams. Write chord, arc, segment, sector and tangent in the correct places.



The area of the curved surface of a cone = π × base radius × slant height = πrl



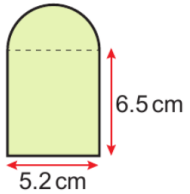


The formula for the volume of a cylinder is $V = \pi r^2 h$.

For this shape work out, correct to 1 decimal place,

a the perimeter

b the area.



a Perimeter of shape = 3 sides of rectangle + arc of semicircle

$= 6.5 + 6.5 + 5.2 + 0.5 \times \pi \times 5.2$

$= 26.368\,140\,9$ — Write down all the figures on your calculator display.

$= 26.4$ cm (to 1 d.p.) — Round the answer to the required accuracy. Remember the units.

b Area of shape = area of rectangle + area of semicircle

$= 5.2 \times 6.5 + 0.5 \times \pi \times 2.6^2$

$= 44.418\,583\,17$

$= 44.4\ cm^2$ (to 1 d.p.)

Subject: Maths – 10F (Lv2 Further)	Term:5	Topic: Year 10 FM1 & FM2

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Overview

In this term, learners will be studying up two units from the Level 2 Further Maths course. Learners will build on their Number and Algebra skills from the GCSE and explore new topics such as binomial expansion

Key Terms:

- Index
- Power
- Root
- Surd
- Rationalise
- Expand
- Simplify
- Solve
- Linear
- Equation
- Binomial
- Pascal's Triangle
- Factorise
- Factor Theorem
- Polynomial
- Division
- Fraction
- Completing the square
- Minimum/ maximum point
- Proof
- Quadratic

Key skills:

FM1 – Number and Algebra 1

- Indices
- Surds
- Algebra and Number
- Simplifying Expressions
- Solving Linear Equations
- Expanding Brackets
- Binomial Expansion

FM2 – Algebra 2

- Factorising
- The Factor Theorem
- Rearranging Formulae
- Algebraic Fractions
- Equations involving fractions
- Completing the Square
- Algebraic Proof

FM1: Number and Algebra 1

Content	Notes
Manipulation of surds, including rationalising the denominator	The use of surds in exact calculations Write $\sqrt{200} - \sqrt{72} + 3\sqrt{162}$ in the form of $a\sqrt{2}$ Rationalise and simplify $\frac{3\sqrt{2}+4}{5\sqrt{2}-7}$ Write the expression $\frac{3\sqrt{3}+7}{3\sqrt{3}-5}$ in the form $a+b\sqrt{3}$, where a and b are integers
Expanding brackets and collecting like terms	Expand and simplify $(y^2-2y+3)(2y-1)-2(y^3-3y^2+4y-2)$
Expand $(a+b)^n$ for positive integer n	Expand and simplify $(5x+2)^3$ Use Pascal's triangle to work out the coefficient of x^3 in the expansion of $(3+2x)^5$
Index laws, including fractional and negative indices and the solution of equations	Express as a single power of x $\sqrt{x^{\frac{1}{2}} \times x^{\frac{7}{2}}}$ Express as a single power of x $\sqrt{\frac{x^{\frac{3}{2}} \times x^{\frac{7}{2}}}{x^2}}$ Solve $x^{-\frac{1}{2}} = 3$ Solve $\sqrt{x} - \frac{10}{\sqrt{x}} = 3 \quad x > 0$

Exam Questions

Rationalise the denominator of $\frac{33}{4-\sqrt{5}}$

Give your answer in the form $a+b\sqrt{5}$ where a and b are integers.

The coefficient of the x^2 term in the expansion of $(x+a)^6$ is 240

Find the possible values of a

$3^x = 9\sqrt{3}$ and $3^y = \frac{1}{\sqrt{3}}$

Work out 3^{x-y}

Subject: Maths – 10F (Lv2 Further Maths)	Term: 5	Topic: FM1 & FM2

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Websites and further reading

- Pearson Active Learn: http://pearsonactivelearn.com
- GCSE and Further Maths revision: https://corbettmaths.com/

Maths Watch: http://mathswatch.co.uk/
GCSE exam revision: https://www.mathsgenie.co.uk/gcse.html

Unit FM2:

Content	Notes
Factorising	Factorise fully $(2x+3)^2-(2x-5)^2$ Factorise $15x^2-34xy-16y^2$ Factorise fully x^4-25x^2
Manipulation of rational expressions: Use of + − × ÷ for algebraic fractions with denominators being numeric, linear or quadratic	Simplify $\frac{5}{x+2}-\frac{3}{2x-1}$ Simplify $\frac{x^3+2x^2+x}{x^2+x}$ Simplify $\frac{5x^2-14x-3}{4x^2-25} \div \frac{x-3}{4x^2+10x}$
Use and manipulation of formulae and expressions	Rearrange $\frac{1}{f}=\frac{1}{u}+\frac{1}{v}$ to make v the subject
Use of the factor theorem for rational values of the variable for polynomials	Factorise x^3-2x^2-5x+6 Show that $2x-3$ is a factor of $2x^3-x^2-7x+6$ Solve $x^3+x^2-10x+8=0$ Show that $x-7$ is a factor of x^5-7x^4-x+7
Completing the square	Work out the values of a, b and c such that $2x^2+6x+7 \equiv a(x+b)^2+c$
Algebraic proof	Prove $(n+5)^2-(n+3)^2$ is divisible by 4 for any integer value of n

Exam Questions

simplify fully $\frac{x^3+2x^2-13x+10}{x^3+11x^2+14x-80}$

Use factor theorem to show that $(2x-1)$ is a factor of $2x^3+7x^2+2x-3$

Write $3x^2-12x+2$ in the form $a(x+b)^2+c$, where a, b and c are constants

Subject: Maths – 10F (Lv2 Further)	Term: 6	Topic: Year 10 FM3 & FM4

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Overview

In this term, learners will be studying up two units from the Level 2 Further Maths course. Learners will build on their Number and Algebra skills from the GCSE and explore new topics such as binomial expansion

Key Terms:

- Mensuration
- Pythagoras
- Hypotenuse
- Alternate
- Corresponding
- Cyclic Quadrilateral
- Alternate Segment Theorem
- Trigonometry
- Sine/Cosine
- Function
- Domain
- Range
- Composite
- Inverse

Key skills:

FM3 – Geometry 1

- Mensuration
- Pythagoras' Theorem
- Angle Facts
- Circle Theorems
- Geometric Proof
- Trigonometry (2D and 3D)
- Sine and Cosine Rule

FM4 – Algebra 3

- Functions
- Domain and Range
- Composite Functions
- Inverse Functions
- Graphs of linear, quadratic and exponential functions

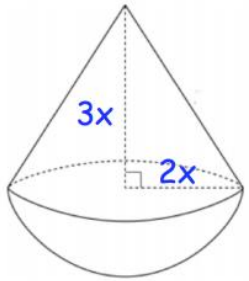
FM3: Geometry 1

Content	Notes
Understand and construct geometrical proofs using formal arguments	Knowledge of perimeter and area of rectangles and circles; and of the area of triangles, parallelograms and trapezia; and of the surface area and volume of prisms, cylinders, spheres, cones and pyramids Knowledge of angle properties of parallel and intersecting lines, triangles, all special types of quadrilaterals and polygons Understand and use circle theorems: Angle at the centre is twice the angle at the circumference; angles in the same segment are equal; opposite angles in cyclic quadrilateral add up to 180°; alternate segment theorem; the

Trigonometry in triangles		
6.3	Sine and cosine rules in scalene triangles; area of a triangle $=\frac{1}{2}ab\sin C$	Knowledge and use of trigonometry to solve right-angled triangles is expected
Pythagoras' theorem		
6.4	Use of Pythagoras' theorem in 2D and 3D	Recognise Pythagorean triples; 3, 4, 5; 5,12,13; 8,15,17; 7, 24, 25 and simple multiples of these
6.5	Be able to apply trigonometry and Pythagoras' theorem to 2 and 3 dimensional problems	Including the angle between a line and a plane and the angle between two planes; including triangles that do not have right angles

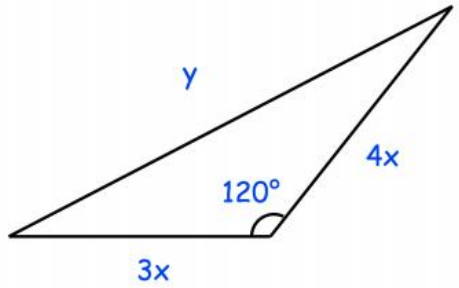
Exam Questions

The diagram shows a solid made up of a cone and a hemisphere.



The radius of the cone is x
The height of the cone is 2x.

Show the volume of the solid is $\frac{28}{3}\pi x^3$



Work out the ratio $y : x$

Subject: Maths – 10F (Lv2 Further Maths)	Term: 5	Topic: FM1 & FM2

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Websites and further reading

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Maths Watch: http://mathswatch.co.uk/
GCSE exam revision: https://www.mathsgenie.co.uk/gcse.html

Unit FM4:

Content	Notes
Definition of a function	Notation f (x) will be used, e.g. f $(x) = x^2 - 9$
Domain and range of a function	Domain may be expressed as, for example, $x > 2$, or 'for all x, except $x = 0$' and range may be expressed as f $(x) > -1$
Composite functions	The result of two or more functions, say f and g, acting in succession. fg (x) is g followed by f
Inverse functions	The inverse function of f is written f^{-1} Domains will be chosen for f to make f one-one
Drawing and sketching of functions Interpretation of graphs	Graphs could be linear, quadratic, exponential and restricted to no more than 3 domains Exponential graphs will be of the form $y = ab^x$ and $y = ab^{-x}$, where a and b are rational numbers Sketch the graph of $y = x^2 - 5x + 6$ Label clearly any points of the intersection with the axes A function f (x) is defined as f $(x) = x^2$ $\quad 0 \leqslant x < 1$ $= 1$ $\quad 1 \leqslant x < 2$ $= 3 - x$ $\quad 2 \leqslant x < 3$ Draw the graph of f(x) on the grid below for values of x from 0 to 3 Given a sketch of $y = ab^{-x}$, and two points, work out the values of a and b

Exam Questions

$$f(x) = \frac{3}{x+4}$$ for all positive values of x

Work out $f(x+2) + f(x+1)$

Give your answer as a single fraction in its simplest form.

$f(x) = x^2 - 2x$

Solve $f(3x) - f(x-1) = 4$

Give your answers to 2 decimal places

The function $f(x)$ is defined as

$$f(x) = 14 - 3x \qquad p \leq x < 8$$

The range of $f(x)$ is $-10 \leq f(x) \leq 30.5$

Work out the value of p

Subject: Science	Term: 5	Topic: Year 10 Separate Sciences– Homeostasis and response

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Topics Covered

Topic
Introduction to homeostasis
Nervous system
Reaction time required practical
Reflex actions
The brain
The eye
Human endocrine system
Control of blood glucose
Diabetes
Hormones and human reproduction
Contraception
Infertility treatment
Negative feedback
Plant hormones and their uses

Do not forget you can revise using Kerboodle. Use the Digital book section and find the green book titled Biology for GCSE combined Science: Trilogy. You could also use:

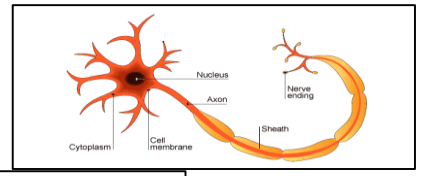
- BBC Bite size
- Primrose Kitten YouTube videos
- Free science lesson videos

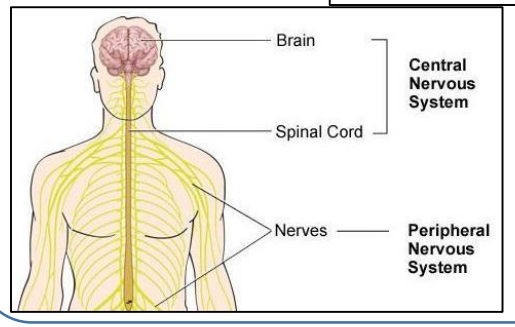
Introduction to homeostasis

Homeostasis is the regulation of internal conditions to maintain optimal conditions for enzyme action and cell function.

Structure and function of the nervous system

The nervous system uses electrical impulses to enable you to react quickly to your surroundings and coordinate behaviour.
Stimuli (changes in the environment) are detected by cells called receptors.
Impulses from the receptors pass along sensory neurones to the central nervous system.
The central nervous system (CNS) is made up of the brain and spinal cord.
The brain coordinates the response and impulses are sent along motor neurones from the brain to effector organs.

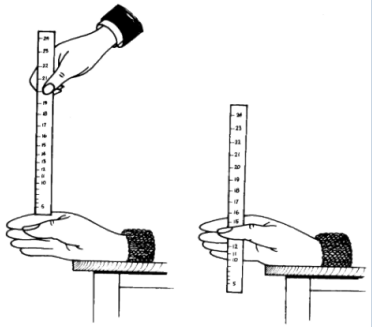




Structure of a neurone

Reaction time required practical

Messages travel very quickly around your body through the nervous system. This is so that you are able to respond to changes in the environment. The time it takes for you to respond to such a change is called your reaction time.
Athletes spend hours practicing to try and to reduce their reaction time. This is to help them improve their performance in their particular sport. Responding quicker to the starter's pistol in a race can gain you the advantage over other runners.
The required practical is an experiment called the **ruler drop test**. From this you can determine whether your reaction time can be reduced with practice.

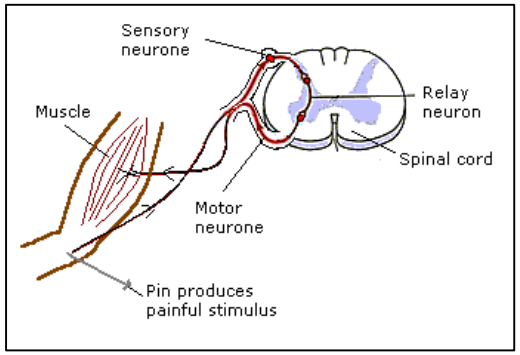


Reflex actions

Reflex actions are automatic and do not involve the conscious part of the brain.
Reflexes involve sensory, relay and motor neurones.

The main stages of the reflex arc are:

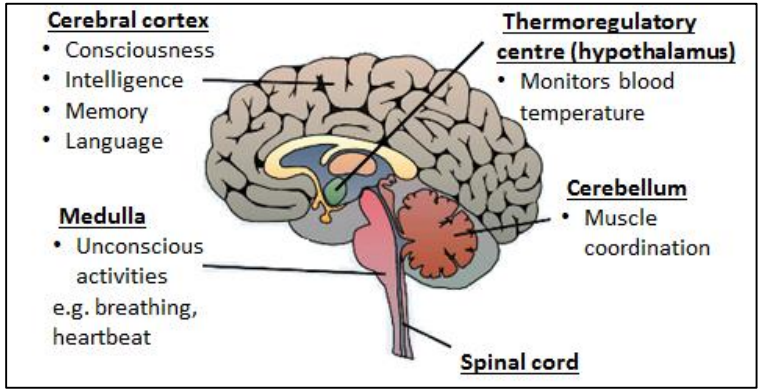
1) Stimulus
2) Receptor
3) Sensory neurone
4) Relay neurone
5) Motor neurone
6) Effector
7) Response



Subject: Science	Term: 5	Topic: Year 10 Separate Sciences – Homeostasis and response

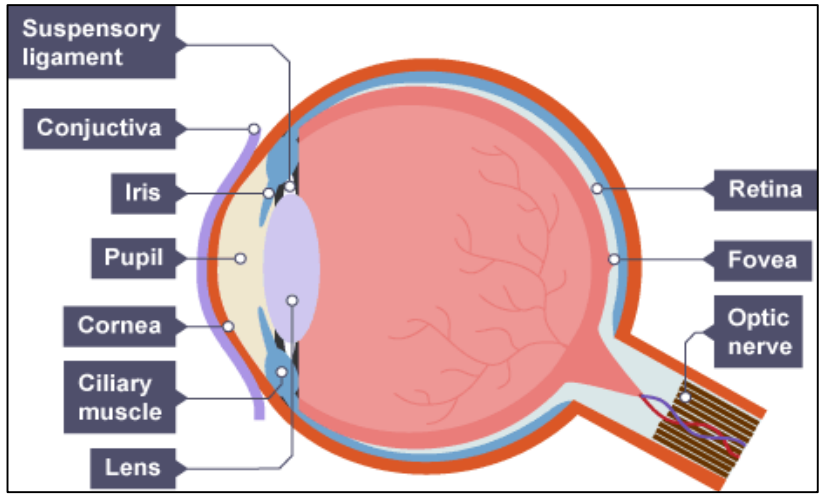
The brain

The brain is made up of billions of interconnected neurones that control complex behaviour.
It has different regions which each have different functions.
Scientists map regions of the brain to their functions by studying patients with brain damage by electrically stimulating different areas of the brain and using MRI scanning techniques.

