THE BEWDLEY SCHOOL

Learning for Life - Achievement for All

Year 9

Work Booklet

This workbook contains English, Maths and Science Resources

Non-Fiction Writing Challenges

Name: _____

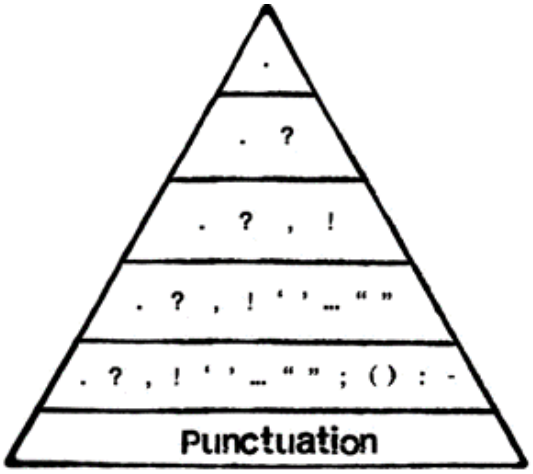
Teacher: _____

Contents

Writing Advice

There are four key elements to remember when it comes to the exam:

Persuasive Devices	**Audience Awareness (Tone)**
Layout	**SPaG**



Persuasive Devices:

- Although there are a range of non-fiction purposes (including inform, entertain, advise, instruct), by far the most popular is persuade.
- Most questions allow for a binary decision and you must sway your audience to your point of view. Include a range of persuasive devices to do this.
- See the list of twenty-five at the end of the booklet.
- Please be advised not to overdo persuasive devices: you must have a well-constructed, detailed argument. Half a dozen persuasive devices per piece of writing is plenty – focus on placing them at key moments to make an idea memorable.

Audience Awareness:

- Perhaps the most overlooked and important aspect of non-fiction writing: deliberately show your awareness of the audience. Constantly. Refer to them directly.
- Your argument needs to take into account the intended audience – writing a letter to a friend is not similar to writing a letter to your head teacher. Your language (register) will need to be adapted, but so will the content. Think about the concerns of your audience and target them.
- Your tone is key to a high level: do you need to be lively or serious? Playful or sincere? Intense or thoughtful? Solemn or witty? Your tone needs to fit the topic, the audience and the format.

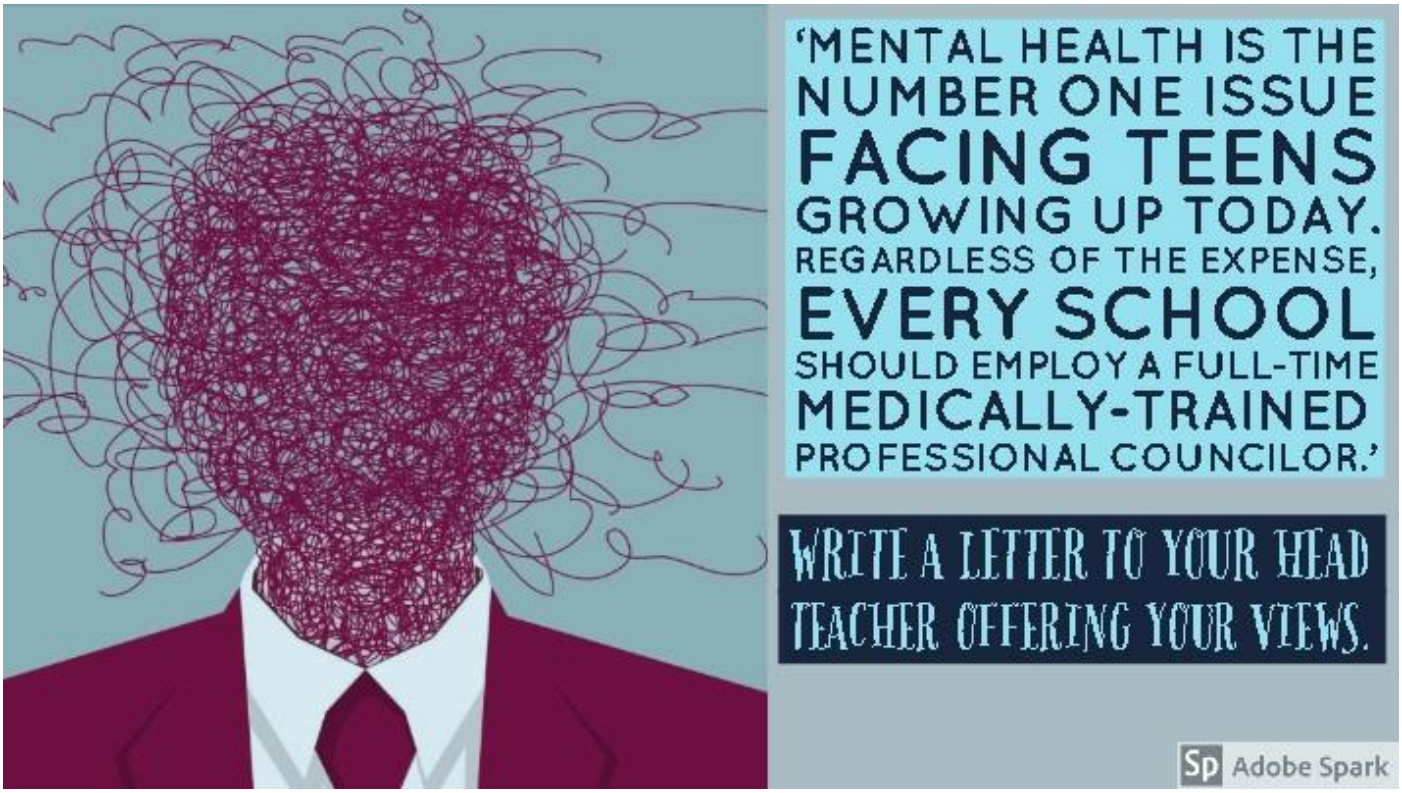
Layout:

- There are seven non-fiction writing styles at GCSE: 1) formal letter 2) informal letter 3) speech 4) article 5) review 6) report 7) leaflet (often called a guide). Each has its own layout features.
- Check the model examples in the back of the booklet for guidance.

SPaG:

- Your spelling, grammar and punctuation counts for almost *half* your marks in the exam.
- Be sure to vary your sentence types and openings regularly to add variety to your writing.
- Stick to the same tense (usually past).
- Remember the basics: accurate spelling, capital letter and punctuation.
- Use the punctuation triangle to try to be ambitious with punctuation.
- Try to display a range of vocabulary, but use the right word for the right situation.

Using this space, create a table and/or mind-map to plan your response.



Using this space, create a table and/or mind-map to plan your response.

Using this space, create a table and/or mind-map to plan your response.

‘Proms are an excuse to show off in an expensive way. There are much better alternatives to celebrating the end of school.’

WRITE A LETTER TO YOUR HEADTEACHER GIVING YOUR VIEWS.

Using this space, create a table and/or mind-map to plan your response.

"WITH RISING KNIFE CRIME, GANG-RELATED VIOLENCE & ACID ATTACKS, IT IS TIME TO ARM EVERY POLICE OFFICER IN BRITAIN SO THAT THEY CAN PROPERLY PROTECT THEMSELVES AND DEFEND THE LAW-ABIDING PUBLIC."