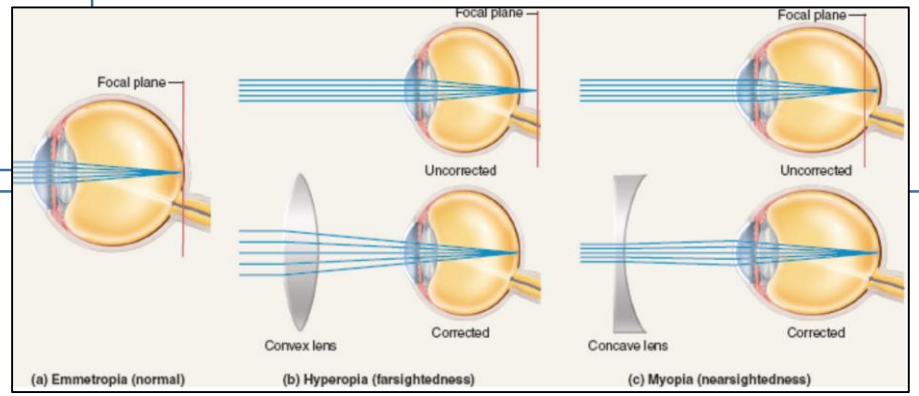


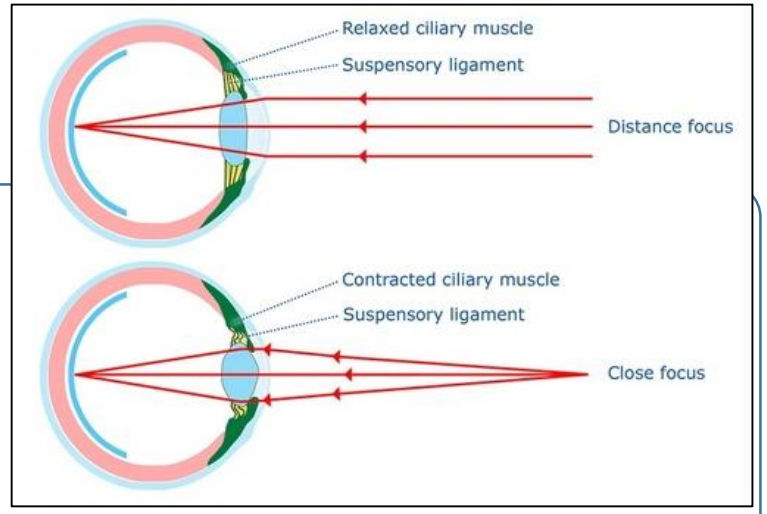
The eye

The eye is a sense organ containing **photoreceptors** in the **retina** that are sensitive to light intensity and colour.
The tough outer **sclera** has a transparent region at the front called the **cornea** that lets light in and refracts light towards the retina.
The muscular **iris** controls the size of the pupil and the amount of light entering the eye.
The **ciliary muscles** and **suspensory ligaments** change the shape of the **lens** to fine focus light on the retina.
The **optic nerve** carries impulses to the brain.



Common problems of the eye





Accommodation is the process of changing the shape of the lens of the eye to focus on near or distant objects.
To focus on **close objects** the ciliary muscles contract, the suspensory ligaments loosen and the lens becomes thicker so it can refract the image strongly.
To focus on **distant objects** the ciliary muscles relax, the suspensory ligaments are pulled tight and the lens is pulled thin so it only refracts the image slightly.
Sight defects can be treated using spectacle lenses, lase surgery and replacement lenses in the eyes.

Subject: Science	Term: 5	Topic: Year 10 Separate Sciences – Homeostasis and response

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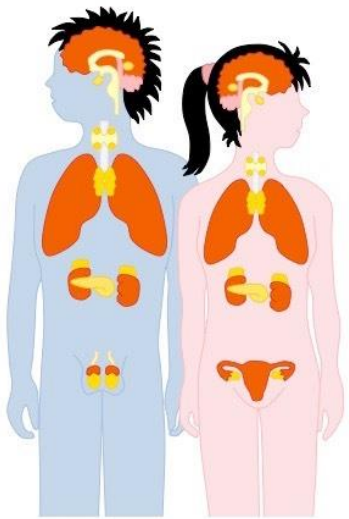
Human endocrine system

The endocrine system is composed of glands that secrete chemicals called hormones into the blood stream. The blood carries the hormone to the target organ where it produces an effect.
The effects of hormones are slower and long lasting.
The pituitary gland is the master gland and secretes several hormones.



Gland	Hormone	Target Organ	Function
Pineal gland	melatonin	many	biological clock
Pituitary gland	FSH / LH ADH growth hormone oxytocin prolactin	ovaries kidneys many uterus breast tissue	menstrual cycle osmoregulation growth & division birth contractions milk production
Thyroid gland	thyroxin	liver	metabolic rate
Adrenal glands	adrenaline cortisol	many many	fight or flight anti-stress
Pancreas	insulin / glucagon	liver	blood sugar levels
Ovaries	estrogen / progesterone	uterus	menstrual cycle
Testes	testosterone	many	male characteristics

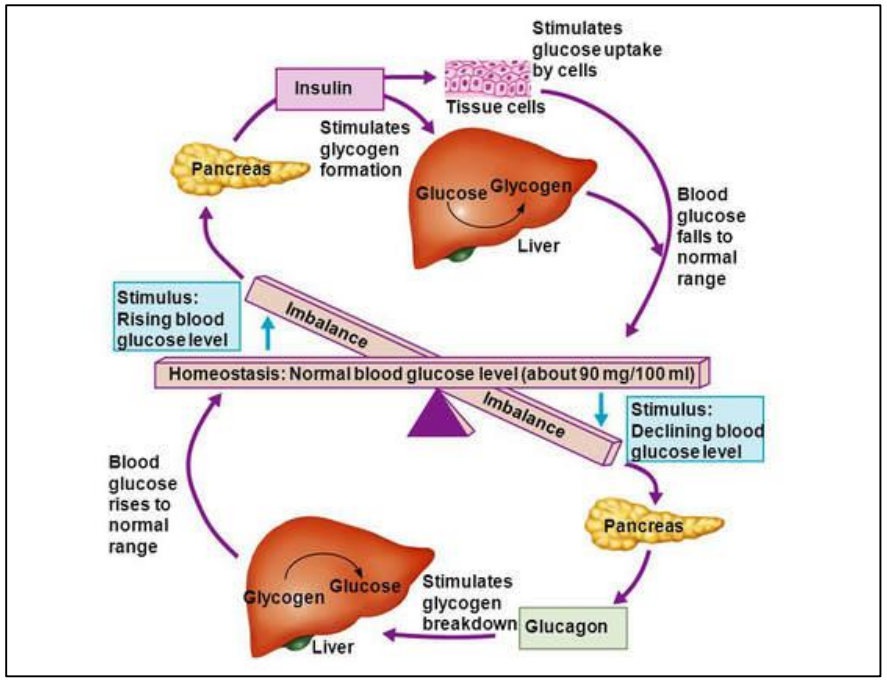
Control of blood glucose levels

Your blood glucose concentration is monitored and controlled by your pancreas.

The pancreas produces the hormone insulin, which allows glucose to move from the blood into the cells and to be stored as glycogen in the liver and muscles.

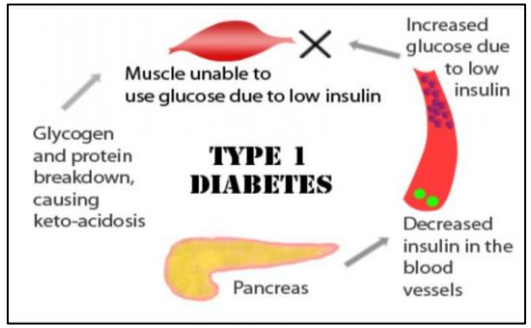
The pancreas also produces glucagon which allow glycogen to be converted back into glucose and released into the blood.

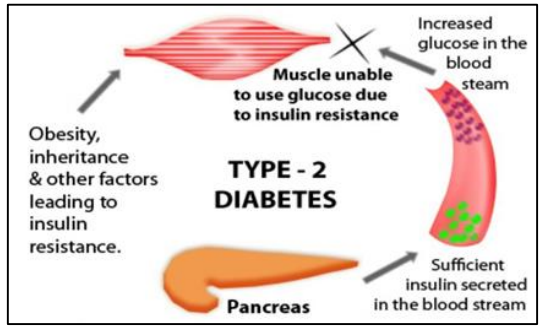
Glucagon interacts with insulin in a negative feedback cycle to control glucose levels.

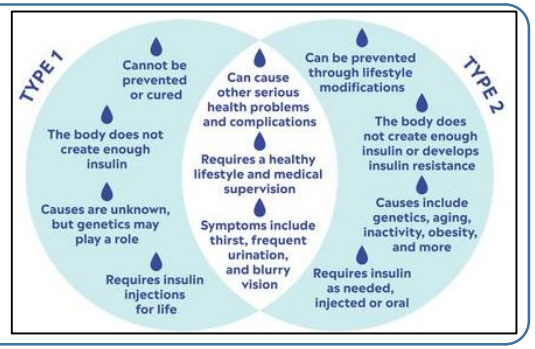


Diabetes

Type 1 diabetes – the pancreas does not produce enough insulin so the blood glucose concentration is not controlled.
Type 2 diabetes – the body stops responding to its own insulin.







Subject: Science	Term: 5	Topic: Year 10 Separate Sciences – Homeostasis and response

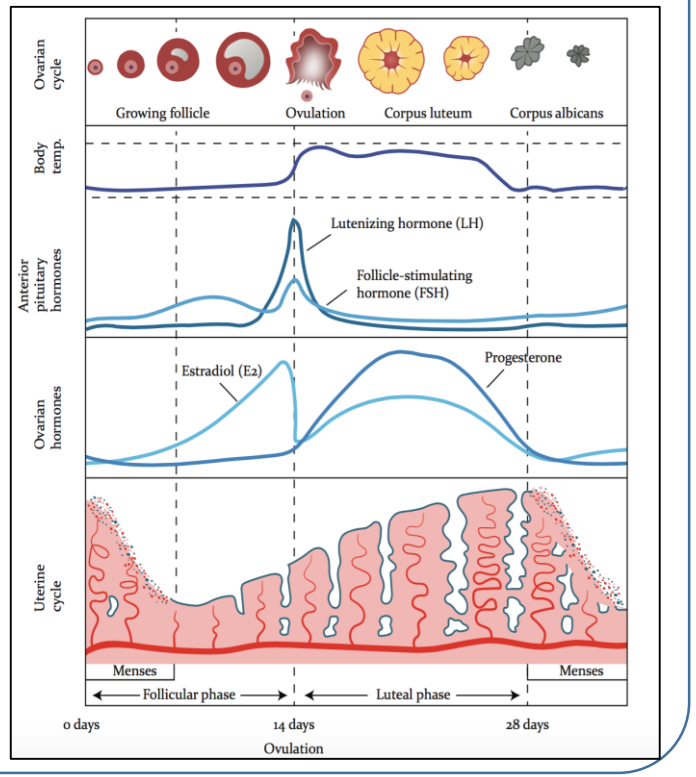
WOOTTON PARK

'Ipsum quod faciendum est diutius durant'

Hormones and human reproduction

During puberty reproductive hormones cause secondary sexual characteristics to develop.
Oestrogen is the main female reproductive hormone produced by the ovary. At puberty eggs begin to mature in the ovary and one is released every 28 days in ovulation.
Testosterone is the main male reproductive hormone produced by the testes and stimulates sperm production.
Hormones involved in the menstrual cycle of a woman include follicle stimulating hormone (FSH), luteinising hormone (LH), oestrogen and progesterone.

FSH
Causes eggs to mature
Stimulates the ovary to produce oestrogen.
LH
Triggers ovulation.
Oestrogen
Causes the lining of the uterus to debvelop.
Inhibits the release of FSH, stimulates the release of LH.
Progesterone
Maintains the lining of the uterus.
Inhibits the release of FSH and LH.



Contraception

Fertility can be controlled by a number of hormonal and non-hormonal methods of contraception.

Contraceptive methods include oral contraceptives, hormonal injections, implants and patches. Barrier methods such as condoms and diaphragms, intrauterine devices, spermicidal agents, abstinence and surgical sterilisation.

	Birth Control	How to Use	Prescription Needed	Protects Against STDs
Hormonal	Monthly oral contraceptive (the Pill)	Take one pill every day as directed.	Yes	No
Hormonal	Extended-regimen oral contraceptive	Take one pill every day for three months as directed.	Yes	No
Hormonal	Patch	Apply to skin and change weekly.	Yes	No
Hormonal	Vaginal ring (hormonal)	Insert monthly and leave in place for 21 days.	Yes	No
Hormonal	Injection	Get injections every three months.	Yes, injections given in health care provider's office.	No
Hormonal	Hormonal intrauterine contraceptive (IUC)	Inserted in the uterus and can remain for up to three or five years.	Yes, IUC inserted in health care provider's office.	No
Hormonal	Implantable hormonal contraceptive	Implanted under the skin of the arm and can remain for up to three years.	Yes, implanted in health care provider's office.	No
Non-hormonal	Spermicide	Apply every time before sex.	No	No
Non-hormonal	Diaphragm	Insert every time before sex. Keep in place for six hours after sex.	Yes	No
Non-hormonal	Contraceptive sponge	Insert vaginally. Effective for 24 hours. Keep in place for six hours after sex.	No	No
Non-hormonal	Cervical cap	Insert every time before sex and keep in place for six hours after sex.	Yes	No
Non-hormonal	Female condom	Insert every time before sex.	No	Yes
Non-hormonal	Male condom	Partner must wear every time during sex.	No	Yes (latex or synthetic only)
Non-hormonal	Non-hormonal intrauterine contraceptive (IUC)	Inserted in the uterus and can remain for up to 10 years.	Yes, IUC inserted in health care provider's office.	No
Non-hormonal	Female sterilization or male sterilization (vasectomy)	No action required after surgery.	No, performed surgically.	No

Subject: Science	Term: 5	Topic: Year 10 Separate Sciences – Homeostasis and response

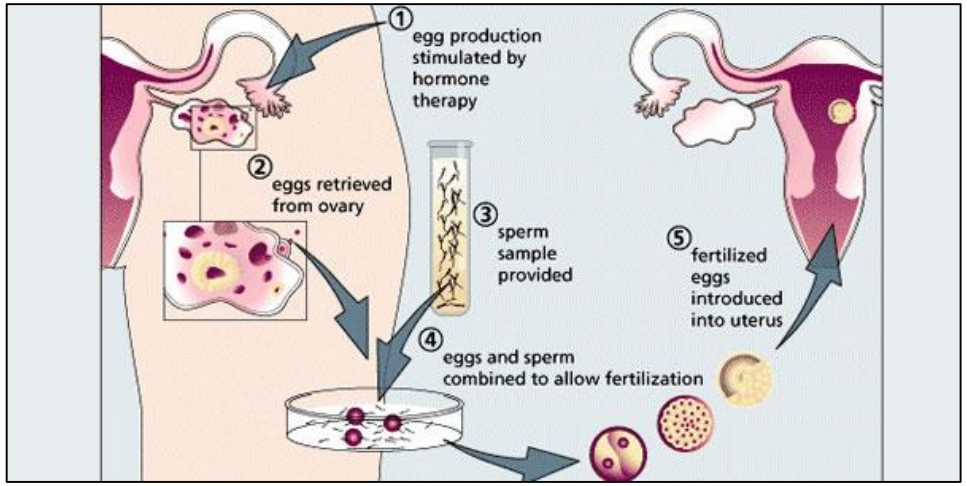
WOOTTON PARK

'Ipsum quod faciendum est diutius durant'

Infertility treatments

FSH and LH can be used as a fertility drug to stimulate ovulation in women with low FSH levels.

In vitro fertilisation (IVF) uses FSH and LH to stimulate maturation of ova that are collected, fertilised, allowed to start development and replaced in the uterus.
IVF is emotionally and physically stressful, often unsuccessful and can lead to risky multiple births.



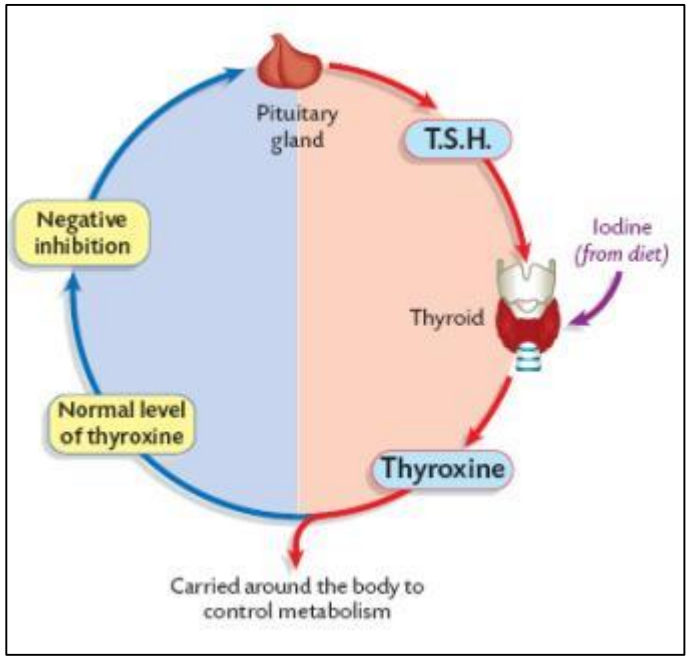
Negative feedback

Thyroxine from the thyroid gland stimulate the basal metabolic rate.
It plays an important role in growth and development.

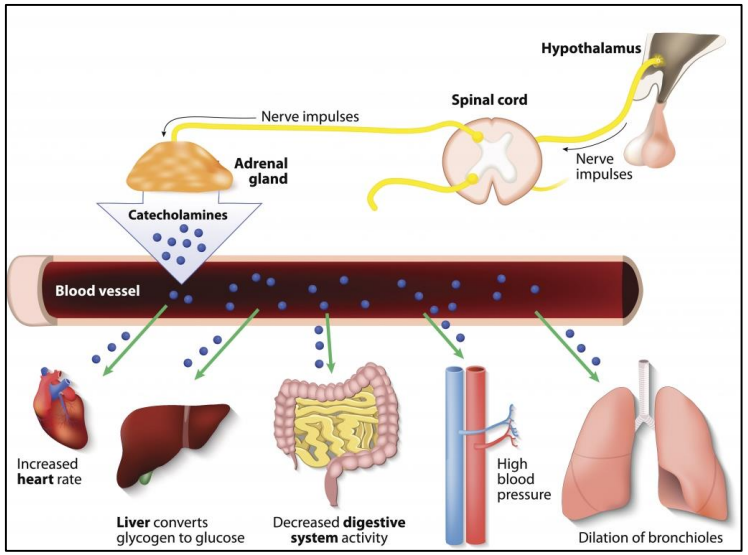
Adrenaline is produced by the adrenal glands in times of fear and stress. It increases the heart rate and boosts the delivery of oxygen and glucose to the brain and muscles, preparing the body for "flight or flight".

Thyroxine is controlled by negative feedback whereas adrenaline is not.

Thyroxine negative feedback



Adrenaline production



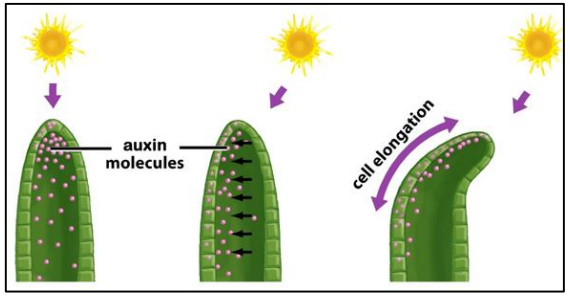
Subject: Science	Term: 5	Topic: Year 10 Separate Sciences – Homeostasis and response

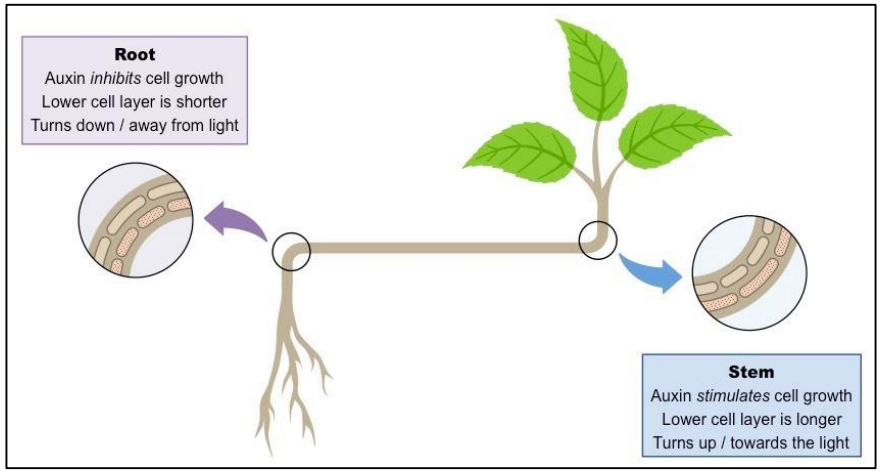
Plant hormones

Plants are sensitive to light (phototropism) and gravity (gravitropism). Plant responses to light and gravity are brought about by the plant hormone auxin.

The responses of roots and shoots to stimuli of light and gravity are the result of the unequal distribution of auxin.

Shoots grow towards the light against the force of gravity.
Roots grow in the direction of the force of gravity.

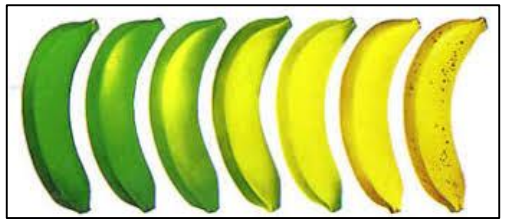




Using plant hormones

Auxins are used as weed killers (it sends the weeds into uncontrolled growth eventually killing them), rooting powders (as the hormone stimulates the root growth) and in tissue culture (stimulates growth and cell division).

Ethene is used to control fruit ripening. Growers harvest fruit when it is not ripe so it can be transported without getting damaged. By adding ethene and increasing the temperature the fruit will ripen to the perfect stage for sale.



Gibberellins can be used to increase fruit size, end seed dormancy in the brewing industry and promote flowering/increase the yield of sugar cane.

Subject: Science	Term: 5	Topic: Year 10 Chemistry – Energy changes

Topics Covered

Chemistry – Energy changes

Code	Topic
C7.1	Exothermic and endothermic reactions
C7.2	Using energy transfers from reaction
C7.3	Reaction profiles
C7.4	Bond energy calculations
C7.5	*Chemical cells and batteries*
C7.6	*Fuel cells*

7.1 Exothermic and endothermic reaction

Many reactions transfer energy from the reacting chemicals to their surroundings. These are called **exothermic reactions.** The energy transferred from the reacting chemicals often heats up the surroundings. So you would see a **rise** in temperature, e.g. burning fuel.

Other reactions transfer energy from the surroundings to the reacting chemicals. These are called **endothermic** reactions as they take in energy from there surroundings and so we see a **decrease** in temperature, e.g. thermal decomposition.

7.2 Using energy transfers from reactions

Warming up – chemical hand and body warmers can be very useful. These hand warms use an exothermic reaction to warm you up.

We can also use exothermic reactions in self-heating cans to make hot drinks like coffee. This usually involves a reaction like:

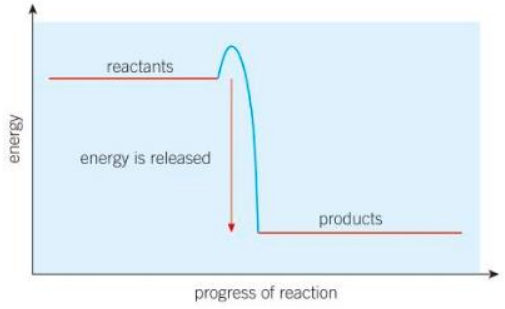
Calcium oxide + water → Calcium hydroxide (+ heat)

Cooling down – we can use endothermic process in chemical cold packs for emergency treatments for sports injuries for example.

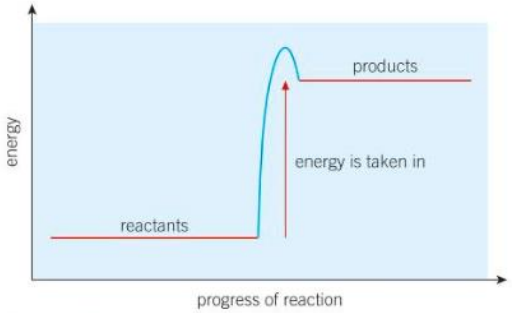
7.3 Reaction profiles

Reaction profiles show what is happening in a particular reactions. It tells us the amount of energy contained in the reactants and the products, measured in **kilojoules per mole (kJ/mol).**

The reaction profile for an exothermic reaction:



The reaction profile for an endothermic reaction:



Activation energy is the minimum amount of energy needed before colliding particles of reactants have enough energy to cause a reaction.

7.4 Bond energy calculations

Making and breaking bonds requires energy. We know if it is an exothermic or endothermic reaction depending on if more energy is released when breaking the bonds or when making them.

Bond energy is the amount of energy needed to break the bond between two atoms and is measured in KJ/mol. You can use these bond energies to work out the energy change for many chemical reactions. To calculate the energy change you need to work out:

1. **How much energy is needed to break the chemical bonds in the reactants**
2. **How much energy is released when the new bonds are formed in the products**

You can then calculate the difference between the two.

Bond	Bond energy in kJ/mol
C—C	347
C—O	358
C—H	413
C—N	286
C—Cl	346
Cl—Cl	243

Subject: Science	Term: 5	Topic: Year 10 Chemistry – Energy changes

7.4 Bond energy calculations

Worked example

Ammonia is made from nitrogen and hydrogen in the Haber process. The balanced symbol equation for this reaction is:

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

Calculate the overall energy change for the forward reaction using bond energies.

Solution

This equation tells you that the bonds in 1 mole of nitrogen molecules and 3 moles of hydrogen molecules need to break in this reaction (see Figure 2).

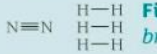


Figure 2 *These bonds are broken in the forward reaction*

Nitrogen molecules are held together by a triple bond (written like this: N≡N). This bond is very strong. Using data from the table, its bond energy is 945 kJ/mol.

Hydrogen molecules are held together by a single bond (written like this: H—H). From the table, the bond energy for this bond is 436 kJ/mol.

The energy needed to break 1 mole of N≡N and 3 moles of H—H bonds = 945 + (3 × 436) kJ = 2253 kJ taken in from the surroundings (an endothermic process).

When these atoms form ammonia (NH_3), six new N—H bonds are made since 2 moles of NH_3 are formed (see Figure 3). The bond energy of the N—H bond is 391 kJ/mol.

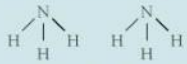


Figure 3 *These bonds are made in the forward reaction*

Energy transferred when 6 moles of N—H bonds are made = 6 × 391 kJ = 2346 kJ (the energy is transferred to the surroundings as this is an exothermic process).

So the *overall* energy change = (2253 kJ – 2346 kJ) = –93 kJ

This is the energy *transferred to the surroundings* in the forward reaction as written above.

The reaction profile in Figure 4 shows the overall energy change for the formation of ammonia.

7.5 Chemical cells and batteries

Electrical cells and batteries rely on differing reactivity of metals. The difference in reactivity can be used to make the battery or electrical cell.

Higher

The sulfate ions do not change in the displacement reaction above. They are spectator ions.

So you can leave them out of the equation and write an ionic equation:

$$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$$

You can think of this redox reaction as two half equations.

One will represent reduction:

$$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$$

The Cu^{2+} ions are reduced to Cu.

The other will be an oxidation reaction:

$$Zn(s) \rightarrow Zn^{2+}(aq) + 2e^-$$

The Zn atoms are oxidised to Zn^{2+} ions.

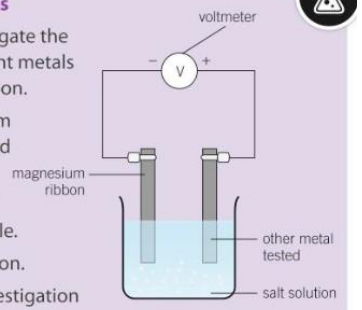
The greater the difference in reactivity between the two metals used, the higher voltage produced.

You can test this out using an experiment →

Investigating chemical cells

Use this apparatus to investigate the voltage produced by different metals paired with magnesium ribbon.

You can compare magnesium against zinc, iron, copper, and tin in your electrical cells.



- Record and display your data using a suitable table.
- Then draw your conclusion.
- You can extend your investigation to find out if any other factors affect the voltage produced, besides the two metals used.
- Or you can check predictions of the voltage produced by other pairs of metals using the data in your table.

Safety: Wear eye protection.

7.6 Fuel cells

Scientists are developing hydrogen as a fuel. It burns well and produces no pollutants:

Hydrogen + Oxygen → Water

Using hydrogen as a fuel could help reduce the human impact on global warming. However, there are problems of safety and storage that need to be solved.

A more efficient use of energy from oxidising hydrogen is in a **fuel cell**. These cells are fed with hydrogen and oxygen and produce water. Most of the energy is released in the reaction is transferred to electrical energy.

$$2H_{2(g)} + 4OH^-_{(aq)} \rightarrow 4H_2O_{(l)} + 4e^-$$

$$O_{2(g)} + 2H_2O_{(l)} + 4e^- \rightarrow 4OH^=_{(aq)}$$

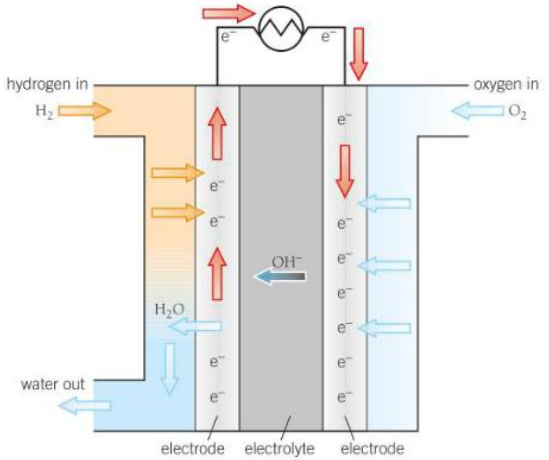


Figure 3 *A hydrogen fuel cell which has an alkaline electrolyte, such as potassium hydroxide solution. Notice that the only waste product is water*

Subject: Science	Term: 5	Topic: Year 10 Chemistry – Rates and equilibrium

Topics Covered

Chemistry – Rates and equilibrium

Code	Topic
C8.1	Rate of reaction
C8.2	Collision theory and surface area
C8.3	The effect of temperature
C8.4	The effect of concentration and pressure
C8.5	The effect of catalysts
C8.6	Reversible reactions
C8.7	Energy and reversible reactions
C8.8	Dynamic equilibrium
C8.9	Altering conditions

8.1 Rate of reaction

The rate of a chemical reactions tells you how fast reactants turn into products. Chemical reactions occur in the human body and are also very important in the chemical industry. But, how can we find out the rate of reactions?

There are two ways you can work out the rate of a chemical reaction. You can find out how quickly:

- The reactants are used up as quickly as they make products, or
- The products of the reaction are made

Here are 3 techniques you can use to collect this type of data in experiments:

1) Measuring the decreasing mass of a reaction mixture
2) Measuring the increasing volume of a gas given off
3) Measuring the decreasing light passing through a solution

8.2 Collision theory and surface area

Reactions can only take place when the particles (atoms, ions, or molecules) of reactants come together. The reacting particles do not only have to collide with each other, but they need to do so with enough energy for a reaction to take place. This is known as **Collision theory**. The minimum amount of energy that particles must have before they can react is called the **activation energy**.

Reactions are more likely to happen between reactant particles if you:

- Increase the frequency of reacting particles colliding with each other
- Increase the energy they have when they collide

A larger surface area results in a quicker reaction because there is a larger surface for particles to collide with.

Worked example 1

A group of students timed how long it took before no more gas was given off from calcium carbonate added to excess dilute hydrochloric acid. They performed three experiments using the same volume and concentration of acid, and 2.50 g of large, medium, and then small marble chips. Here are their results:

Size of marble chips	Time until no more bubbles of gas appeared in s
small	102
medium	188
large	294

Calculate the mean rate of reaction of each size of marble chips used.

Solution

Using the equation in Topic C8.1:

$$\text{mean rate} = \frac{\text{mass of reactant used up (g)}}{\text{time (s)}}$$

Small chips	Medium chips	Large chips
$\frac{2.50\,g}{102\,s}$	$\frac{2.50\,g}{188\,s}$	$\frac{2.50\,g}{294\,s}$
= 0.0245 g/s (fastest mean rate)	= 0.0133 g/s	= 0.00850 g/s (slowest mean rate)

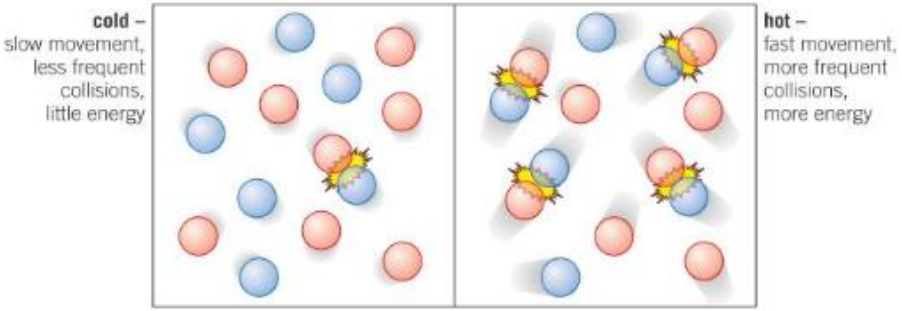
Notice that the data are given to 3 significant figures, so the answers are consistent with the data provided.