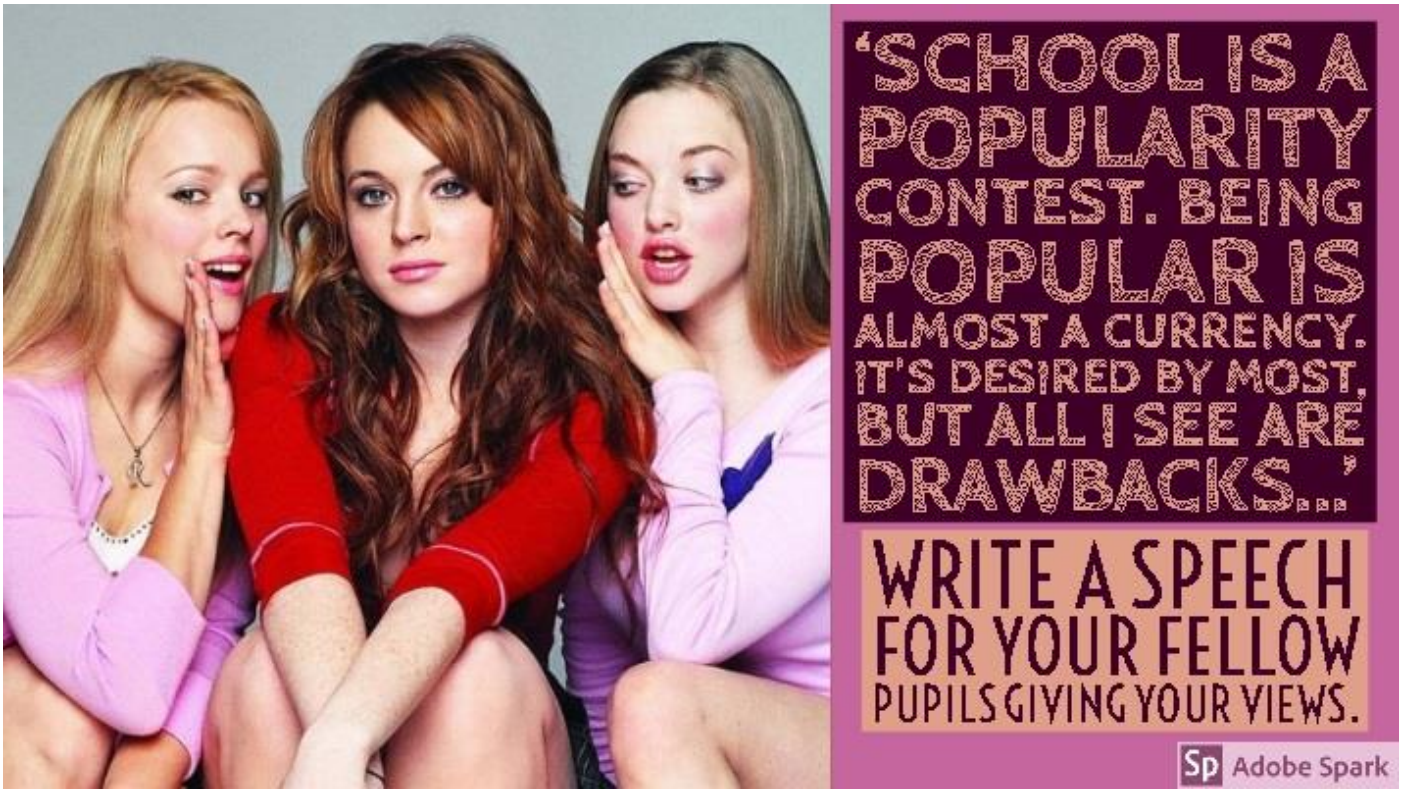
WRITE A LETTER TO A NATIONAL NEWSPAPER OFFERING YOUR VIEWS.

Using this space, create a table and/or mind-map to plan your response.

‘CCTV IN EVERY CLASSROOM & CORRIDOR WOULD REDUCE POOR BEHAVIOUR & IMPROVE STANDARDS ACROSS SCHOOL.’

WRITE AN ARTICLE FOR YOUR SCHOOL WEBSITE GIVING YOUR VIEWS.

Using this space, create a table and/or mind-map to plan your response.



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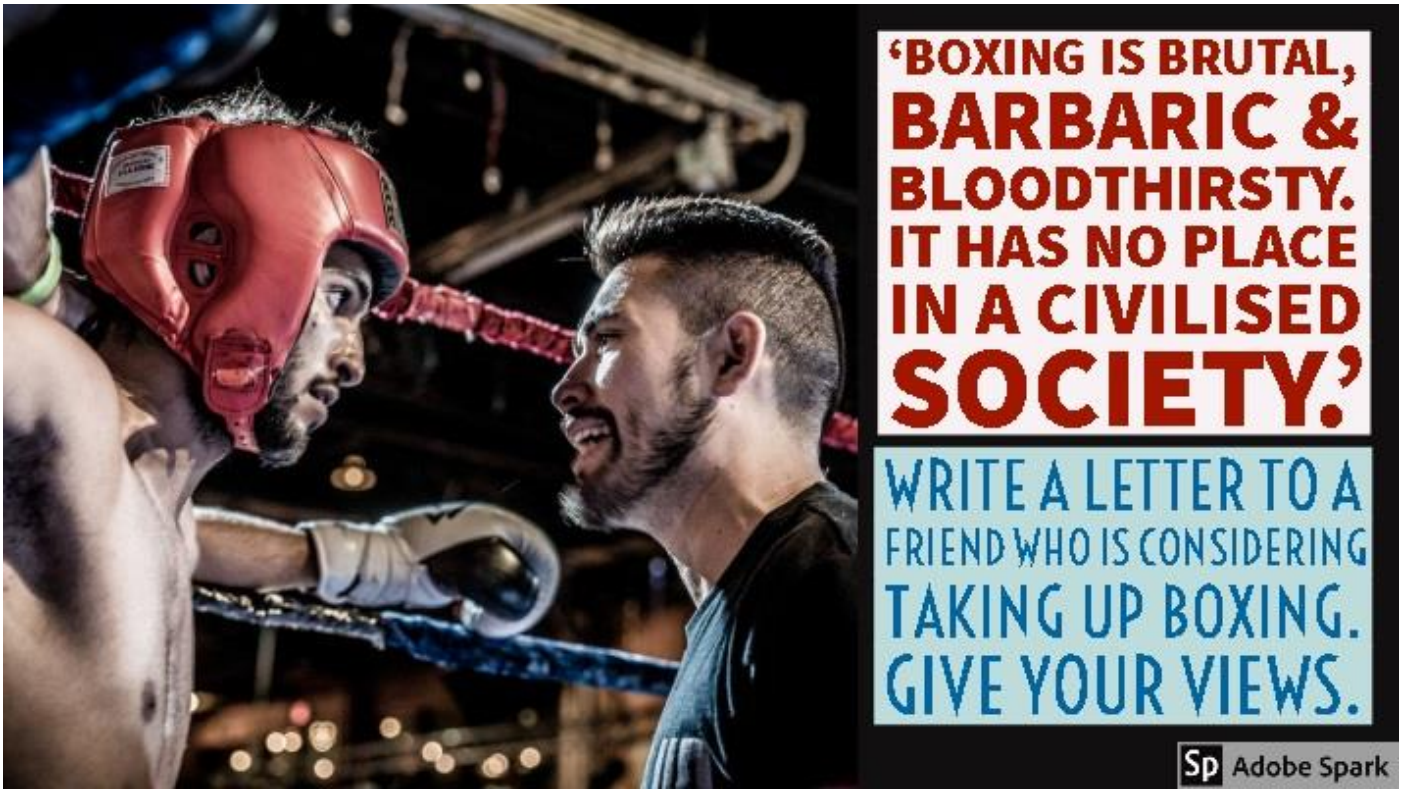


Using this space, create a table and/or mind-map to plan your response.

Some people believe it is preferable to stay in Britain rather than travel abroad on holiday. Write a letter to a newspaper to give your opinion on this topic.

44 Zoo Lane,
Hindley,
Wigan,
WN3 4HZ

26th March 2016

The Wigan Observer,
42 Tottenham Road,
Wigan,
WN3 6PS

Dear Editor,

Having recently read several articles that suggest it is unethical to travel abroad, I thought I would express an alternative point of view. I am the first person to express love for my country: England is my home and I'm proud to be English, however, I simply cannot agree with the idea that holidays abroad should be avoided.

I don't mean to give Mother Nature a cough, but I fail to see how one tiny flight a year can compare to the hundreds of coal stations around the world that pump millions of tonnes of waste into the environment. Let me make it clear to every one of your readers: I am passionate about the natural world and I am not one of those fools who claims that global warming is a myth. I recycle. I never drop litter. I even have a solar panel on my roof at home. So, with all the effort I put into protecting our planet, do I not deserve a quality holiday every summer?

It's not as if the sun usually visits us in England. Our version of summer is waking up to a sky that isn't the same colour as the pavement! You can keep your wet weekends in Devon; I'll sip cocktails on a beach in Mexico. I mean what would you prefer: a game of cards in a caravan or the crystal clear sea and softly swaying palm trees? I'm not putting down our home, but you must remember that travel allows you to experience a new culture and meet new people.

Have you ever seen the Eiffel Tower? The Pyramids? The Statue of Liberty? Every time I've been abroad it has broadened my horizons and I've been amazed at the beauty of the world. Staying at home and Googling pictures of these places just isn't the same. My children have learnt more from seeing Mount Vesuvius than they have from building a model of a volcano in their science lesson. Also, consider what would happen to countries that rely on tourism. I dread to think of what would happen to Egypt, Turkey and many other places without the financial support of travellers.

I know there is a cost to the environment when we travel, but I choose to travel only once a year. It makes all the difference to my family; we work hard all year and it is our one treat. I do not deny the cost to the planet, but the look on my children's faces the first time they saw Disneyland was priceless. I'll never forget the incredible memories I have from travelling abroad and I would encourage your readers to travel (inside and outside the country) as much as possible.

Yours faithfully,

Tim Blake

You have a friend at university who is considering entering a clinical trial to earn money. Write a letter to your friend to express your opinion.

17 Bold Street,
Chester,
CH4 5ER

1st March 2016

Dear Kyle,

I thought I'd write to you straight away as I saw on Facebook that you were considering getting involved in clinical trial at university to pay your rent. Now, I'm not one for dramatics, but I have to ask: have you lost your mind? No, I'm serious! I know life at uni is difficult and that money is tight, but to allow someone to pump you full of an untested drug seems beyond stupid. I know that you can be a little… shall we say 'rash' sometimes… so I wanted to sort this out before it goes too far.