8.3 The effect of temperature

Collision theory tells you why raising the temperature increases the rate of reaction. There are 2 reasons:

1. Particles collide more often
2. Particles collide with more energy

So when we increase the temperature of a reacting mixture we **increase the proportion of particles exceeding the activation energy and therefore there is a greater effect on the rate that there are successful collisions.**



Subject: Science	Term: 5	Topic: Year 10 Chemistry – Rates and equilibrium

8.4 The effect of concentration and pressure

Increasing the concentration of reactants in a solution increases the rate of reaction because there are more particles of the reactants moving around in the same volume of solution. The more 'crowded' together the reactant particles are, the more likely it is that they will collide. Increasing the pressure of reacting gases has the same effect.

Higher

Worked example

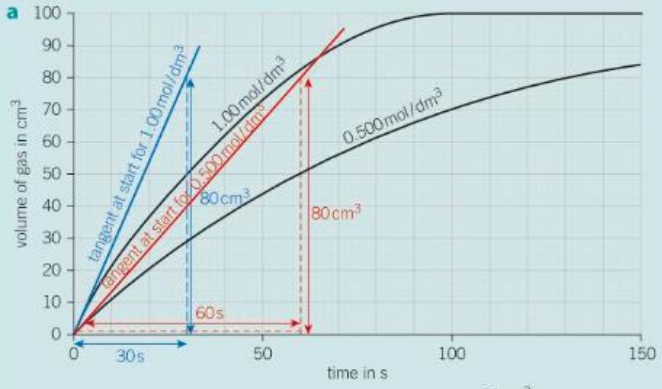
An investigation was carried out to find how the concentration of dilute hydrochloric acid affected the rate of its reaction with calcium metal. The volume of hydrogen gas given off was monitored over 150 seconds using a gas syringe. One test was carried out using 0.167 g of calcium with an excess of 1.00 mol/dm³ dilute hydrochloric acid, and this was repeated using the same volume of 0.500 mol/dm³ acid, also in excess. The results were plotted on a graph – see the two curves in the graph below.

a Use the results on the graph to find the initial rates of reaction, i.e. at the start when time = 0 seconds.

b Draw a conclusion from part **a**.

Solution

a



Initial rate for 1.00 mol/dm³ acid (gradient of tangent) at $t = 0$ s is: $\frac{80\,cm^3}{30\,s} = 2.67\,cm^3/s$

Initial rate for 0.500 mol/dm³ acid (gradient of tangent) at $t = 0$ s is: $\frac{80\,cm^3}{60\,s} = 1.33\,cm^3/s$

b The rate for 1.00 mol/dm³ dilute hydrochloric acid is twice the rate for the 0.500 mol/dm³ acid. So doubling the concentration doubles the rate of reaction. The rate is *directly proportional* to the concentration for this reaction. This could be because in any given volume of the acids, in the 1.00 mol/dm³ dilute hydrochloric acid there are twice as many $H^+(aq)$ ions as there are in the 0.500 mol/dm³ acid. This makes it twice as likely that collisions will occur between the acidic $H^+(aq)$ ions and the calcium. So in any given time there will be twice as many collisions, resulting in the reaction rate also doubling.

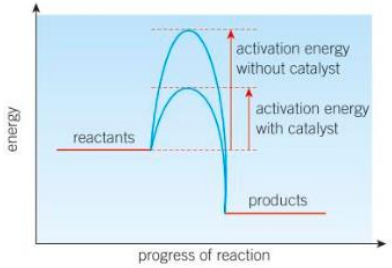
8.5 The effect of catalysts

You can speed up some reactions and reduce energy costs by using **catalysts**.

A catalyst is a substance that changes the rate of a reaction. However, it is not changed chemically itself at the end of the reaction. A catalyst is not used up in a reaction, so it can be used over and over again.

How do catalysts work?

Catalysts do not increase the frequency of collision between reactant particles, nor do they make collisions more energetic. They increase rates of reaction by providing an alternative reaction pathway to the products, with a lower activation energy than the reaction without the catalyst present.



8.6 Reversible reactions

In most chemical reactions, the reactants react completely to form the products. You show this by using an arrow pointing *from* the reactants *to* the products:

$$A + B \rightarrow C + D$$

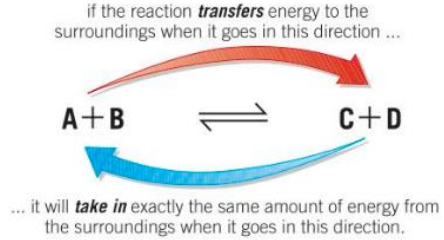
However, in some reactions the products can react together to make the original reactants again. This is called **reversible reaction**.

A reversible reaction can go in both directions, so two 'half-arrows' are used in the equation. One arrow points in the forwards direction and one in the backwards direction:

$$A + B \rightleftharpoons C + D$$

8.7 Energy and reversible reactions

In a reversible reaction between A and B below, energy is transferred to the surroundings and so is exothermic. This means that the reverse reaction must be endothermic and take energy in from the surroundings.



Subject: Science	Term: 5	Topic: Year 10 Chemistry – Rates and equilibrium

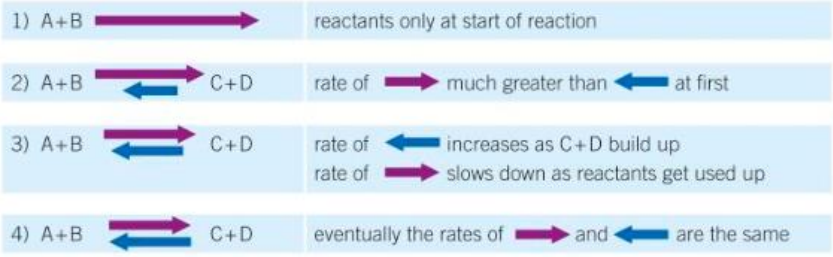
8.8 Dynamic equilibrium

Some reactions are reversible. The products formed can react together to make the original reactants again:

$$A + B \rightleftharpoons C + D$$

So what happens when you start with just the reactants in a reversible reaction in a **closed system**, in which no reactants or products can get in or out?

At equilibrium, the rate of the forward reaction equals the rate of the reverse reaction.



8.9 Altering conditions

We have seen how changing concentration can affect a reversible reaction at equilibrium . In general, the position of equilibrium shits as if trying to cancel out any change in conditions.

Think about increasing the concentration of a reactant. This will cause the position of equilibrium to shift to the right, in favour of the products, in order to reduce the concentration of that reactant.

By changing the pressure at which the reaction is carried out, you can change the amount of products that are made:

If the forward reaction produces *more* molecules of gas …	If the forward reaction produces *fewer* molecules of gas …
… an increase in pressure decreases the amount of products formed.	… an increase in pressure increases the amount of products formed.
… a decrease in pressure increases the amount of products formed.	… a decrease in pressure decreases the amount of products formed.

By changing the temperature, you can plan to get more of the products and less of the reactants:

If the forward reaction is exothermic …	If the forward reaction is endothermic …
… an increase in temperature decreases the amount of products formed.	… an increase in temperature increases the amount of products formed.
… a decrease in temperature increases the amount of products formed.	… a decrease in temperature decreases the amount of products formed.

Higher

Affecting the composition of an equilibrium mixture

One example of a reversible reaction is the reaction between iodine monochloride, ICl, and chlorine gas. Iodine monochloride is a brown liquid, while chlorine is a yellowish green gas. These substances can be reacted together to make yellow crystals of iodine trichloride, ICl_3.

When there is plenty of chlorine gas, the forward reaction makes iodine trichloride crystals, which are quite stable. However, if the concentration of chlorine gas is lowered, the rate of the forward reaction decreases and the rate of the reverse reaction increases. This starts turning more iodine trichloride back to iodine monochloride and chlorine, until equilibrium is established again.

You can change the relative amounts of the reactants and products in a reacting mixture at equilibrium by changing the conditions. This is an application of **Le Châtelier's Principle**. Henry Louis Le Châtelier was a French chemist who observed equilibrium mixtures. He noticed that whenever a change in conditions is introduced to a system at equilibrium, the position of equilibrium shifts so as to cancel out the change. The change in conditions can be changes in concentration, pressure or temperature.

This principle is very important in the chemical industry. In a process with a reversible reaction, industrial chemists need to find the conditions that give as much product as possible, in as short a time as possible.

However, there are always other economic and safety factors to consider when chemists manipulate reversible reactions in industry.

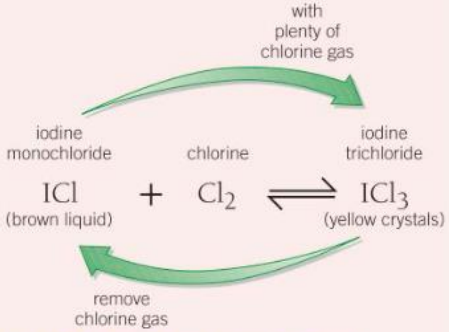


Figure 3 *This reacting mixture can be changed by adding or removing chlorine from the mixture*

Subject: Science	Term: 6	Topic: Year 10 Separate Sciences – Wave properties

WOOTTON PARK
'Ipsum quod faciendum est diutius durant'

Topics Covered

Physics – Wave Properties

Code	Topic
P12.1	The nature of waves
P12.2	The properties of waves
P12.3	Reflection and refraction
P12.4	More about waves
P12.5	*Sound waves*
P12.6	*The uses of ultrasound*
P12.7	*Seismic waves*

Do not forget you can revise using Kerboodle. Use the Digital book section and find the green book titled Biology for GCSE combined Science: Trilogy. You could also use:

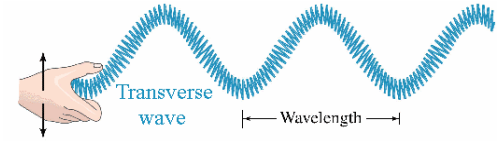
- BBC Bite size
- Primrose Kitten YouTube videos
- Free science lesson videos

12.1 The nature of waves

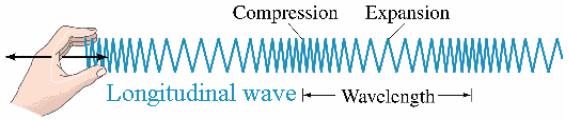
There are different types of waves:

- **Mechanical waves** – like sound waves or water waves. This type travel through a medium (a substance)
- **Electromagnetic waves** – like light waves or radio waves. This type can travel through a vacuum.

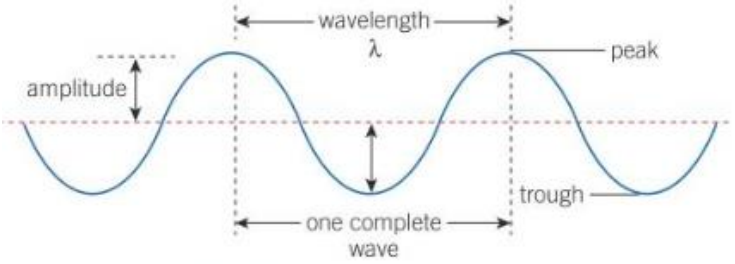
Transverse waves - The oscillations of a transverse wave are perpendicular to the direction in which the waves transfer.



Longitudinal waves – The oscillations of a longitudinal wave are parallel to the direction in which the waves transfer energy.



12.2 The properties of waves



The bigger the amplitude of the waves, the more energy the waves carry.

Wavelength – is the distance from one point on the wave to the equivalent point on the adjacent wave.

Frequency – is the number of waves per second and is measured in Hertz, Hz.

Wave speed – the speed of the waves is the distance travelled by each wave every second through a medium. Energy is transferred by the waves at this speed.

Wave speed (m/s) = frequency (Hz) x wavelength (m)

Measuring the speed of sound in air:

Speed (m/s) = Distance (m) ÷ Time (s)

12.3 Reflection and refraction

Reflection of waves can be investigated using the ripple tank. Each ripple is called a wavefront because it is the front of each wave as it travels across the water surface. Incident waves are produced, for example, when dipping a ruler in water repeatedly. The incident rays may then be reflected off a barrier.

Refraction of waves occurs when a plane wave crosses a boundary at a non-zero angle to the boundary causing each wavefront to change speed and direction.

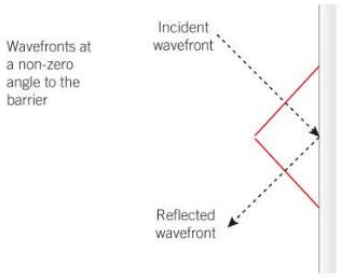


Figure 1 *Reflection of plane waves*

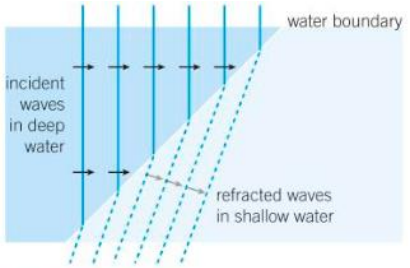


Figure 2 *Refraction*

Subject: Science	Term: 6	Topic: Year 10 Separate Sciences – Wave properties

12.4 More about waves

Investigating waves

Investigate waves on a stretched string using the apparatus shown in Figure 4. The oscillator sends waves along the string. You can adjust the frequency of the oscillator until there is a single loop on the string. Its length is half the length of one wavelength. The vibrating string sends out sound waves at the same frequency into the surrounding air.

- Note the frequency of the oscillator.
- Make suitable measurements to find the length, L, of a single loop and calculate the wavelength of the waves ($= 2L$)
- Calculate the speed of the waves on the string using the equation: wave speed = frequency × wavelength
- Increase the frequency to obtain more loops on the string. Make more measurements to see if the wave speed is the same.

To measure the speed of the waves in a ripple tank (Figure 2, Topic P12.2), use a ruler to create plane waves that travel towards one end of the ripple tank.

- Use a stopwatch to measure the time it takes for a wave to travel from one end of the ripple tank to the other.
- Measure the distance the waves travel in this time.
- Use the equation speed = distance ÷ time to calculate the speed of the waves.

Observe the effect on the waves of moving the ruler up and down faster. More waves are produced every second and they are closer together.

- Determine whether the speed of the waves has changed.

Safety: Take care not to spill any liquids and, if you do, let your teacher know. You should also take care with hanging weights – clamp the stands to the bench and wear eye protection.

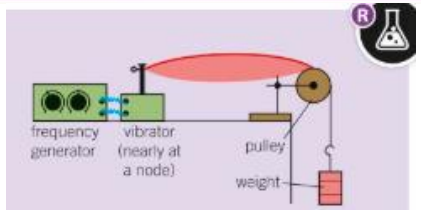
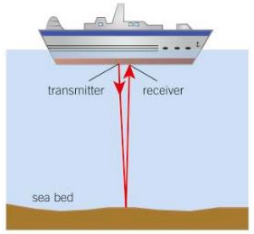


Figure 4 *Investigating waves on a string*

12.5 Sound waves

The ear can detect an enormous range of sound waves of different intensities as well as a wide range of frequencies, from 20 Hz to about 20 kHz. When a sound wave makes your ear drum vibrate your ear sends signals to your brain about what you are hearing.

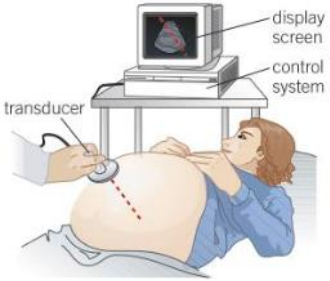
Echo sounding uses pulses of high-frequency sound waves to detect objects in deep water and deep water to measure water depth below a ship.



12.6 The uses of ultrasound

Sound waves above the highest frequency that humans can detect are called **ultrasounds**. Each ultrasound wave pulse from the transducer:

- Is partially reflected from the different tissue boundaries in its path
- Returns to the transducer as a sequence of ultrasound waves reflected by the tissue boundaries, arriving back at different times.



$$Distance\ travelled\ by\ the\ wave, m = \frac{speed\ of\ ultrasound\ waves\ in\ body\ tissue, m/s}{time\ take, s}$$

$$The\ depth\ of\ the\ boundary\ below\ the\ surface, m = 0.5\ \times\ speed\ of\ the\ ultrasound \times time\ taken$$

12.7 Seismic Waves

Seismic waves are shock waves created by energy being transferred from the Earth's core and the movement of tectonic plates. A seismometer can record and measure the size of seismic waves and display three main types;

- **Primary waves (P-Waves)** cause the initial tremors lasting about one minute. These are longitudinal waves that push or pull on material as they move through the Earth.
- **Secondary waves (S-waves)** cause more tremors a few minutes later. They are transverse waves that travel more slowly than P-waves. They shake the material that they pass through inside the Earth from side to side.
- Long waves (L-waves) arrive last and cause violent movements on the surface up and down as well as backwards and forwards. They travel more slowly than P-waves or S-waves, and they only happen in the Earth's crust.

Subject: Science	Term: 6	Topic: Year 10 Separate Sciences – Electromagnetic waves

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Topics Covered

Physics – Electromagnetic waves

Code	Topic
P13.1	The electromagnetic spectrum
P13.2	Light, infrared, microwaves, and radio waves
P13.3	Communications
P13.4	Ultraviolet waves, X-rays, and gamma rays
P13.5	X-rays in medicine

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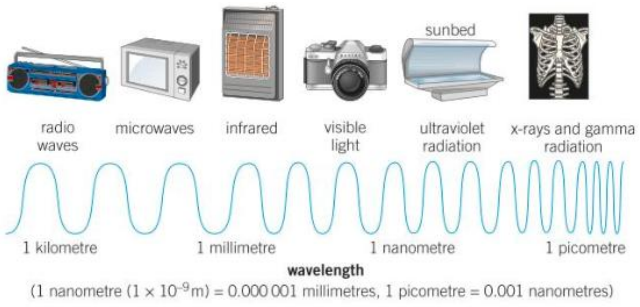
- Free science lesson videos

13.1 The Electromagnetic spectrum

Electromagnetic waves are electric and magnetic disturbances that can be used to transfer energy from a source to an absorber. You use waves from different parts of the **electromagnetic spectrum** in everyday devices.

Waves from different parts of the EM spectrum have different wavelengths:

- Long-wave radio waves have wavelengths as long as 10 km (10^4)
- X-rays and gamma rays have wavelength as short as a millionth of a millionth of a millimetre (= 0.000 000 000 001 mm or 10^{-15}m)
- Your eyes detect visible light, which is only a limited part of the EM spectrum



13.2 Light, infrared, microwaves, and radio waves

Light – light from ordinary lamps and the Sun is called **white light**. This is because it has all the colours of the visible spectrum in it. Photographers need to know how shapes and colours of light affect the photographs they take:

Infrared radiation – is emitted from all objects and can be used in infrared devices, such as in **optical fibres**, remote controls or cameras.

Microwaves – have a short wavelength than radios. We cab use them for communications, e.g. satellite TV or for heating food.

Radio waves - have frequencies that range from about 200 000 Hz to 300 million hertz. They are used to carry radio, TV and mobile phone signals.

13.3 Communications

When you use a mobile phone, radio waves carry signals between your mobile phone and the nearest mobile phone mast. The waves used to carry any type of signal are called **carrier waves.** The shorter the wavelength of radio waves the more information they can carry but their range is shorted and less spread out.

13.4 Ultraviolet waves, X-rays and gamma rays

UV waves are harmful to eyes and skin. We can use them for security pens or to mark valuable objects.

X-rays and gamma rays – both travel straight intro substances and can pass through them. They both have short-wavelengths and carry a lot of energy. We use both for medical purposes, X-rays for X-rays and gamma rays for killing harmful bacteria and cancer cells.

13.5 X-rays in medicine

When an x-ray machine is turned o, x-rays from the x-ray tube pass through the part of the patients body that is under investigation. X-rays pass through the soft tissue but are absorbed by bones. A flat-panel detector is a small screen that contains a **charge-coupled device (CCD)**. This CCD converts the x-rays into light. The light rays then create an electronic signals in the sensors that are sent to a computer, which displays a digital x-ray image.

The **radiation dose** received by a person is a measure of the damage done to their body by ionising radiation.

Subject: Science	Term: 6	Topic: Year 10 Separate Sciences – Light

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'Ipsum quod faciendum est diutius durant'

Topics Covered

Physics – Light

Code	Topic
P14.1	*Reflection of light*
P14.2	*Refraction of light*
P14.3	*Light and colour*
P14.4	*Lenses*
P14.5	*Using lenses*

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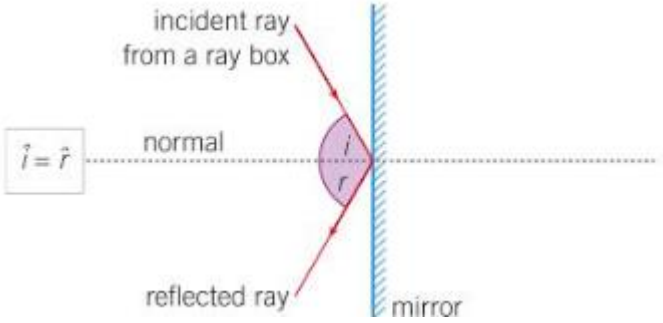
14.1 Reflection of light

The law of reflection tells us that the angle of incidence = the angle of reflection.

A **virtual image** is formed at a place where light rays appear to come from after they have been reflected (or refracted). It can't be projected onto a screen like the movie images you see at a cinema. AN image that can seen on a screen is described as a real image because it is formed by focusing light onto the screen.

Specular reflection – is when parallel light rays are reflected in a singular direction

Diffuse reflection – is when light rays are scattered when reflected from a rough surface.



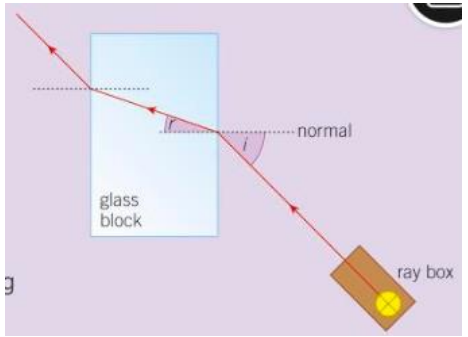
14.2 Refraction of light

Refraction is the change of direction of a light wave once is has changes speed.

<u>Refraction rules</u>

Your investigation should show that a light ray:

1. Changes direction towards the normal when it travels from air into glass. The angle of refraction (r) is smaller than the angle of incidence (i).
2. Changes direction away from the normal when it travels from glass into air. The angle of refraction (r) is greater than the angle of incidence (i).



14.3 Light and colour

Colour filters work by absorbing certain wavelengths and transmitting other wavelengths of white light.

14.4 Lenses

A **convex lens** makes parallel rays convers to a focus. The point where parallel rats are focused to is the **principal focus**.

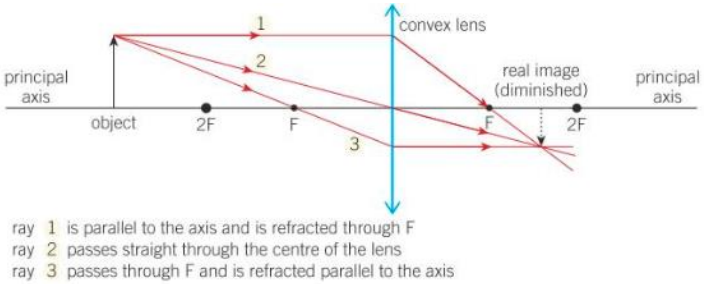
A **concave lens** makes parallel rays diverge.

Whether the lens is concave or convex, the distance from the centre of the les to the principal focus is called the f**ocal length** of the lens.

$$Magnification\ produced\ by\ a\ lens = \frac{image\ height}{objects\ height}$$

14.5 Using lenses

We can use lenses to form real images:



We can also form a virtual image using convex and concave lenses.

Subject: Science	Term: 6	Topic: Year 10 Separate Biology - Ecology

Topics Covered

Biology - Ecology

Code	Topic
4.6.4	Classification of living organisms
4.7.1	Adaptations, interdependence and competition
4.7.2	Organisation of an ecosystem
4.7.3	Biodiversity

4.7.1 Biotic and abiotic factors

Biotic factors are living factors that can affect a community.
E.g.
Availability of food, new predators, new competitors, new diseases.

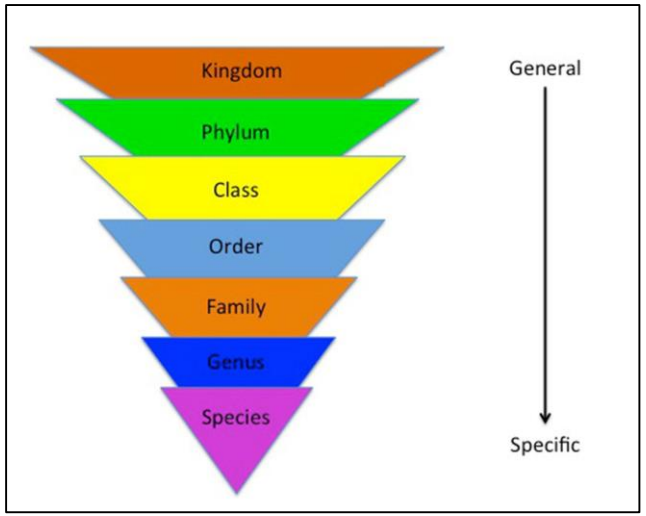
Abiotic factors are non-living factors that can affect a community.
E.g.
Light intensity, temperature, moisture levels, soil pH, wind intensity, oxygen levels.

4.6.4 Classification of living organisms

Traditionally organisms have been classified into groups depending on their characteristics.
Organisms were classified into smaller and smaller groups.

Carl Linnaeus classified organisms into the following groups: Kingdom – Phylum – Class – Order – Family – Genus – Species

He also devised a **binomial naming system** to name organisms by using their **genus** name and then their **species** name.



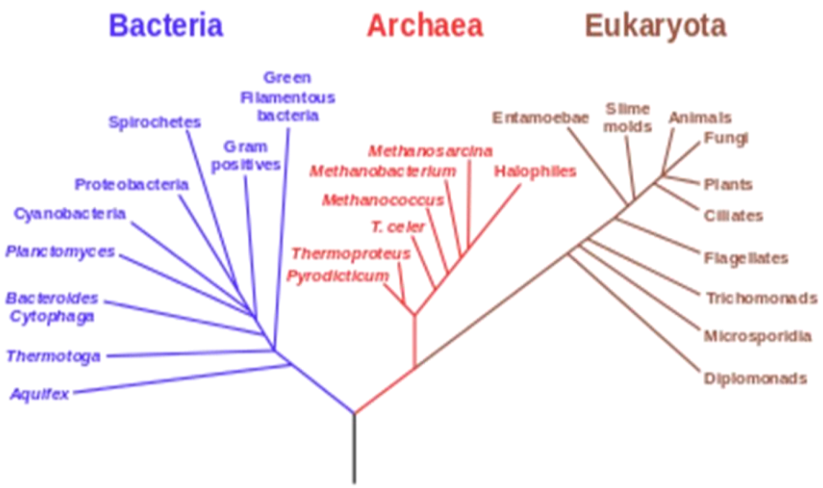
Common Name: Pebble Crab

Genus ↓ Species ↓

Scientific Name: *Xanthias* *lamarckii*

Carl Woese later developed the three domain system. This is due to the improvement in microscope technology allowing more detailed internal structures to be observed.
Three domains:

1. Archaea (primitive bacteria)
2. Bacteria (true bacteria)
3. Eukaryota (protists, fungi, plants, animals)



Subject: Science	Term: 6	Topic: Year 10 Separate Biology - Ecology

4.7.1 Communities

Ecosystem = A community and the habitat in which it lives.

Community = All of the populations of different organisms that live together in a habitat.

Competition = Animals and plants compete for resources that they need to survive.

Plants compete for:
Light, space, water and mineral ions.
Animals compete for:
Food, mates, territory.

Habitat = The place where an organism lives.

Interdependence = One species depends on another for food, shelter, pollination, seed dispersal etc.

Stable community = All species and environmental factors are in balance.
Population sizes remain fairly constant.
E.g. Tropical rainforests.

4.7.1 Adaptations

Organisms **have adapted for survival**, they may be structural, behavioural or functional.

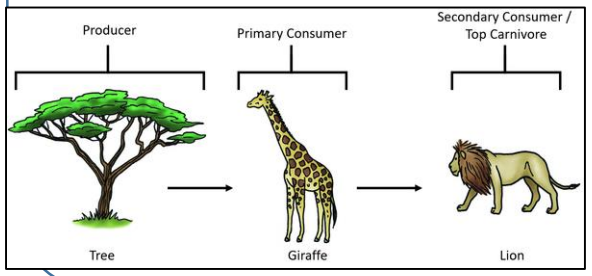
Extremophiles are organisms that have adapted to survive in extreme environments such as high temperature, high pressure or high salt concentration.

Tardigrades, also known as "water bears" are around 1 mm in length and can withstand extreme temperatures, lack of water and oxygen.

4.7.2 Levels of organisation

Feeding relationships can be represented by **food chains.**

A food chain begins with a **producer**, which synthesises molecules by the process of **photosynthesis.**
Producers are eaten by **consumers.**
Consumers that eat other animals are **predators** and those that are eaten are **prey.**



Trophic levels:
1 = producers
2 = primary consumers
3 = secondary consumers
4 = tertiary consumers

4.7.2 Distribution of organisms

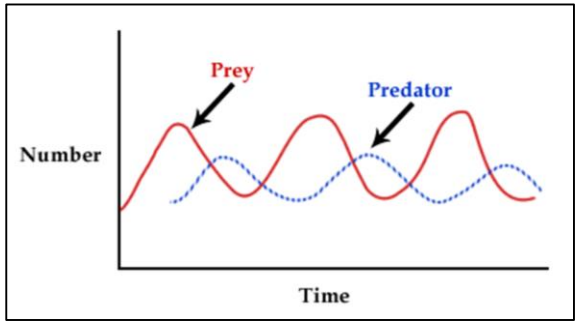
Quantitative data on the distribution and abundance of organisms can be obtained by:
1. Random sampling with quadrats
2. Sampling along a quadrat.

Random Sampling with Quadrats	Transects
Process Qudrats are placed **randomly** in the area being sampled. A **grid system** is used to **avoid bias**. The populations within the quadrats are counted to give an **average population count** for the total area.	**Process** A transect line is unrolled along a **gradient.** Quadrats are placed at **specific intervals** along the transect and the populations are counted.
What could you use it for? Immobile or very slow moving populations. Can be used to show the average population size across a large area.	**What could you use it for?** Looking at trends across a gradient.
Pro's and Cons Good method for measuring the average population size for a large area. If not enough quadrats are used the results won't be valid. The quadrats need to be placed randomly to avoid bias.	**Pro's and Cons** Can show trends across a large area. The quadrats need to be placed at regular intervals for valid results. Accuracy is important for valid results.

Subject: Science	Term: 6	Topic: Year 10 Separate Biology - Ecology

4.7.2 Levels of organisation

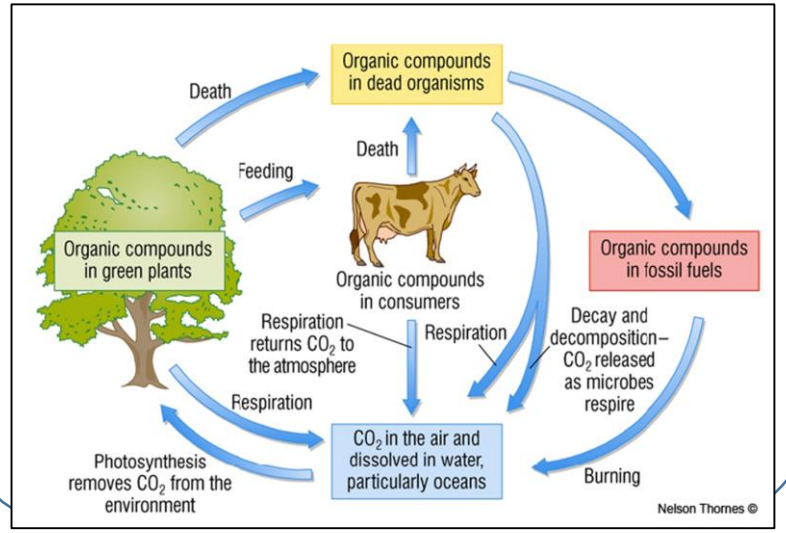
In a stable community the numbers of predators and prey rise and fall in cycles.



4.7.2 How materials are cycled.

Materials are recycled to provide the building blocks for future generations.