Now I know I sound extreme, and that I'm coming on a little intense, but you're one of my oldest mates and there is no way I can sit back and just watch you do this. Only a total moron would consider risking their health for a few quid. I know it must sound exciting, and there were a few people on Facebook who commented on your status to encourage you, but please don't listen to them. They don't have your best interests at heart; they see it as entertainment and a bit of laugh, but the laughter will stop quickly if something goes wrong…

You do realise what you're getting yourself into, don't you? These random drugs have NEVER been tested on a human being before. Ever. Only rats. Which basically makes you a human rat. Their little pet for tests. Does that sound like a good time? Most of the drugs have names that aren't even pronounceable! Also, they make you sign a contract before you take them so that you can't sue them when things go wrong. That fact doesn't exactly inspire faith, does it? I can just imagine the (mad) scientist saying: "Here, sign this paper. Now bend over for this giant needle." Not much fun…

Besides you also need to consider the side effects. Oh yes, you didn't even think about those, did you? Not only are you choosing to take dangerous, untested drugs (that most normal people would run a mile from), but they cause side effects: which means you could end up with a hairy back, a third-eye or even a heart attack. Again, not much fun…. I bet that thousand pounds isn't sounding like such a good deal now. Have you spoken to your parents about this? I'd hate to see your mum in a state because you decided to make some 'easy' money. I know life at uni is expensive, but your health is priceless. It's just not worth the risk, mate.

If I were you, I'd look for a job. I know that doesn't sound exciting, but it's better than the alternative. I'd get a job in a bar or club, then someone can pay you to party! Plus, you could use it as an opportunity to chat up the girls (I know what you're like!) Seriously though, think about it hard before you decide and give me a call to talk it through.

See you soon,

James

Write a speech for year six pupils to encourage them to read for pleasure.

Do you ever get fed up of school? Does it sometimes feel like an exam factory? After all, everyone learns the same things, sat in the same places, at the same time. Sometimes life can feel that way too, the same boring routine: get up, bus, school, bus, homework, television, computer, bed. Repeat. Repeat. Repeat. What you need is an escape route. Freedom. A journey into the unknown. What you need is a book!

Let me guess, you weren't exactly expecting that to be the answer. Perhaps a sunny holiday abroad, or a trip to a theme park, but not books. Books? But consider it… every time you open the cover of a book, you're entering a new world. And, as it's your choice what you read, you have freedom. Reading gives you the power to follow your passion, learn more about our world, or even escape into another: why not join Harry in Hogwarts, Katniss in Panem or Bilbo in Middle Earth?

Now, you might be thinking: 'The thought of reading a huge novel makes me feel ill!' That's fine. Don't. All reading is good for you. The wonder of reading is the range: from short stories to comics, newspapers to magazines, it all counts and it's all good for you. Can you think of a better way to develop your imagination or creativity? A little voice inside might be muttering: 'I prefer the telly or films', but almost everything found on a screen began life on the page anyway!

Also, reading doesn't have to be opposed to technology. If you're waiting for the bus and have ten minutes to spare, why don't you pull out your mobile and read whilst you wait? You can download a Kindle app - for free - and read anywhere. Plus, there are so many YouTube channels for group reading (it doesn't have to be a solo activity), not to mention blogs, Instagram accounts, I really could go on and on…

But try not to get distracted by Facebook! Seeing hundreds of selfies will rot your brain, if not bore you to tears. Instead, read and expand your mind. I think the best thing about reading is that it allows you to slip into a dream someone else has created. Is there anything more relaxing that enjoying a good book - especially at this time of year, when the weather is miserable and the sky is dark mid-afternoon? Go on, grab a hot chocolate, a warm blanket and get yourself cosy in front of the fire with a good book.

I'm not trying to say you should spend every waking hour with your nose stuck in a book, although confession time: that sounds like my idea of heaven! No, I'm saying you should read regularly for your own health. It's like exercise: everyone wants to take care of their body and look and feel their best, so why not use books to do the same with your mind? Recent research, carried out by experts at Manchester University, has proven that reading for pleasure not only leads to higher exam results in school, but a better career in the future. So there you go, if nothing else, reading will help to fill your future wallet!

I know that in the past most of you were enthusiastic readers. Everyone has those special memories of being read to at bed time by their parents. But, the thing is, the older people get, the less they read. Don't let that person be you. As you grow older, you don't have to let reading go. Good books never grow old. As a famous author once said: "A reader lives a thousand lives before he dies. The man who never reads lives only one."

So, there you go. I hope I've managed to inspire some of you to pick up a book, if not a kindle or a newspaper. In this world, it's easy to get stuck in a rut, following the same routines. But you really can banish boredom with a book. Futuristic cities, haunted woods, and everything in between is waiting for you. Go on, take a journey with a good book today!

Write an article for your school magazine entitled: 'Don't get me started on _____'.

Don't Get Me Started On Buses

Where to even start? BUS: Big, Useless, and Smelly. You stand at the bus stop in the pouring rain and when the bus finally arrives it is absolutely packed, with any remaining seats covered with litter and I dread to think what else. After spending what seems like an eternity squashed like a sardine, wedged between a window and a weirdo, you are free to start your day in a much worse mood than when you left the house.

So, perhaps I should start with the driver: is it in the job description to be moody and un-cooperative? Why do they always start driving as soon as you've got on the bus? Oh great, the public humiliation of falling flat on my face – amazing! Also, must you pull over for a cigarette and/or read of the paper when the bus is already late? Recently, I was made late for a school exam because the bus driver felt it necessary to go and buy a bottle of coke halfway round his bus route. I was furious.

It is quite alright for them – they are already at work! The rest of us are cold, annoyed and squashed, and if it is early in the morning we're probably irritable too. Due to this, my friends and I get very frustrated when the driver tries to overcharge us. We're wearing our school uniforms, obviously we're not adults. Stop trying to haggle for an extra 40p.

Once the bus has arrived (late), you've got on, argued with the driver, fallen over in the aisle and found a seat you can begin to relax. Or not! The next battle is with everyone else on the bus: an awesome collection of freaks and misfits collectively known as the British Public. Why people choose to make loud phone calls on buses I'll never know. More than that, why people choose to play their music loud enough to pop their eardrums, waken the dead and infuriate the rest of us simultaneously is beyond me.

Yet by far the most exasperating people of all are the young people. You know the ones, the members of our generation who give us the bad name. The ones who scare Grannies and kick cats. The nutters. Buses are full of them! Every bus seems to have a 'back-of-the-bus-crew'. Really, finding a bus without a 'crew' is like finding a needle in a haystack. They are rude, riotous hooligans who leave graffiti, chewing gum and other debris for the next lucky passenger to deal with. How very thoughtful.

I challenge you to find someone who uses public transport regularly who doesn't have a negative story or experience of buses, or public transport in general. The side of most buses boast of a bus "every fifteen minutes". Give me a break. I think they need to fix their watches…

Basically, buses are useless. Despite all of the reasons I've given, the government will still encourage people to use public transport to be 'green' and protect the planet. I can understand that, but there are too many flaws and until they are fixed people will continue to travel by car whenever possible. I don't blame them: I hate the peasant wagon.

Write a review of a book, film, TV show or album for your school website.

The Hunger Games: Catching Fire - The Odds Are Always in Your Favour

Ever seen it rain blood in a kids' film before? How about a pensioner getting executed in front of his family? Or Lenny Kravitz being slapped in the face? The first *Hunger Games* caught flak because it dared to treat its YA audience like A's – but things aren't exactly looking any rosier in the sequel.

Following the unwritten lore of movie trilogies, the middle chapter of Katniss Everdeen's sci-fi survival story is darker, moodier, meaner and, yes, better than Part 1. Outgrowing its *Battle Royale* meets *Twilight* meets *The X Factor* comparisons, *Catching Fire* expands Suzanne Collins' novel beyond the confines of the arena to tackle some seriously brutal truths – plugging gaps and sowing seeds for a two-part finale that will have to work hard to match its grit.

And it's Jennifer Lawrence's performance that takes centre stage. Taking her post-Oscar fame publicly in her stride since she last picked up her bow, the 23-year-old actress has grown up as fast as her character. As mopey as the teenage love triangle almost gets, it's the boys that do all the moping. Well on her way to becoming one of the greatest sci-fi heroines since Ripley, the avenger of District 12 is as undefined by her hidden vulnerability as she is by her inner strength; anchoring the series with an emotional realism that upstages everyone else in the film.

True, most of them are stuck in roles that haven't developed much since we last met them. Peeta (Josh Hutcherson) is still an unlikeable wimp who cries every time he gets a paper cut, Gale (Liam Hemsworth) is still a gormless hunk who doesn't do anything, and Donald Sutherland, Woody Harrelson and Elizabeth Banks are still hiding beneath candyfloss hair and panto outfits.