Carbon cycle:



4.7.2 How materials are cycled.

Decay cycle:

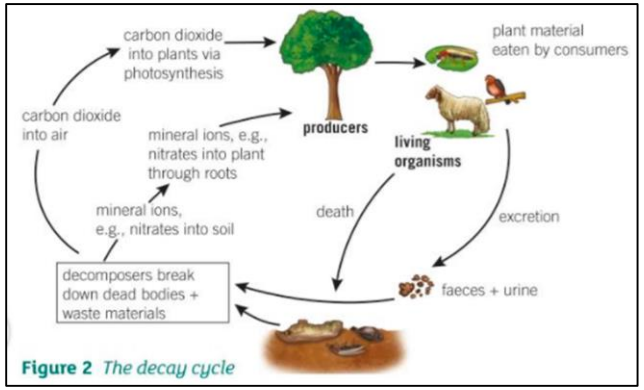
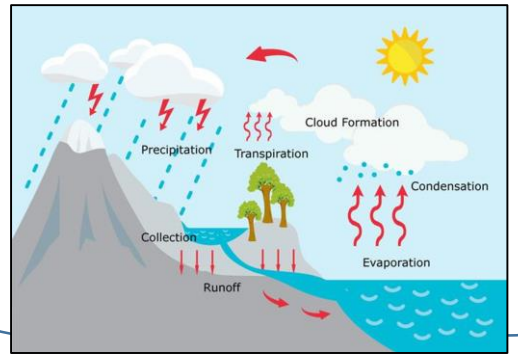


Figure 2 *The decay cycle*

Conditions for decay:

1. Temperature (required practical to investigate the effect of temperature on the rate of decay of fresh milk by measuring the pH change).
2. Moisture
3. Oxygen

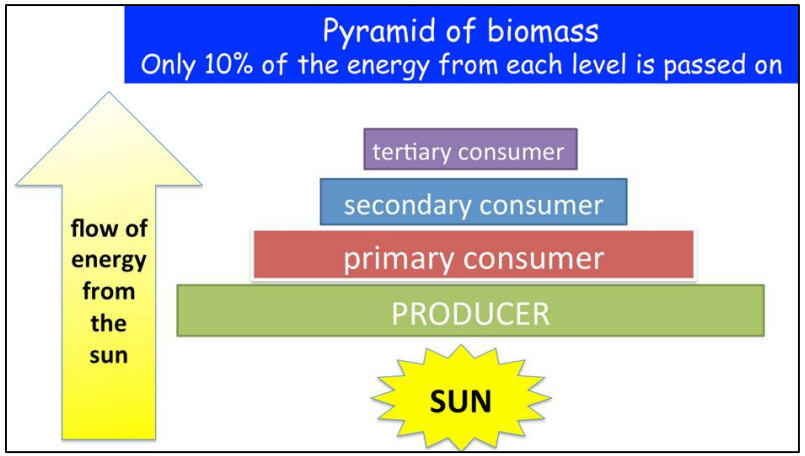
Water cycle:



4.7.2 Levels of organisation

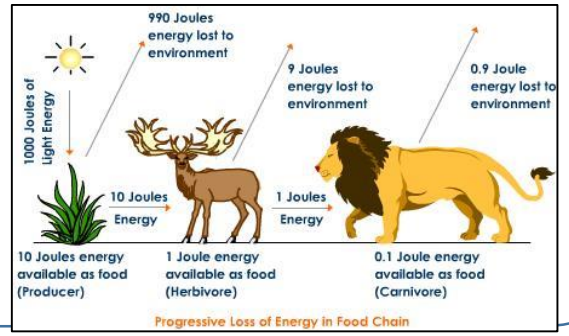
Pyramids of biomass:

Biomass:
Mass of material in living organisms.



Biomass transfer:
Only about 10% of the biomass from each trophic level is transferred to the level above it.
Losses in biomass occur because not all of the ingested material is absorbed, some is lost as faeces or waste products such as carbon dioxide and water in respiration.

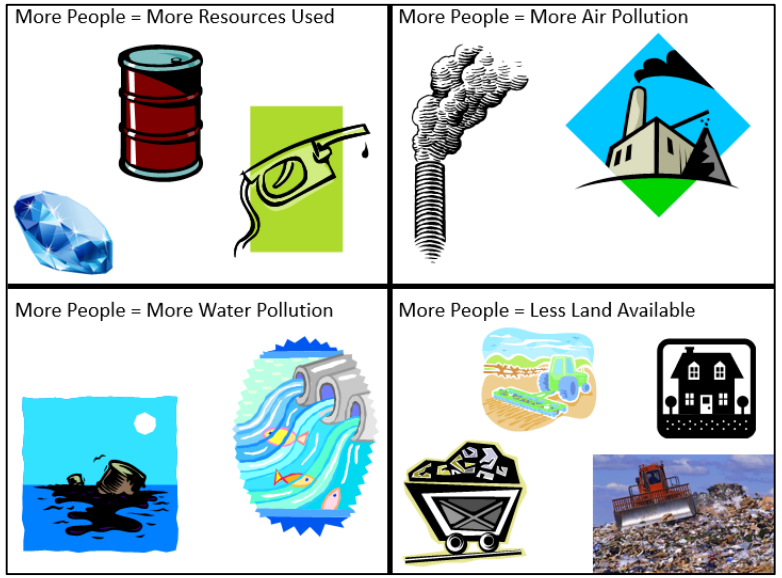
Energy in a food chain:



Subject: Science	Term: 6	Topic: Year 10 Separate Biology - Ecology

4.7.3 Biodiversity

Biodiversity is the **variety** of all life on Earth.
A great biodiversity ensures **stability** of ecosystems.
The future of the human species relies on us **maintaining** a good level of biodiversity.
Human activities can **reduce biodiversity.**



Maintaining biodiversity:
Programmes have been put in place to maintain biodiversity:

- Breeding programmes for endangered animals
- Protection and regeneration of rare habitats e.g. coral reefs, mangroves, heathland.
- Reintroduction of field margins and hedgerows in agricultural areas.
- Reduction of deforestation.
- Recycling resources rather than dumping in landfill.

Waste management

Rapid human population growth means that more wastes are produced which could lead to more pollution.

Farming chemicals

Chemicals such as pesticides and herbicides are poisons. When sprayed on crops they enter the food chain. Although the levels are small at the start of the food chain as they often can't be broken down by the organisms in the food chain they build up and eventually become fatal, this is known as bioaccumulation.

Fertilisers

Minerals from the fertilisers are washed from the soil into local streams, ponds and rivers.
These increase the growth of algae, plants and microorganisms eventually leading to the death of all living organisms due to a lack of oxygen (eutrophication).

Air pollution

When nitrogen and sulfur oxides dissolve in water droplets in clouds, it makes the rain more acidic than normal. This is called **acid rain.**

Peat bog destruction

Peat bogs and peatlands act as massive carbon stores.
They are unique ecosystems that are home to a large number of specially adapted plants, animals and microorganisms.
Peat is burnt as a fuel and is also used by gardeners to produce garden compost.
Both processed release carbon dioxide into the atmosphere.

Global warming

Levels of carbon dioxide and methane are increasing.

Consequences include:

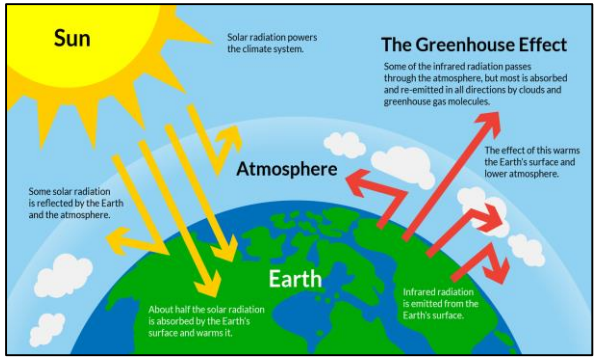
1. Loss of habitat due to flooding and rising sea levels.
2. Changes in global weather patterns.
3. Extinction of animal and plant species.
4. Loss of global biodiversity.
5. Changes in migration patterns.

Land use and deforestation

What is deforestation?
When land is cleared for timber and farms, there are fewer trees to remove carbon dioxide from the atmosphere for photosynthesis. If the fallen trees are burned additional carbon dioxide is released into the atmosphere.

The main reasons for deforestation are:

- To clear land for growing staple crops such as rice in the developing world.
- To rear cattle for the beef market.
- To grow crops that are used to make biofuels.



Subject: Science	Term: 6	Topic: Year 10 Separate Biology - Ecology

The impact of change

The distribution of living organisms depends on the environmental conditions and how they change around the world.

Environmental changes can be due to:

1. Seasonal changes.
2. Geographic changes.
3. As a result of human interaction.

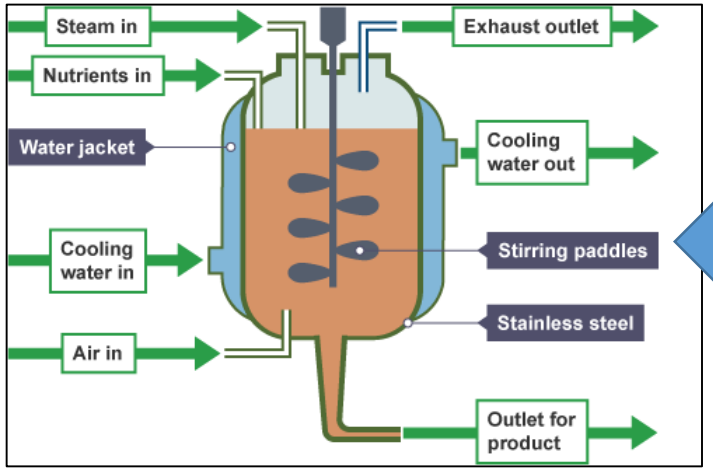
Factors affecting food security

- Increasing birth rates.
- Changing diets in developed countries resulting in scarce food resources being transported around the world. People replace their traditional foods with modern food alternatives.
- New pests and pathogens affecting farming.
- Environmental changes affecting food production.
- The cost of agricultural developments e.g. genetically modified crops.
- Conflicts leading to insecurity of food.

Making food production efficient

The efficiency of food production can be improved by restricting energy transfer from food animals to the environment.
This can be achieved by:

- Restricting their movement.
- Controlling the temperature of the surroundings so animals don't have to use biomass to keep warm and instead can use it primarily for growth.
- Giving them a high protein diet.
- Reducing the number of stages in the food chain.
- Eating plants directly.



Sustainable food production

Maintaining the oceans

Fish stocks in the oceans are declining.
It is important to maintain fish stocks at a level where breeding can continue to reduce the risk of some species becoming extinct.

Overfishing can be eliminated by:

- Controlling net size
- Introducing fishing quotas

Biotechnology

Scientists are developing new ways of growing foods to solve food production problems.

Modern biotechnology techniques allow large quantities of microorganisms to be cultured for food.

E.g. the fungus Fusarium is useful for producing mycoprotein, a protein-rich food that is suitable for vegetarians.

E.g. Genetically modified crops can provide more food or food with increased nutritional value.

Subject: Science	Term: 6	Topic: Year 10 Separate Chemistry – Crude oil and fuels

Topics Covered

Chemistry – Crude oil and fuels

Code	Topic
C9.1	Hydrocarbons
C9.2	Fractional distillation of oil
C9.3	Burning hydrocarbon fuels
C9.4	Cracking hydrocarbons

Do not forget you can revise using Kerboodle. Use the Digital book section and find the green book titled Biology for GCSE combined Science: Trilogy. You could also use:

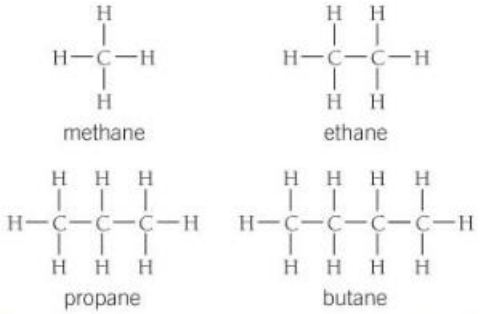
- BBC Bite size
- Primrose Kitten YouTube videos
- Free science lesson videos

C9.1 Crude Oil

Crude oil is a dark, smelly liquid formed over millions of years from the remains of tiny ancient sea animals and plants. It is a **mixture** of many different carbon compounds. Nearly all of the compounds in crude oil are compounds containing only **hydrogen** and **carbon**. These compounds are called **hydrocarbons**.

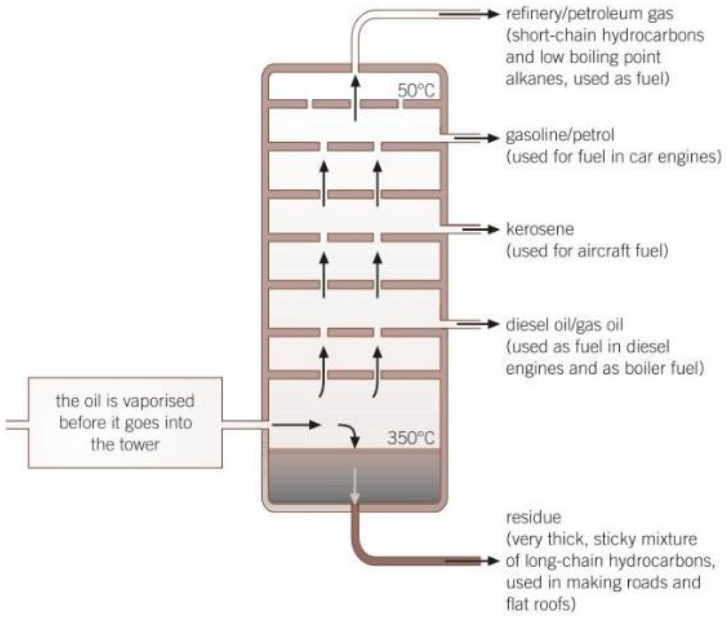
Crude oil can be split into different **fractions** to make them more useful, through a process of **distillation**.

Alkanes make up the majority of hydrocarbons and all of their names end in '-ane.' They are described as saturated as they only have single bonds. The **general formula** for an alkane is $C_nH_{(2n+2)}$.



C9.2 Fractional distillation of oil

In **fractional distillation** crude oil is separated into hydrocarbons with similar boiling points, called fractions. Crude oil is heated and fed into the bottom of a tall tower (a fractionating column) as hot vapour. The column is hot at the bottom and cooler at the top. The gases move up the column and the hydrocarbons condense when they reach the temperature of their boiling points. We can then collect the different fractions at the different levels.



C9.3 Burning hydrocarbon fuels

Complete combustion is when a fuel is burnt in plenty of oxygen, as they burn hydrocarbons release a lot of energy to the surroundings. Complete combustion always leads to the production of carbon dioxide and water, the fuel is fully **oxidised**.

Propane + oxygen → Carbon dioxide + Water

In **incomplete combustion** there is not enough oxygen and so instead all of the carbon in the fuel turns into not only carbon dioxide, but also **carbon monoxide (CO)** is formed which is a very toxic gas.

C9.4 Cracking hydrocarbons

Some hydrocarbon chains are so long that they are useless to us. So we can break them down into smaller more useful ones in a process called **cracking**.

Cracking takes place over a hot catalyst or mixed with steam and heated to a very high temperatures. The hydrocarbons are cracked as **thermal decomposition** reactions take place.

$$\underset{\text{decane}}{C_{10}H_{22}} \xrightarrow{500\,^{\circ}C + \text{catalyst}} \underset{\text{pentane}}{C_5H_{12}} + \underset{\text{propene}}{C_3H_6} + \underset{\text{ethene}}{C_2H_4}$$

Subject: Science	Term: 6	Topic: Year 10 Separate Chemistry – *Organic reactions*

Topics Covered

Chemistry – Organic reactions

Code	Topic
C10.1	*Reactions of the alkenes*
C10.2	*Structures of alcohols, carboxylic acids and esters*
C10.3	*Reactions and uses of alcohols*
C10.4	*Carboxylic acids and esters*

Do not forget you can revise using Kerboodle. Use the Digital book section and find the green book titled Biology for GCSE combined Science: Trilogy. You could also use:

- BBC Bite size
- Primrose Kitten YouTube videos
- Free science lesson videos

10.1 Reactions of the alkenes

Alkenes, unlike alkanes, are **unsaturated hydrocarbons** because they contain a C=C group. The C=C grouping is an example of a **functional group**. A functional group gives a 'family' of organic compounds their characteristic reactions. A 'family' of organic compounds is called a **homologous series**. The general formula for the alkene series is:

$$C_nH_{2n}$$

Alkenes can be combusted;

Ethene + oxygen → carbon dioxide + water

Alkenes can be added together;

Alkenes can react with halogens:

Ethene + Bromine → Dibromoethane

$C_2H_4 + Br_2 \rightarrow C_2H_4Br_2$

Alkenes can react with hydrogen;

Pentene + hydrogen $\xrightarrow{catalyst}$ Pentane

$C_5H_{10} + H_2 \rightarrow C_5H_{12}$

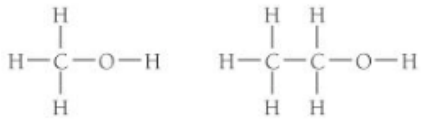
Alkenes can react water;

Ethene + steam $\xrightleftharpoons{Catalyst}$ ethanol

$C_2H_4 + H_2O \rightarrow C_5H_5OH$

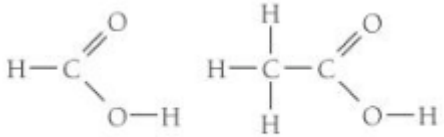
10.2 Structure of alcohols, carboxylic acids and esters

The '**alcohol**' group has a functional group of –OH. Where a hydrogen from an alkane is replaced with the functional group. E.g:



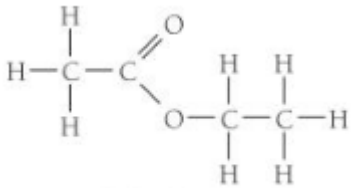
methanol ethanol

The '**carboxylic acid**' group has a functional group of –COOH. E.g:



methanoic acid ethanoic acid

The '**esters**' are closely related to the carboxylic acids and look like:



ethyl ethanoate

10. 3 Reactions and uses of alcohols

Alcohol is made by **fermentation**.

Glucose $\xrightarrow{Yeast}$ ethanol + carbon dioxide

<u>Reactions of alcohols:</u>

Combustion:

Ethanol + oxygen → carbon dioxide + water

Reaction with sodium:

Sodium + ethanol → sodium ethoxide + hydrogen

Oxidation:

Ethanol + oxidising agent → ethanoic acid + water

10.4 Carboxylic acid

Carboxylic acids form acidic solution when they dissolve in water, hence what the are acids. Carboxylic acid react with metal carbonates:

Ethanoic acid + Sodium carbonate → Sodium ethanoate + water + carbon dioxide

Although they are acids, they are classified as '**weak acids**' because they will only partially ionise in water.

Making esters

Carboxylic acids can also react with alcohols to make esters. Water is also formed in this reversible reaction:

Ethanoic acid + ethanol $\xrightleftharpoons{Catalyst}$ ethyl ethanoate + water

Esters formed have distinctive smells and very volatile which is why they are used in perfumes.

Subject: Science	Term: 6	Topic: Year 10 Separate Chemistry – *Organic reactions*

Topics Covered

Chemistry – Polymers

Code	Topic
C11.1	*Addition polymerisation*
C11.2	*Condensation polymerisation*
C11.3	*Natural polymers*
C11.4	*DNA*

Do not forget you can revise using Kerboodle. Use the Digital book section and find the green book titled Biology for GCSE combined Science: Trilogy. You could also use:

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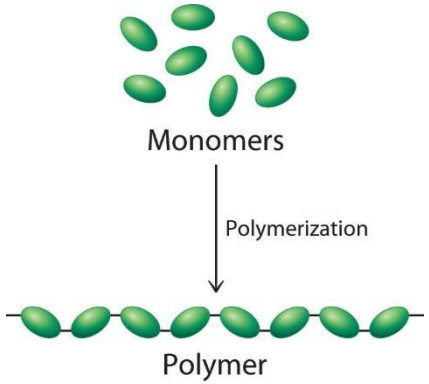
11.1 Addition polymerisation

One of the most important ways that chemicals from crude oil are used to make **polymers**. Polymers are long chain hydrocarbons made up of small molecules joined together called **monomers.**

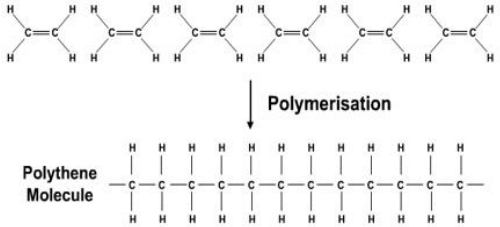


Ethene monomers → Poly(ethane)

Propene monomers → Poly(propene)

How do monomers join together?

We react monomers in a reaction called **addition polymerisation**:



11.2 Condensation polymerisation

As well as addition polymerisation chemists can also make polymers in **condensation polymerisation**. In addition polymerisation we only make one product, in condensation polymerisation we can make two. The two products would be the condensation polymer and a small molecule.

Making nylon

Put a thin layer of monomer A into the bottom of a very small beaker.
Carefully pour a layer of monomer B on top of this.
Gently draw a thread out of the beaker using a pair of tweezers.
Wind it around a test-tube.

11.3 Natural polymers

Carbohydrates are compounds made up of molecules containing carbon, hydrogen and oxygen atoms. They often have a general formula of $C_x(H2O)_y$ and are made up on one or more types of sugar molecules.

Glucose is called a monosaccharide (made of one sugar unit), as is fructose. Monosaccharides can act as monomers to make polymers.

Glucose monomers → Starch polymers + water

Glucose monomers → cellulose polymers + water

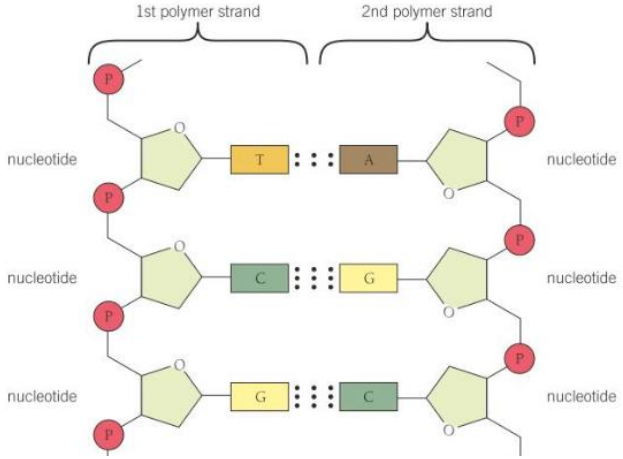
Proteins are also natural polymers:

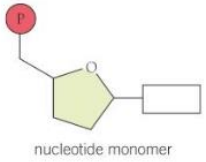
Variety of amino acid monomers → protein polymers + water

11.4 DNA

DNA (deoxyribonuecleic acid) is another natural polymer that is essential for life. The DNA molecule consists of a double helix made up of repeating units of monomers called **nucleotides**. So DNA is known as a polynucleotide:

Millions of nucleotides → DNA (a polynucleotide) + water





Subject: Geography Year 10 (GCSE AQA)	Term: 3 and 4	Topic: Challenges of natural hazards – Climatic Hazards

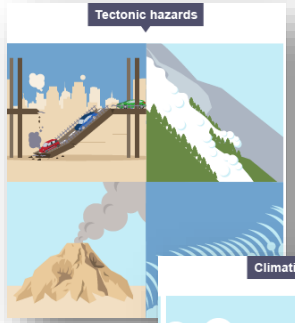
WOOTTON PARK

Key concept: Tectonic hazards Vs. Climatic Hazards

Natural hazards can be placed into two categories - **tectonic hazards** and **climatic hazards**.

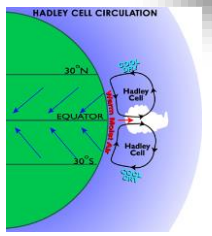
Tectonic hazards occur when the Earth's crust moves. For example, when the plates move, friction can cause them to become stuck. Tension builds until the plates release, which leads to an earthquake.

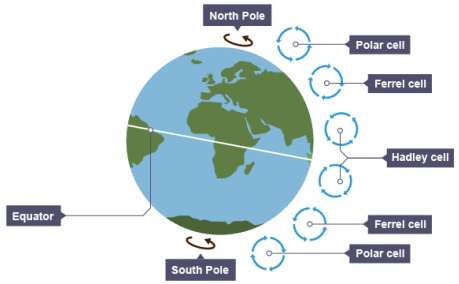
Climatic hazards occur when a region has certain weather conditions, for example heavy rainfall can lead to flooding.



Key concept: Climatic atmospheric circulation

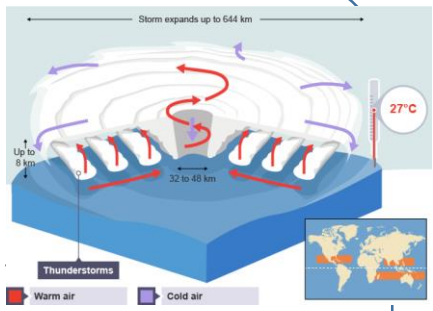
How does global circulation work?
The movement of air across the planet occurs in a specific pattern. The whole system is driven by the equator, which is the hottest part of the Earth. Air rises at the equator, leading to low pressure and rainfall. When the air reaches the edge of the atmosphere, it cannot go any further and so it travels to the north and south. The air becomes colder and denser, and falls, creating high pressure and dry conditions at around 30° north and south of the equator. Large cells of air are created in this way.
Air rises again at around 60° north and south and descends again around 90° north and south. The names of the cells are shown in the diagram.





Key concept: Tropical Storms

Tropical storms are immensely powerful and can travel up to speeds of 65 km/h. Resembling large whirlpools, they are made up of rotating, moist air, with wind speeds that can reach over 120 km/hr.



How tropical storms develop

- Tropical storms form between approximately 5° and 30° latitude because of easterly winds they initially move westward.
- The air above the warm ocean is heated. Once the ocean water reaches at least 27°C, the warm air rises quickly, causing an area of very low pressure.
- As the air continues to rise quickly it draws more warm moist air up from above the ocean leading to strong winds.
- The rapidly rising warm air spirals upwards, cools, condenses and large cumulonimbus clouds form.
- These clouds form the eye wall of the storm and produce heavy rainfall.
- In the centre of the storm, cold air sinks forming the eye of the storm - here, conditions are calm and dry.

Case Study – Typhoon Haiyan

- November 2013
- The Philippines
- Primary effects
- Secondary effects
- Immediate responses
- Long-term responses

- https://www.kerboodle.com/api/courses/58750/interactives/136589.html
- https://www.bbc.com/bitesize/guides/zpxgk7h/revision/1
- http://coolgeography.co.uk/gcsen/NH_Typhoon_Haiyan.php

Key terms:

Natural Hazard **Climatic hazard** **Tectonic hazard** **Tropical Storm** **Hurricane** **Cyclone** **Global atmospheric circulation** **Tropical Storms** **Cumulonimbus clouds** **Latitude** **Primary effects** **Secondary effects** **Immediate responses** **Long-term responses**

Subject: Geography	Term: 4	Topic: Bristol Case study

WOOTTON PARK
'Ipsum quod faciendum est diutius durant'

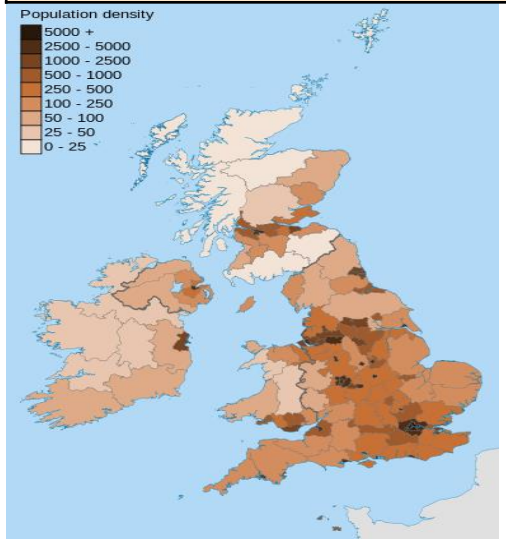
The AQA Exam Board have identified 'Subject Specific Vocabulary' that they expect candidates to know and Understand. You need to learn these terms!

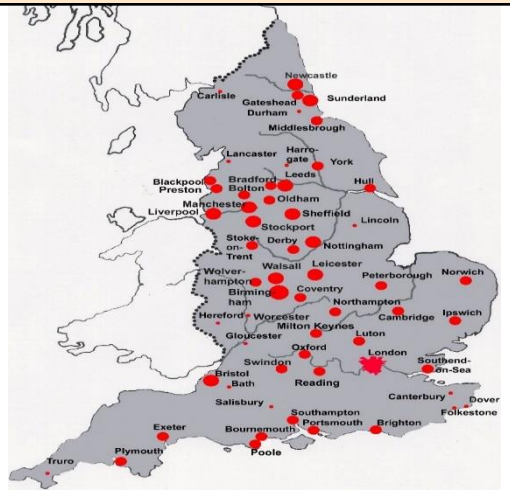
Urbanisation	The process where an increasing percentage of a country's population comes to live in towns and cities, rapid urbanisation is a feature of NEEs
Migration	When people move from one area to another. Many people are moving from rural areas to urban areas in LICs and NEEs leading to rapid urbanisation.
Natural Increase	The birth rate minus the death rate.
Rural-urban Fringe	A zone of transition on the edge of the city between the built up area and the countryside.
Economic opportunities	Chances for people to improve their standard of living through jobs and employment.
Social opportunities	Chances for people to improve their quality of life, includes access to education and healthcare.
Social Deprivation	The degree to which people are deprived of services, decent housing, adequate income and local employment
Pollution	Chemicals, noise, dirt and other substances which poison the environment.
Waste recycling	The process of extracting and reusing useful substances found in waste.
Traffic congestion	Occurs when there is too great a volume of traffic for roads to cope with so traffic jams and traffic slows to a crawl.
Brownfield versus Greenfield Sites	Brownfield sites have previously been built upon and await new use whereas greenfield sites have not been built upon before and are usually at the edge of the city.
Integrated Transport Systems	When different transport methods connect together, making journeys smoother. Better integration should result in more demand for public transport and reduce private car use.

Dereliction	Abandoned buildings and wasteland.
Sustainable Urban Living	Where there is minimal damage to the environment, the economic base is sound , resources are fairly allocated and jobs secure.
Urban Greening	The process of increasing and preserving open space such as public parks and open space.
Urban Regeneration	The revival of old parts of the built up area by either installing modern facilities (renewal) or redevelopment (demolishing old buildings for new ones).

An overview of the distribution of population and the major UK cities

UK cities tend to be located in **lowland areas** where building is easier such as Birmingham. Coastal cities developed due to trade opportunities such as Bristol. Mineral wealth led to the development of Leeds and Sheffield on coal deposits. London grew as a major port, financial centre and administrative area.





Subject: Spanish (Y10)	Term: 5/6	Topic: Viva GCSE; Módulo 3: De costumbre – Theme 1: Identity & Culture

WOOTTON PARK

'Ipsum quod faciendum est diutius durant'

Key Content 1 – La vida sana– Comer y beber *(Healthy living - eating and drinking)*

Knowing food and drink items

Talking about healthy and unhealthy eating

Describing meals and menus

Role plays and giving advice

Key Content 2 – La casa *(The house)*

Describing houses

Reviewing rooms in the house

Talking about preferences, adjectives, furniture, using colours

Using emphatic pronouns and demonstratives

Key Content 3 – La rutina diaria *(Daily routine)*

Describing a normal day

Planning the weekend

Using modal verbs

Using reflexive verbs

Using time

Key Content 4 –Las fiestas *(Festivals)*

Talking about festivals and customs

Describing a party

Discussing cultural differences

Talking about traditions

Key Content 5 – ¿Comemos? *(Shall we eat?)*

Forming questions

Describing/reviewing a restaurant

Using present and future

Talking about shopping for ingredients

Using weights, measures and prices

Talking about shopping online

Key Content 5 – Me duele…*(It hurts)*

Body parts

Saying there is a problem

Talking about illness and solutions

Role play – at the chemist/doctor

Activities *(you may complete some or all of these…)*

Coming up with healthy eating plans

Designing healthy lifestyle advice

Creating a routine diary

Acting out shop, restaurant and conversation role-plays

Researching and writing about cultural traditions

Websites and further reading:

Search on www.quizlet.com for 'Viva GCSE, M6'

Use the sixth module in your textbook and on www.pearsonactivelearn.com

Use www.linguascope.com to play games – login: wootton p/word: wpssch00l

Use www.languagesonline.org and go to the Spanish Grammar section to practise

De costumbre

Key Vocabulary (See Textbook pages 130 & 131) *For revision you need to be able to understand all the texts on the double pages*

Practise vocabulary at home and/or with a friend at school

Tick off the points above as you complete them, and make sure you can still do these topics for the Assessment Point. Look over your learning and complete anything missing at home each week:

Look, cover, write, check…

You need: **Food and drink□ Question words□ Housing & rooms□ Furniture□ Festivals and celebrations□ Emphatic pronouns□ Routine verbs - reflexives□ Body parts & idioms with tener□**

High Frequency Words: *Me gustaría (I would like), Hay (there is/are), Es (it is – permanent characteristic), Está (it is – temporary/location), Se puede (one can), Me duele (It hurts), Tengo (I have)*

VOCABULARY

Year 10 Spanish T5 & 6

FOUNDATION

Las comidas	Meals		
el desayuno	breakfast	(el) café / (el) té	coffee / tea
la comida / el almuerzo	lunch	(el) chorizo	spicy chorizo sausage
la merienda	tea (meal)	(el) marisco	seafood
la cena	dinner / evening meal	(el) pescado	fish
desayunar	to have breakfast / to have… for breakfast	(el) pollo	chicken
		(el) zumo de naranja	orange juice
		(la) carne	meat
comer	to have lunch / to have… for lunch	(la) ensalada	salad
merendar	to have tea / to have… for tea	(la) fruta	fruit
cenar	to have dinner / to have… for dinner	(la) leche	milk
		(la) sopa	soup
tomar	to have (food / drink)	(la) tortilla	omelette
Desayuno…	I have breakfast…	(los) cereales	cereals
temprano / tarde	early / late	(los) churros	fried doughnut sticks
a las ocho (y media)	at (half past) eight	(las) galletas	biscuits
a las nueve (menos / y cuarto)	at (quarter to / past) nine	(las) patatas fritas	chips
Desayuno / Como…	For breakfast / lunch I have…	(las) tostadas	toast
Merienda / Ceno…	For tea / dinner I have…	(las) verduras	vegetables
algo dulce / rápido	something sweet / quick	Soy alérgico/a a…	I'm allergic to…
un huevo	an egg	Soy vegetariano/a.	I'm a vegetarian.
un yogur	a yogurt	Soy goloso/a.	I have a sweet tooth.
un pastel	a cake	(No) tengo hambre.	I'm (not) hungry.
un bocadillo	a sandwich	Es / Son…	It is / They are…
una hamburguesa	a hamburger	picante(s) / rápido/a(s)	spicy / quick
(el) bistec	steak	rico/a(s) / sanos/a(s)	tasty / healthy