It's all change behind the camera too, with new director Francis Lawrence (*Constantine, I Am Legend*) upping the menace both in and out of the arena. Marauding monkeys and axe-wielding gladiators might be pretty scary, but it's nothing compared to an armed policeman beating a political dissident to death. In fact, *Catching Fire* often reflects real world horrors so impassively it's easy to forget you're watching a kids' movie. Until you see Stanley Tucci's hair, that is…

Yes, the Capitol still looks like the Emerald City, the big spinning thing in the arena comes straight out of *Total Wipeout* and the film's cutting edge is dulled down and camped up whenever things get too gnarly. Some obvious concessions are made to appease the book's devout fans too (At 146 minutes, it seems like they tried to fit *every* bloody page in), but it's hard to see how anyone could be too disappointed with the incendiary results.

Then again, if the rousing finale of *Catching Fire* is anything to go by, *Mockingjay* is going to burn the house down…

Rating:*****

Twenty-Five Persuasive Devices

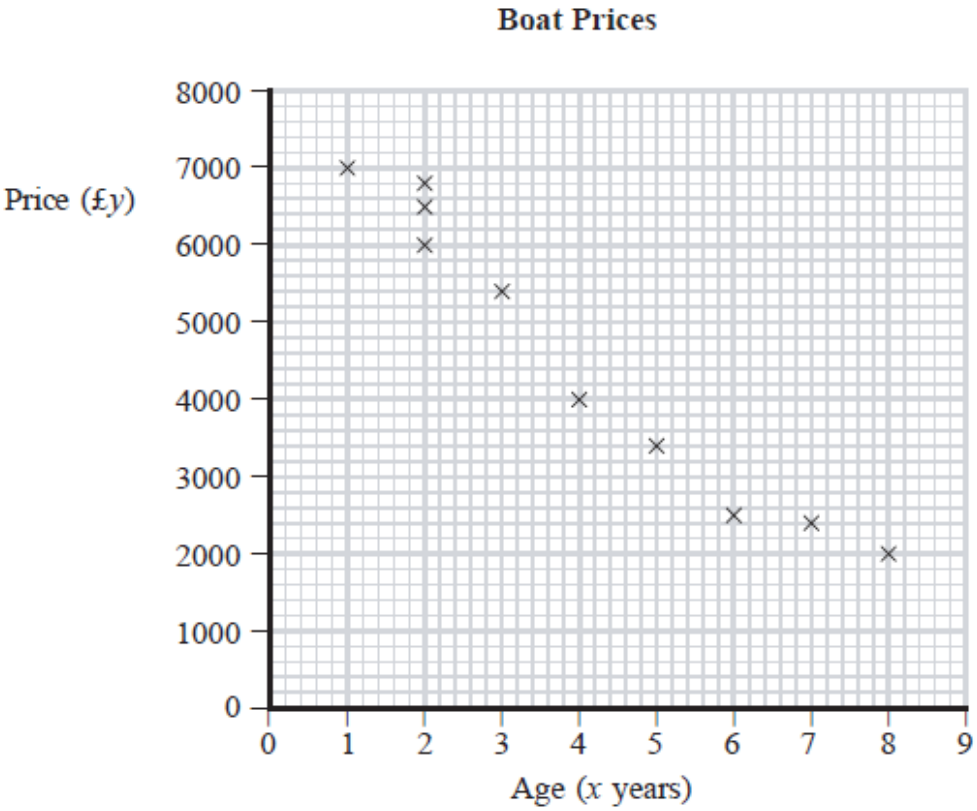
Emerging	**Alliteration**	**Hyperbole**	**Tricolon**	**Statistics**	**Anecdote**
	The close reoccurrence of the same letter or sound. *Tragedy travelled through our trivial lives.*	**Deliberately exaggerating for effect or emphasis.** *The bag weighed a ton!*	**Three parallel words or phrases.** *I came, I saw, I conquered.*	**Using numerical evidence for support.** *62% of adults are overweight in the UK.*	**A short story about a real person or incident.** *I remember when…*
	Imperative	**Direct Address**	**Collective Pronouns**	**Rhetorical Question**	**Emotive Language**
	Giving an authoritative command. *Do not smoke.*	**Speaking directly to the audience using 'you'.** *You must realise that animal testing is cruel.*	**Linking yourself with the audience via 'we', 'our', 'us'.** *We must act now.*	**Asking a question as a way of asserting a point.** *Have you ever lied in your life?*	**Using language to move your audience.** *Those savage hooligans attacked her.*
Developing	**Counter Argument**	**Expert Reference**	**Simile**	**Metaphor**	**Allusion**
	Opposing a contradictory belief or opinion. *Although fireworks can be dangerous, professional displays ensure the public's safety.*	**Quoting a professional.** *Professor Arthur Knowles, an expert in _____, stated that: "……."*	**A comparison that uses 'like' or 'as'.** *Energy drinks are like toxic waste – useless sewage that damages the body.*	**A direct comparison between two objects or ideas.** *Drowning in an ocean of debt.*	**A reference to a person, place or event.** *She's a real Einstein.*
	Syntax	**Prolepsis**	**Metanoia**	**Hypophora**	**Anaphora**
	Reordering words in sentences to place emphasis at the end. *If you shop online, you will <u>save money</u>.*	**Imagining an audience's response/objection.** *Some of you might be thinking _____, however ……..*	**Correcting yourself for emphasis.** *I think – no, I know – that animal testing is wrong.*	**Asking a question before answering it yourself.** *Who enjoys doing homework? No-one!*	**Repetition of the same word or phrase in successive sentences.** *I have a dream…* *I have a dream…* *I have a dream…*
Mastering	**Climax**	**Extended Metaphor**	**Isocolon**	**Antithesis**	**Pun**
	A good-better-best structure. *A good thing about holidays are the food. Even better is the rest. The best, by far, is the weather.*	**A drawn-out metaphor that can last several sentences.** *Homework Is a prison. Your room is a cage. You're buried under your school books. You're chained to your pen.*	**Creating sentences with parallel structures.** *Many will enter, few will win.*	**Contrasting relationship between two ideas.** *That's one small step for man; one giant leap for mankind.*	**A humorous play on words.** *New study of obesity looks for larger test group.*

Maths - Scatter Graphs and Stem and leaf diagrams

Section A

Question 1

Sangita wants to buy a second-hand boat. In a magazine she finds 10 advertisements for the type of boat she wants to buy. The scatter diagram shows the age, x years, and the price, £y, of these boats.



(a) Write down the price of the boat that was 4 years old.

£.....

(1)

(b) Describe the correlation between the age and the price of these boats.

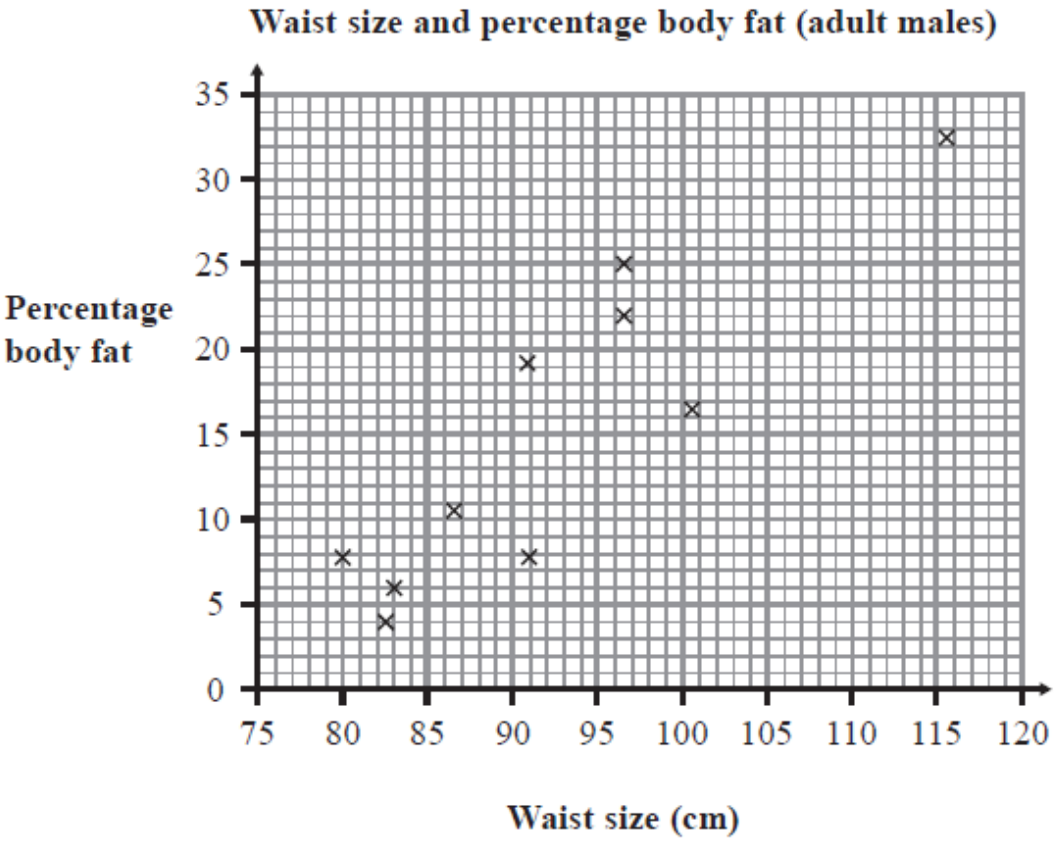
.....

(1)

Question 2

Measuring a person's waist size has been suggested as a way of estimating their percentage body fat.

The scatter diagram below shows information about the percentage body fat and waist size for a sample of adult males.



(Data source: *South Dakota School of Mines & Tech*)

(a) Describe the correlation between percentage body fat and waist size.

.....

(1)

Question 3

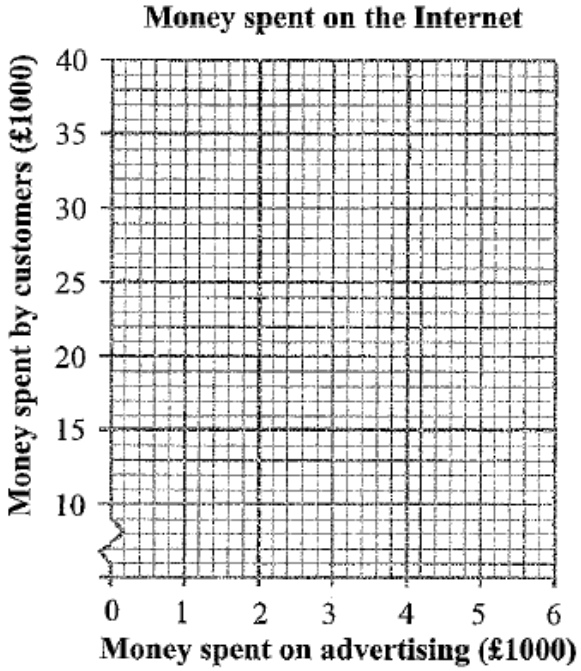
An Internet company wants to know if its advertising works.

The table shows the amount of money it spent, per quarter, on advertising over 5 quarters.

It also shows the amount of money customers spent using the company's Internet site.

Money spent on advertising (£1000)	1.2	2.0	3.4	3.9	5.0
Money spent by customers on the Internet site (£1000)	12	20	25	35	38

(a) On the graph paper below, draw a scatter diagram for the data.



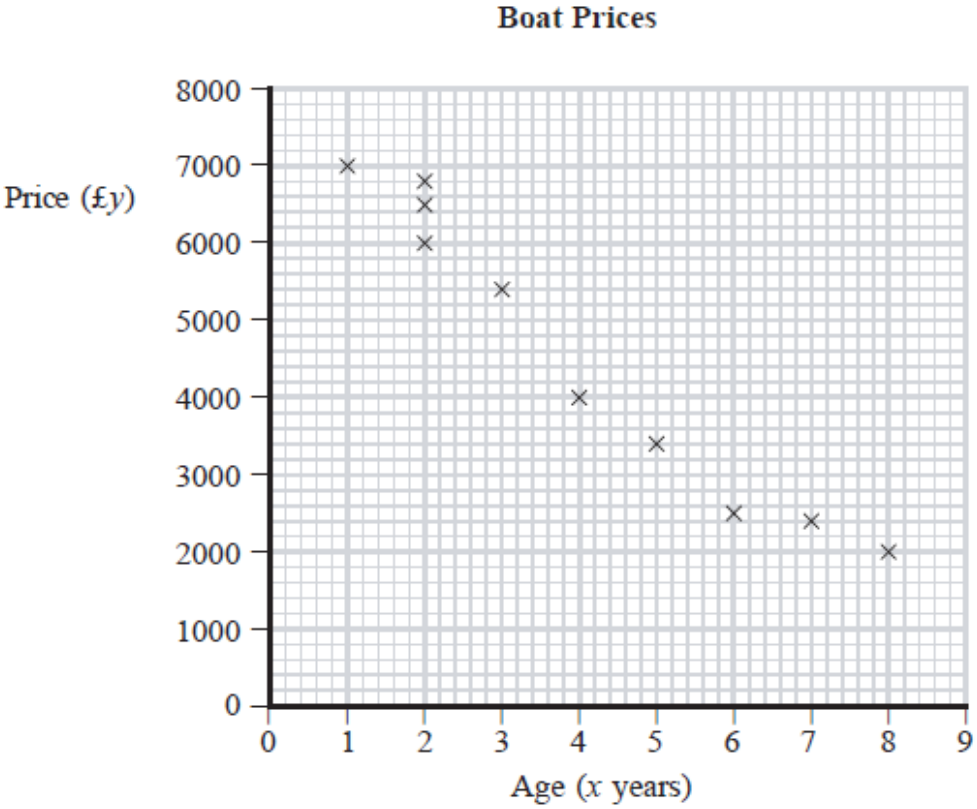
(2)

Section B

Question 4

This question is a continuation of question 1 in Section A

Sangita wants to buy a second-hand boat. In a magazine she finds 10 advertisements for the type of boat she wants to buy. The scatter diagram shows the age, x years, and the price, £y, of these boats.



(c) Draw a line of best fit on the diagram

Sangita can afford to pay £3000 for her boat.

(d) Use your line of best fit to estimate the age of the boat that she can afford to buy.

..... years
(1)

Question 5

The table shows the usual times taken for 9 different rail journeys in 1987 and in 2008

Journey	1987 Time (minutes)	2008 Time (minutes)
Canterbury East to Victoria	81	86
Chatham to Victoria	43	44
Lewes to Victoria	61	67
Lewes to Haywards Heath	15	20
Southend to Fenchurch St	49	54
Southend to Upminster	28	30
Canterbury East to Faversham	13	17
Haywards Heath to Gatwick	13	14
Barking to Fenchurch St	12	16

(Source: Passenger Focus)

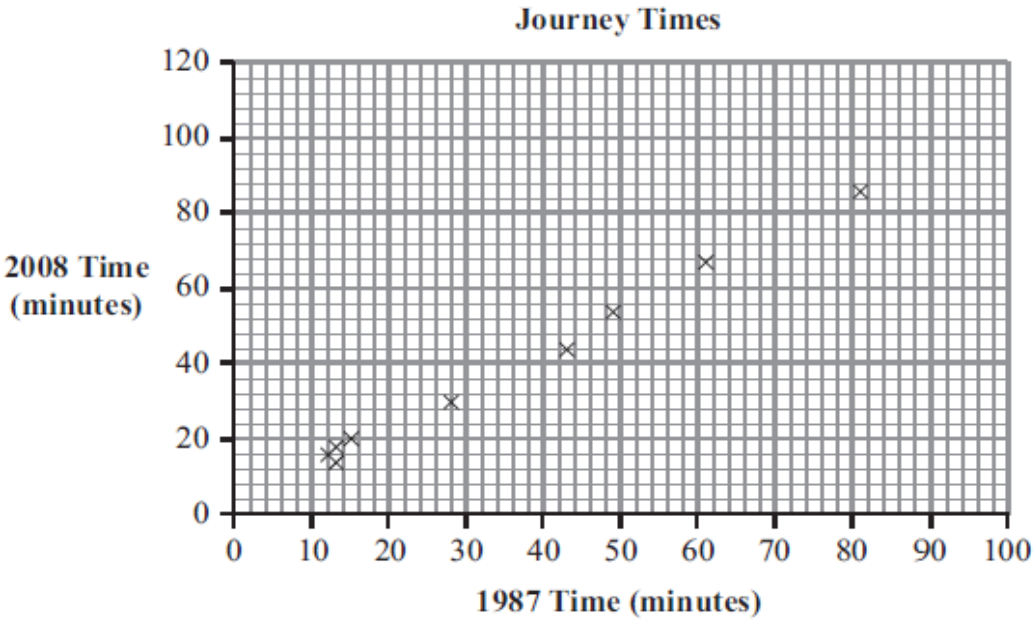
(a) Write down what the table shows about journey times in 1987 compared to journey times in 2008

.....

.....

(1)

The scatter diagram shows these data.



(b) Draw a line of best fit on the scatter diagram.

(1)

In 1987 a train took 70 minutes to complete a journey.

(c) Estimate the time a train took to complete the **same** journey in 2008

..... minutes

(1)

In 2008 a train took 40 minutes for a journey.