Las expresiones de cantidad	Expressions of quantity		
cien gramos de…	100 grammes of…	una barra de…	a loaf of…
quinientos gramos de…	500 grammes of…	una botella de…	a bottle of…
un kilo (y medio) de…	a kilo (and a half) of…	una caja de…	a box of…
un litro de…	a litre of…	una docena de…	a dozen…
un paquete de…	a packet of…	una lata de…	a tin / can of…

Mi plato favorito	My favourite dish		
Me gustaría probar…	I would like to try…	(la) coliflor	cauliflower
Es un tipo de comida / bebida / postre.	It's a type of food / drink / dessert.	(la) harina	flour
		(la) mantequilla	butter
Es un plato caliente / frío.	It's a hot / cold dish.	(la) pasta	pasta
Es un plato típico de…	It's a typical dish from…	(los) guisantes	peas
Contiene(n)…	It contains / They contain…	(los) pepinos	cucumbers
(el) aceite de oliva	olive oil	(los) pimientos	peppers
(el) agua	water	(los) plátanos	bananas
(el) ajo	garlic	(los) refrescos	fizzy drinks
(el) arroz	rice	(los) tomates	tomatoes
(el) azúcar	sugar	(las) cebollas	onions
(el) pan	bread	(las) judías (verdes)	(green) beans
(el) queso	cheese	(las) manzanas	apples
(la) cerveza	beer	(las) naranjas	oranges
(la) carne de cerdo / cordero / ternera	pork / lamb / beef	(las) salchichas	sausages
		(las) zanahorias	carrots

Mi rutina diaria	My daily routine		
me despierto	I wake up	vuelvo a casa	I return home
me levanto	I get up	si tengo tiempo	if I have time
me ducho	I have a shower	enseguida	straight away
me afeito	I have a shave	el comedor	the dining room
me visto	I get dressed	el cuarto de baño	the bathroom
me lavo los dientes	I clean my teeth	el salón	the living room
me acuesto	I go to bed	la cocina	the kitchen
salgo de casa	I leave home	mi dormitorio	my bedroom

¿Qué le pasa?	What's the matter?		
No me encuentro bien.	I don't feel well.	la garganta / la mano	throat / hand
Estoy enfermo/a / cansado/a.	I am ill / tired.	la nariz / la pierna	nose / leg
Tengo calor / frío.	I am hot / cold.	los dientes / las muelas	teeth
Tengo un resfriado.	I have a cold.	los oídos / las orejas	ears
Tengo dolor de garganta.	I have a sore throat.	los ojos	eyes
Tengo fiebre.	I have a fever / temperature.	¿Desde hace cuánto tiempo?	How long for?
Tengo mucho sueño.	I am very sleepy.	Desde hace…	For…
Tengo tos.	I have a cough.	un día / un mes	a day / a month
Tengo una insolación.	I have sunstroke.	una hora / una semana	an hour / a week
Me duele(n)…	My… hurt(s).	quince días	a fortnight
Me he cortado…	I've cut my…	más de…	more than…
Me he quemado…	I've burnt my…	Tiene(s) que / Hay que…	You have to…
Me he roto…	I've broken my…	beber mucha agua	drink lots of water
el brazo / el estómago	arm / stomach	descansar	rest
el pie / la boca	foot / mouth	ir al hospital / médico / dentista	go to the hospital / doctor / dentist
la cabeza / la espalda	head / back	tomar aspirinas	take aspirins
		tomar este jarabe / estas pastillas	take this syrup / these tablets

Las fiestas	Festivals		
Celebramos / Celebran la fiesta de…	We / They celebrate the festival of…	Llevamos / Llevan un disfraz.	We / They wear a costume.
		Participamos / Participan en…	We / They participate in…
Comemos / Comen…	We / They eat…	Quemamos / Queman las figuras.	We / They burn the figures.
Corremos / Corren…	We / They run…	Vamos / Van a…	We / They go to…
Decoramos / Decoran las tumbas.	We / They decorate the graves.	Vemos / Ven los desfiles / los fuegos artificiales.	We / They watch the processions / the fireworks.
Hacemos / Hacen hogueras.	We / They make bonfires.	Es una fiesta para niños / familias / todos.	It's a festival for children / families / everyone.
Lanzamos / Lanzan huevos.	We / They throw eggs.		

Un día especial	A special day		
Ayer fue…	Yesterday was…	Recibí regalos y tarjetas.	I received gifts and cards.
(el) Domingo de Pascua	Easter Sunday	Visité a amigos.	I visited friends.
(la) Nochebuena	Christmas Eve	Me bañé / Me vestí.	I had a bath / I got dressed.
(la) Nochevieja	New Year's Eve	Me desperté temprano.	I woke up early.
Comí doce uvas.	I ate twelve grapes.	Cantamos villancicos.	We sang carols.
Desayuné / Recé.	I had breakfast / I prayed.	Cenamos bacalao / pavo.	We had cod / turkey for dinner.
Fui a la iglesia / a la mezquita.	I went to church / to the mosque.	Hicimos una cena especial.	We had a special (evening) meal.
		Nos acostamos muy tarde.	We went to bed very late.

¿Qué va a tomar?	What are you going to have?		
Quiero reservar una mesa.	I want to book a table.	La especialidad de la casa.	The house speciality.
De primer / segundo plato…	For starter / main course…	Está buenísimo/a / riquísimo/a.	It's extremely good / tasty.
De postre…	For dessert…	¡Que aproveche!	Enjoy your meal!
voy a tomar…	I'm going to have…	¿Algo más?	Anything else?
(el) filete de cerdo	pork fillet	Nada más, gracias.	Nothing else, thank you.
(el) flan	crème caramel	¿Me trae la cuenta, por favor?	Can you bring me the bill, please?
(el) jamón serrano	Serrano ham	Me hace falta un cuchillo / un tenedor / una cuchara.	I need a knife / a fork / a spoon.
(el) melocotón	peach		
(la) piña	pineapple	No hay aceite / sal / vinagre.	There's no oil / salt / vinegar.
(la) tortilla de champiñones	mushroom omelette	El plato / vaso… está sucio / roto.	The plate / glass… is dirty / broken
(los) calamares	squid		
(las) albóndigas	meatballs	El vino está malo.	The wine is bad/off.
(las) chuletas de cordero	lamb chops	La carne está fría.	The meat is cold.
(las) croquetas de atún	tuna croquettes	El ambiente era alegre.	The atmosphere was cheerful / happy
(las) fresas	strawberries	El camarero / La camarera era amable.	The waiter / waitress was nice / kind.
(las) gambas al ajillo	garlic prawns		
¿Qué me recomienda?	What do you recommend?	El servicio era lento.	The service was slow.
El menú del día	The set menu	Todo estaba muy limpio.	Everything was very clean.

Un festival de música	A music festival		
Admiro…	I admire…	precioso/a(s)	beautiful
No aguanto / soporto…	I can't stand…	repetitivo/a(s)	repetitive
su comportamiento	his/her behaviour	original(es)	original
su forma de vestir	his/her way of dressing	Acabo de (pasar cuatro días)	I have just (spent four days)
su talento	his/her talent	Vi / Comí / Bebí / Canté / Bailé	I saw / ate / drank / sang / danced
Su música / voz es…	His/her music / voice is…	Antes de… / Después de…	Before… / After…
Sus canciones / letras son…	His/her songs / lyrics are…	Fue una experiencia inolvidable.	It was an unforgettable experience.
imaginativo/a(s)	imaginative	La próxima vez voy a…	Next time I'm going to…

VOCABULARY

HIGHER

Year 10
Spanish
T5 & 6

Las comidas / Meals

el desayuno	breakfast	(el) Cola Cao	Cola Cao (Spanish chocolate d
la comida / el almuerzo	lunch	(el) marisco	seafood
la merienda	tea (meal)	(el) pescado	fish
la cena	dinner / evening meal	(el) pollo	chicken
desayunar	to have breakfast / to have … for breakfast	(el) zumo de naranja	orange juice
		(la) carne	meat
comer / almorzar	to have lunch / to have … for lunch	(la) ensalada	salad
merendar	to have tea / to have … for tea	(la) fruta	fruit
cenar	to have dinner / to have … for dinner	(la) leche	milk
tomar	to have (food / drink)	(la) sopa	soup
beber	to drink	(la) tortilla	omelette
entre semana…	during the week…	(los) cereales	cereals
los fines de semana…	at weekends…	(los) churros	fried doughnut sticks
Desayuno a las ocho.	I have breakfast at eight o'clock.	(las) galletas	biscuits
Desayuno / Como / Meriendo / Cena…	For breakfast / lunch / tea / dinner I have…	(las) patatas fritas	chips
		(las) tostadas	toast
un huevo	an egg	(las) verduras	vegetables
un yogur	a yogurt	algo dulce / ligero / rápido	something sweet / light / quick
un pastel	a cake	ser goloso/a	to have a sweet tooth
un bocadillo	a sandwich	tener hambre	to be hungry
una hamburguesa	a hamburger	tener prisa	to be in a hurry
(el) café / (el) té	coffee / tea	tomar un desayuno fuerte	to have a big (lit. strong) breakfa

Las expresiones de cantidad / Expressions of quantity

cien / quinientos gramos de…	100 / 500 grammes of…	una barra de…	a loaf of…
un bote de…	a jar of…	una botella de…	a bottle of…
un kilo de…	a kilo of…	una caja de…	a box of…
un litro de…	a litre of…	una docena de…	a dozen…
un paquete de…	a packet of…	una lata de…	a tin / can of…

Los alimentos / Food products

el aceite de oliva	olive oil	los pimientos	peppers
el agua	water	los plátanos	bananas
el ajo	garlic	los pomelos	grapefruits
el arroz	rice	los refrescos	fizzy drinks
el atún	tuna	las cebollas	onions
el azúcar	sugar	las fresas	strawberries
el chorizo	spicy sausage	las judías (verdes)	(green) beans
el maíz	corn	las legumbres	pulses
el pan	bread	las lentejas	lentils
el queso	cheese	las manzanas	apples
la cerveza	beer	las naranjas	oranges
la carne de cerdo / cordero / ternera	pork / lamb / beef	las peras	pears
la coliflor	cauliflower	las piñas	pineapples
la harina	flour	las uvas	grapes
la mantequilla	butter	las zanahorias	carrots
la mermelada	jam	¿Has probado…?	Have you tried…?
los albaricoques	apricots	el gazpacho	gazpacho (chilled soup)
los guisantes	peas	la ensaladilla rusa	Russian salad
los lácteos	dairy products	la fabada	stew of beans and pork
los melocotones	peaches	Es un tipo de bebida / postre.	It's a type of drink / dessert.
los melones	melons	Es un plato caliente / frío.	It's a hot / cold dish.
los pepinos	cucumbers	Contiene(n)…	It contains / They contain…
		Fue inventado/a / introducido/a…	It was invented / introduced…

Mi rutina diaria / My daily routine

me despierto	I wake up	me acuesto	I go to bed
me levanto	I get up	salgo de casa	I leave home
me ducho	I have a shower	vuelvo a casa	I return home
me peino	I brush my hair	temprano / tarde	early / late
me afeito	I have a shave	enseguida	straight away
me visto	I get dressed	odio levantarme	I hate getting up
me lavo los dientes	I clean my teeth		

¿Qué le pasa? / What's the matter?

No me encuentro bien.	I don't feel well.	Tengo dolor de cabeza.	I have a headache.
Me siento fatal.	I feel awful.	Tengo fiebre.	I have a fever / temperature.
Estoy enfermo/a / cansado/a.	I am ill / tired.	Tengo gripe.	I have flu.
Tengo calor / frío.	I am hot / cold.	Tengo mucho sueño.	I am very sleepy.
Tengo catarro.	I have a cold.	Tengo náuseas.	I feel sick.
Tengo diarrea.	I have diarrhoea.	Tengo quemaduras de sol.	I have sunburn.
Tengo tos.	I have a cough.	los ojos	eyes
Tengo una insolación.	I have sunstroke.	¿Desde hace cuánto tiempo?	How long for?
Tengo una picadura.	I've been stung.	desde hace…	for…
Me duele(n)…	My … hurt(s)	un día / un mes	a day / a month
Me he cortado el/la…	I've cut my…	una hora / una semana	an hour / a week
Me he hecho daño en…	I've hurt my…	¿Desde cuándo?	Since when?
Me he quemado…	I've burnt my…	desde ayer	since yesterday
Me he roto…	I've broken my…	desde anteayer	since the day before yesterday
Me he torcido…	I've twisted my…	no se preocupe	don't worry
el brazo / el estómago	arm / stomach	¡Qué mala suerte!	What bad luck!
el pie / el tobillo	foot / ankle	Tiene(s) que / Hay que…	You have to…
la boca / la cabeza	mouth / head	beber mucha agua	drink lots of water
la espalda / la garganta	back / throat	descansar	rest
la mano / la nariz	hand / nose	ir al hospital / médico / dentista	go to the hospital / doctor / dentist
la pierna / la rodilla	leg / knee	tomar aspirinas	take aspirins
los dientes / las muelas	teeth	tomar este jarabe / estas pastillas	take this syrup / these tablets
los oídos / las orejas	ears	usar esta crema	use this cream

Las fiestas / Festivals

la fiesta de…	the festival of…	las calles se llenan de…	the streets are filled with…
esta tradición antigua…	this old tradition…	los niños / los jóvenes…	children / young people…
se caracteriza por…	is characterised by…	los familiares / las familias…	relations / families…
se celebra en…	is celebrated in…	comen manzanas de caramelo	eat toffee apples
se repite…	is repeated…	decoran las casas / las tumbas con flores / velas	decorate houses / graves with flowers / candles
se queman figuras de madera	wooden figures are burnt	preparan linternas / altares	prepare lanterns / altars
se construyen hogueras	bonfires are built	se disfrazan de brujas / fantasmas	dress up as witches / ghosts
se disparan fuegos artificiales	fireworks are set off	ven desfiles	(they) watch processions
se lanzan huevos	eggs are thrown		

Un día especial / A special day

Abrimos los regalos.	We open presents.	Vamos a la mezquita / iglesia.	We go to the mosque / church.
Buscamos huevos de chocolate.	We look for chocolate eggs.	Ayer fue…	Yesterday was…
Cantamos villancicos.	We sing Christmas carols.	el baile de fin de curso	the school prom
Cenamos bacalao.	We have cod for dinner.	el Día de Navidad	Christmas Day
Comemos dulces navideños / doce uvas / pavo.	We eat Christmas sweets / twelve grapes / turkey.	(el) Domingo de Pascua	Easter Sunday
Nos acostamos muy tarde.	We go to bed very late.	(la) Nochebuena	Christmas Eve
Nos levantamos muy temprano.	We get up very early.	(la) Nochevieja	New Year's Eve
Rezamos.	We pray.	Me bañé y luego me maquillé.	I had a bath and then did my make up.

¿Qué va a tomar? / What are you going to have?

de primer / segundo plato…	for starter / main course…	el menú del día	the set menu
de postre…	for dessert…	la especialidad de la casa	the house speciality
Voy a tomar…	I'm going to have…	está buenísimo/a / riquísimo/a	it's extremely good / tasty
(el) bistec	steak	¡Que aproveche!	Enjoy your meal!
(el) filete de cerdo	pork fillet	¿Algo más?	Anything else?
(el) flan	crème caramel	Nada más, gracias.	Nothing else, thank you.
(el) jamón serrano	Serrano ham	¿Me trae la cuenta, por favor?	Can you bring me the bill, please?
(la) merluza en salsa verde	hake in parsley and wine sauce	No tengo cuchillo / tenedor / cuchara.	I haven't got a knife / fork / spoon.
(la) sopa de fideos	noodle soup	No hay aceite / sal / vinagre.	There's no oil / salt / vinegar.
(la) tortilla de espinacas	spinach omelette	El plato / vaso / mantel está sucio.	The plate / glass / table cloth is dirty.
(la) trucha a la plancha	grilled trout	El vino está malo.	The wine is bad / off.
(los) calamares	squid	La carne está fría.	The meat is cold.
(las) albóndigas	meatballs	dejar una propina	to leave a tip
(las) chuletas de cordero asadas	roast lamb chops	equivocarse	to make a mistake
(las) croquetas caseras	homemade croquettes	pedir	to order / ask for
(las) gambas	prawns	ser alérgico/a…	to be allergic to…
(las) natillas	custard	ser vegetariano/a	to be a vegetarian
¿Qué me recomienda?	What do you recommend?		

Un festival de música / A music festival

Me fascina(n)…	…fascinate(s) me.	atrevido/a(s)	daring
Admiro…	I admire…	imaginativo/a(s)	imaginative
No aguanto / soporto…	I can't stand…	precioso/a(s)	beautiful
su actitud / talento	his/her attitude / talent	repetitivo/a(s)	repetitive
su comportamiento	his/her behaviour	original(es)	original
su determinación / estilo	his/her determination / style	triste(s)	sad
su forma de vestir	his/her way of dressing	Me/Te hace(n) falta…	I/You need…
su música / voz	his/her music / voice	crema solar	sun cream
sus canciones / coreografías	his/her songs / choreography	el pasaporte / DNI	your passport / national ID card
sus ideas / letras	his/her ideas / lyrics	un sombrero / una gorra	a hat / cap