(d) Estimate the time a train took to complete the **same** journey in 1987

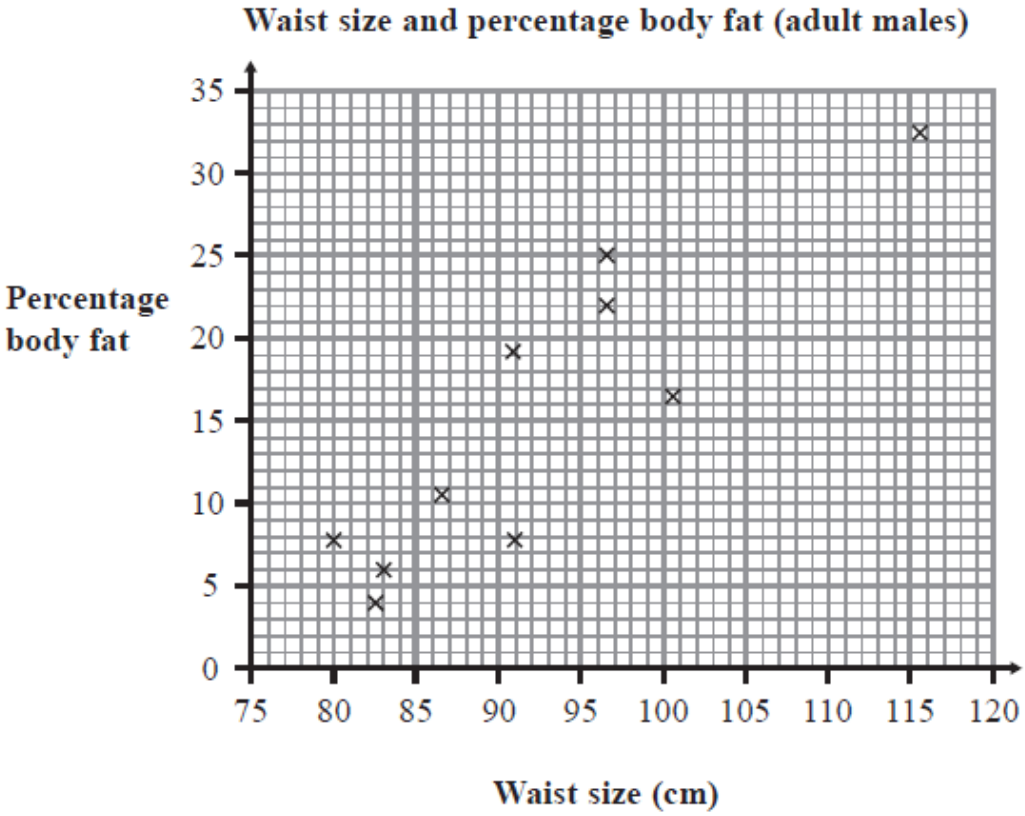
..... minutes

(1)

Question 6 **This question is a continuation of question 2 in Section A**

Measuring a person's waist size has been suggested as a way of estimating their percentage body fat.

The scatter diagram below shows information about the percentage body fat and waist size for a sample of adult males.



(Data source: *South Dakota School of Mines & Tech*)

(b) Draw a line of best fit on the scatter diagram.

(1)

(c) Use your line of best fit to estimate the percentage body fat for an adult male whose waist size is 100 cm.

.....%

(1)

(d) Do you think that waist size could be used as a way of estimating the percentage body fat of adult males? Give a reason for your answer.

.....

.....

.....

.....

.....

.....

(2)

Question 7 **Turn to question 3. Use the graph you have drawn for this question to answer this one.**

(b) Draw a line of best fit.

(1)

(c) The company spends £3000 on advertising.

Use your line of best fit to find an estimate for the amount of money spent by customers.

£ .....

(1)

(d) Write down the effect advertising appears to have on the amount spent on the Internet.

.....

.....

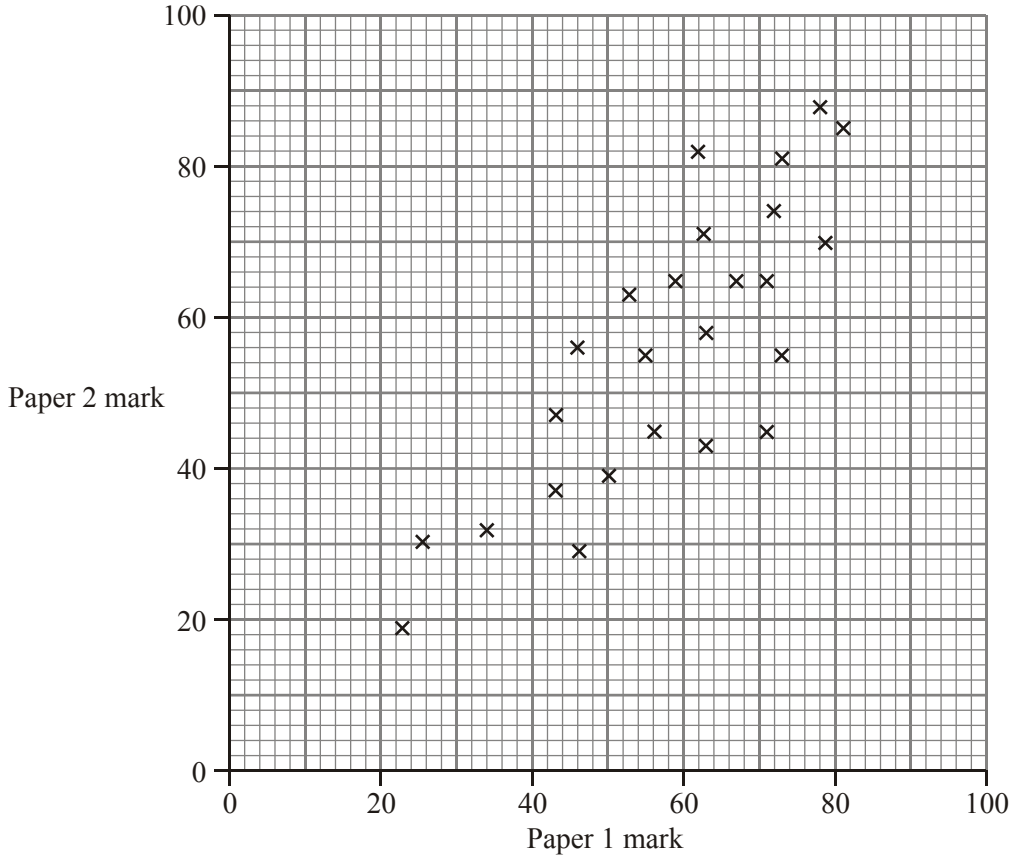
.....

(1)

(The following questions encompass both Section A and B)

Question 8

Mrs Millington gives her class two mock GCSE examination papers. The scatter graph shows the results.



(a) Write down the highest mark scored on Paper 2.

Answer ..... marks **(1)**

(b) Describe the relationship shown on the scatter graph.

.....

.....

.....**(1)**

(c) Draw a line of best fit on the scatter graph. **(1)**

(d) Kay was absent for Paper 2, but scored a mark of 56 on Paper 1.
Use your line of best fit to estimate Kay's mark on Paper 2.

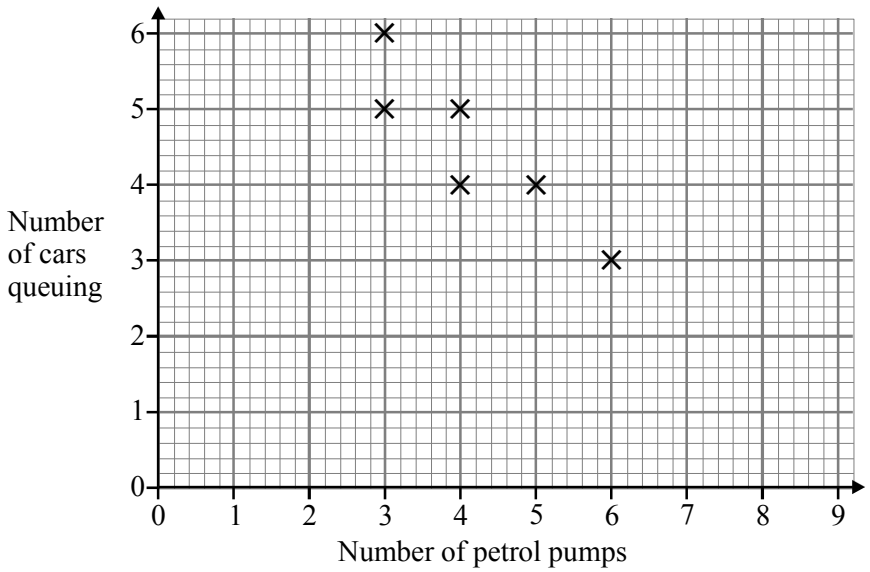
.....

Answer ..... marks (1)

(Total 4 marks)

Question 9

The scatter graph shows the number of petrol pumps and the number of cars queuing at midday at six garages.



(a) State the type of correlation shown.

Answer .....

(1)

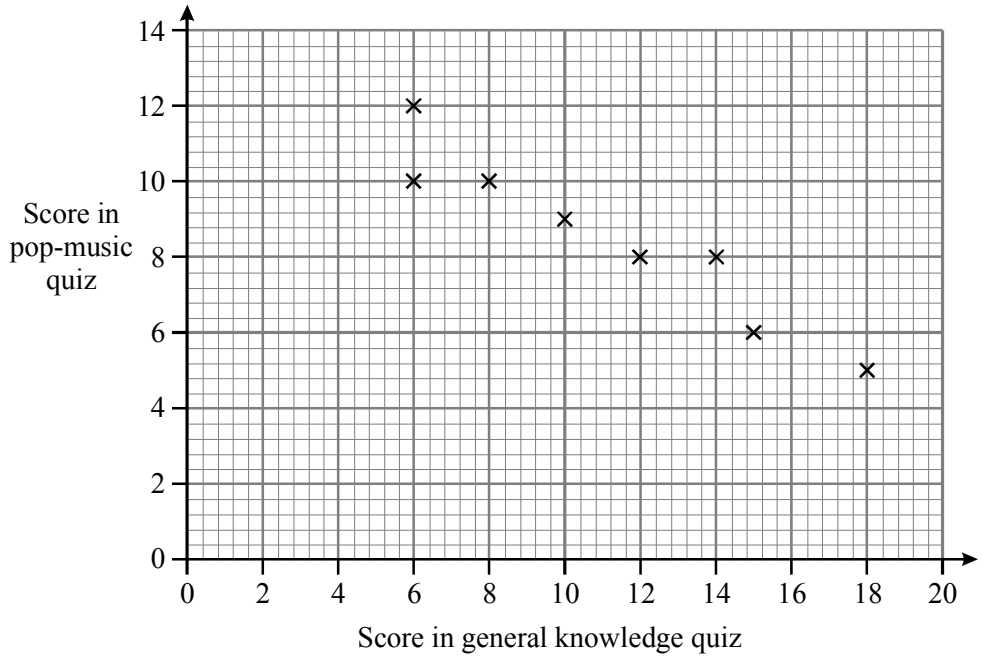
(b) Use the scatter graph to estimate the number of cars queuing at a garage with 8 petrol pumps.

Answer .....(1)

Question 10

Eight teenagers took part in a general knowledge quiz and a pop-music quiz.

The scatter graph shows their scores.



(a) Draw a line of best fit on the scatter graph.

(1)

(b) Describe the relationship shown in the scatter graph.

Section C

Question 11

39 male students were asked to read the same essay.

The time taken, to the nearest minute, for each of 30 of the male students are shown in the stem and leaf diagram.

Time	Key: 2 | 5 = 25 minutes
2	5 6 7 8 8 9
3	2 2 2 3 4 4 4 4 5 6 7 7 7 9
4	0 0 1 1 1 2 2 3
5	0 1

The times for the other male students are given below.

43 51 43 45 52 48 53 55 48

(b) Complete the stem and leaf diagram for the 39 male students.

(2)

(c) Using your stem and leaf diagram,

(i) find the median time for the male students to read the essay,

..... minutes

(ii) write down the number of male students who took less than 38 minutes to read the essay.

.....

(2)

Question 12

A farmer records the weight of plums, to the nearest kg, that were produced by each of her 15 plum trees. The results are given below.

80	42	68	72	84	92	77	89
68	69	66	86	73	81	65	

(a) Complete the ordered stem and leaf diagram below.

Weight of Plums Key: 8 | 0 = 80 kg

4	
5	
6	
7	
8	
9	

(2)

(b) For this data

(i) find the median,

.....

(ii) work out the inter-quartile range.

.....

(3)

Question 13

The stem and leaf diagram shows the ages, in years, of 15 members of a badminton club.

Key: | **2** | 7 means an age of 27 years

2	7	8				
3	0	2	4	8		
4	1	2	3	3	4	6
5	3	6				
6	2					

(a) How many members are aged over 40?

Answer .....

(1)

(b) What is the median age of the members?

.....

Answer ..... years

(1)

(Total 3 marks)

Question 14

The ages, in years, of 10 members of a badminton club are

30 27 41 53 62 46 44 38 34 28

Represent this data as a stem-and-leaf diagram

You must show a key

.....

.....

.....

.....

.....

.....

.....

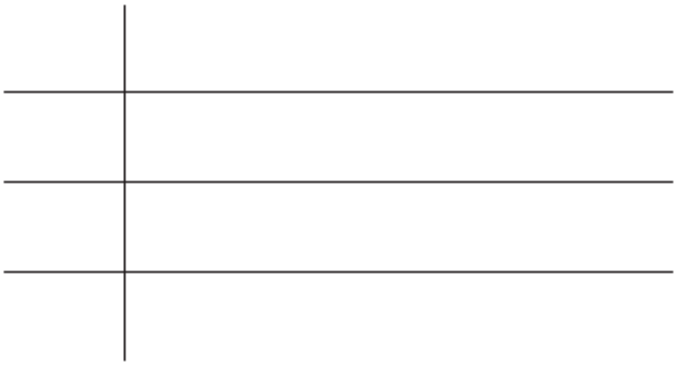
(Total 4 marks)

Question 15

Here are the heights, in cm, of 15 female students.

146	176	163	151	158
169	152	167	158	164
170	147	172	155	154

Draw an ordered stem and leaf diagram to show this information.
You must include a key.



Key:

(Total 3 marks)

Question 16

The ages of people in a group are shown below.

39	16	36	21	43	24	28	38
8	20	40	34	27	38	18	26
19	49	15	12	9			

(a) Construct a stem and leaf diagram to represent this data.

[3]

(b) For these ages, find

(i) the median,

.....

[1]

(ii) the range.

.....

[1]

Question 17

This stem and leaf diagram shows the times that a group of people took to do a fun run.

3	7 8
4	0 2 5
5	0 1 2 2 2 3 4 4
6	6 7 9
7	1 2 3 5 5 6 7
	4 5 8

Key: 5 | 3 represents 53 minutes

(a) How many people are took part in the fun run?

…….....

[1]

(b) Juanita says that the range for these times is 38 to 78.

Explain the two errors that she has made.

1 .....

2 .....

[2]

(c) A person is selected at random. Calculate the probability that the person took longer than 60 minutes to complete the fun run.

…….....

[2]

Two-way tables and surveys and questionnaires

Section A

Question 1

(Total 2 marks)

60 British students each visited one foreign country last week.

This two-way table shows information about which countries the students visited.

	France	Germany	Spain	Total
Female			9	34
Male	15			
Total		25	18	60

(a) Complete the two-way table.

(3)

One of the students is picked at random.

(b) Write down the probability that this student visited Germany last week.

.....

(1)

(Total 4 marks)

Question 2

80 children went on a school trip.
They went to London or to York.

23 boys and 19 girls went to London.
14 boys went to York.

(a) Use this information to complete the two-way table.

	London	York	Total
Boys			
Girls			
Total			

(3)

One of these 80 children is chosen at random.

(b) What is the probability that this child went to London?

.....

(1)

(Total 4 marks)

Question 3

The two-way table gives some information about how 100 children travelled to school one day.

	Walk	Car	Other	Total
Boy	15		14	54
Girl		8	16	
Total	37		30	100

(a) Complete the two-way table.

(3)

One of the children is picked at random.

(b) Write down the probability that this child walked to school that day.

.....

(1)

One of the girls is picked at random.

(c) Work out the probability that this girl did **not** walk to school that day.

.....

(2)

(Total 6 marks)

Question 4

Ana did a survey for the local optician.
She asked 100 people whether or not they wore glasses.
This table shows her results.

	Wear glasses	Not wear glasses	Total
Male		32	60
Female			40
Total	43		100

(a) Complete the table.

[2]

(b) One of the 100 people is chosen at random.
What is the probability that this person does not wear glasses?

.....

[1]

(c) One of the females is chosen at random.
What is the probability that she wears glasses?

.....

[2]

(d) In the survey, Ana wanted to find out how long each day people wore their glasses.

Write a suitable question she could ask, with response boxes for people to tick.

[3]

Question 5

This table shows information about Year 4 pupils in a primary school.

	Can swim	Cannot swim
Boys	19	13
Girls	18	10

One pupil is chosen at random from this year group.

What is the probability that this pupil cannot swim?

.....

[2]

Section B

Question 6

The Further Academy has 567 pupils in Years 7, 8 or 9.

Of these pupils, 278 are boys

There are 175 pupils in Year 7, of which 71 are girls

There are 192 pupils in Year 8

There are 80 boys in Year 9

(a) What is the probability that a randomly chosen student is a Year 8 girl ?

……

(3)

(b) What is the probability that a randomly chosen pupil is in Year 8, given that he is a boy ?

……

(2)

(Total 5 marks)

Question 7

The Garcia Foundation has 130 students enrolled.

80 students are following Foundation courses, of which 46 are girls

There are 36 students on Intermediate courses

9 of the 64 boys are on Higher courses

(a) What is the probability that a randomly chosen student is following a Higher course ?

…….

(3)

(b) What is the probability that a randomly chosen student is following an Intermediate course , given that she is a girl ?

…….

(2)

(Total 5 marks)

Section C

Question 8

Emma reads in a magazine that there is a link between the number of children and the number of pets in a family.

(a) Design a data capture sheet to record the number of pets and the number of children in a sample of families.

(3)

(b) Complete your two-way table by inventing data for eight families.

(1)

(Total 4 marks)

Question 9

The manager of Cost-U-Less supermarket wants to carry out a survey of her customers. She asks customers to complete a questionnaire.

(a) Here is one of the questions she asks:

"Don't you agree that Cost-U-Less is the best supermarket?"

Write down **one** criticism of this question.

.....

.....

.....

(1)

(b) Here is another part of her questionnaire.

Question How much do you spend at Cost-U-Less?			
Response (tick one box)			
Under £10 ☐	Under £20 ☐	Under £50 ☐	Under £100 ☐

Write down **one** criticism of the question and **one** criticism of the response section.

Criticism of question .....

.....

Criticism of response section .....

.....

(2)

(c) The manager collects her data by asking 100 shoppers who visit the supermarket on Friday evening.

Explain why this sample may not be representative of all the shoppers who use this supermarket.

.....

.....

.....

(1)

(Total 4 marks)

Question 10

Sam wants to do a survey to find out how much TV kids watch.

Write a question that would help Sam to investigate how much tv her pupils in her school watch

Include a response section.

.....

.....

.....

.....

.....

.....

(2)

Question 11

A local radio station would like to know more about the listening habits of the local community. They pose the following question:

How long do you listen to the radio?

Less than 10 minutes ☐

1 hour ☐

1 – 2 hours ☐

(a) Write down two things that are wrong with this question:

1 .....

2 .....

[2]

(b) Design a better question for the radio station to use. You should include some response boxes.

Question 12

Max is doing a survey on "Healthy Eating" in the town where he lives.

(a) One of the questions he asks is

"Do you eat fruit or sweets?"

Explain why this is a poorly worded question.

.....

.....

1 mark

(b) There are 2000 people in the town where Max lives.
He interviews 15 people for his survey.

Explain why his survey may not be representative of the people in the town.

.....

.....

..... 2 marks

Estimation and decimals

Question 1

Work out an estimate for the value of $\frac{637}{3.2\times9.8}$

.....

(Total 4 marks)

Question 2

Work out an estimate for $\frac{302\times9.96}{0.51}$

.....

(Total 3 marks)

Question 3

Work out an estimate for the value of $\frac{31\times4.92}{0.21}$

.....

(Total 3 marks)

Question 4

Work out an estimate for $\dfrac{3.92 \times 89.9}{0.209}$

.....

(Total 3 marks)

Question 5

Work out an estimate for 3.9×102

.....

(Total 2 marks)

Question 6

Work out an estimate for $\frac{19.4 \times 31.3}{8.1 \times 4.9}$

.....

(Total 3 marks)

Question 7

Work out an estimate for the value of $\frac{7.9 \times 18.3}{9.8}$

.....

(2)

(Total 2 marks)

Question 8

Using the information that

$$74 \times 234 = 17316$$

write down the value of

(a) 740×234

.....

(2)

(b) 74×2.34

.....

(2)

Question 9

Using the information that

$$4.8 \times 34 = 163.2$$

write down the value of

(a) 48×34

.....

(1)

(b) 4.8×3.4

.....

(1)

(c) $163.2 \div 48$

.....

(1)

(Total 3 marks)

Question 10

Use the information that

$$322 \times 48 = 15\,456$$

to find the value of

(a) 3.22×4.8

.....

(1)

(b) 0.322×0.48

.....

(1)

(c) $15\,456 \div 4.8$

.....

(1)

(Total 3 marks)

Question 11

You are given that $32.7 \times 26 = 850.2$

(a) Write down the value of 327×26

.....

Answer ..... *(1 mark)*

(b) Write down the value of $85.02 \div 26$

.....

Answer ..... *(1 mark)*

(c) Work out the value of 32.7×27

.....

.....

.....

Answer ..... *(2 marks)*

Question 12

You are given that $23.5 \times 64 = 1504$

(a) Work out 23.5×6.4

.....

Answer ..... *(1 mark)*

(b) Work out $\frac{1504}{640}$

.....

Answer ..... *(1 mark)*

(c) Work out 23.5×65

.....

Answer ..... *(2 marks)*

Section B

Question 13

Work out 1.83 × 47

.....

(Total 3 marks)

Question 14.

Felix want to work out how much it costs him to use his tumble dryer.

The tumble dryer uses 1.9 units of electricity to dry one load of washing.

Felix dries four loads of washing each week.

He pays 12.8p for every unit of electricity he uses.

Work out the weekly cost, in pence, of using the tumble dryer.

.....

(Total 4 marks)

Question 15.

Work out 86 × 2.65

.....

(Total 3 marks)

Question 16.

One kilogram of butter costs £6.80

Javed buys 200 g of butter.

Work out how much Javed pays.

£.....

(Total 3 marks)

Question 17

Steve wants to put a hedge along one side of his garden.

He needs to buy 27 plants for the hedge.

Each plant costs £5.54.

Steve has £150 to spend on plants for the hedge.

Does Steve have enough money to buy all the plants he needs?

.....

(Total 4 marks)

Question 18

Work out 437×24

.....

(Total 3 marks)

Question 19

Work out 286×43

……..

(Total 3 marks)

Section C

Question 20

A litre of petrol costs £1.14. Nevis wants to buy 25 litres.

He pays with a £50 note. How much change does he receive?

(4)

Question 21

Calculate

a) 0.6 x 12

b) 4.2 x 3.6

(3)

Question 22

In supermarket, loaves of bread can be sliced at the bakery counter.

A loaf of bread is 32cm long.

It can be cut into slices 9mm thick.

How many complete 1.2cm slices can the loaf be cut into?

(3)

Question 23

Given $\frac{28.609}{4.27} = 6.7$

work out

a) $\frac{2.8609}{0.427}$

b) 67×4.27

c) 0.67×42

d) $\frac{286.09}{42.7}$

(4)

Fractions

Section A

Question 1

(a) Work out $\frac{1}{3} + \frac{1}{12}$

.....

(1)

(b) Work out $\frac{3}{4} \times \frac{1}{5}$

.....

(1)

Question 2

Work out the value of $\frac{2}{3} \times \frac{3}{4}$

Give your answer as a fraction in its simplest form.

.....

(1)

Question 3

Work out $80 \times \frac{4}{5}$

.....

(Total 2 marks)

Question 4

(a) Work out $\frac{1}{3} + \frac{1}{12}$

.....

(2)

(b) Work out $\frac{3}{4} \times \frac{1}{5}$

.....

(1)

Question 5

Here are some fractions.

$\frac{2}{8}$	$\frac{3}{10}$	$\frac{4}{16}$	$\frac{5}{20}$	$\frac{8}{24}$

Two of the fractions are **not** equivalent to $\frac{1}{4}$

Tick the boxes underneath each of these **two** fractions.

(Total 1 mark)

Question 6

Work out.

$$\frac{3}{4} \times \frac{1}{5}$$

.....

[1]

Question 7

Work out. Give your answer as a fraction in its simplest form.

$$\frac{6}{7} \div \frac{4}{3}$$

.....

[3]

Question 8

Work out. Give your answers as mixed numbers.

$$2\frac{2}{3} + 3\frac{2}{5}$$

.....

[3]

Question 9

Work out. Give your answer as a mixed number

$$4\frac{1}{3} - 1\frac{3}{4}$$

.....

[3]

Section B

Question 10

Complete each of these.

$\frac{1}{2}$ is the same as **0.** …….

$\frac{1}{4}$ is the same as ..... %

$\frac{7}{10}$ is the same as .... **0.** .....

[3]

Question 11

(a) Express 0·08 as a fraction in its simplest form.

.....

[1]

(b) Write $\frac{7}{20}$ as a decimal.

.....

[2]

(c) Express 0·128 as a fraction in its lowest terms.

.....

[2]

(d) Change $\frac{5}{8}$ into a decimal.

..... [2]

Question 12

Write down three-quarters as a percentage

[1]

Question 13

Write a number in each box to make the correct statements

a. 50% = $\frac{\square}{2}$

b. 0.7 = $\frac{\square}{10}$

c. ⅓ = $\square$%

[3]

Question 14

a. Write ¼ as a percentage **[1]**

b. Write 30% as a decimal **[1]**

c. Write ¼, 30% and 0.2 in order with the smallest first **[1]**

Section C

Question 15

Work out the difference between

10% of 350 and ½ of 76

Answer .....

[3]

Question 16

Work out.

(a) $\frac{1}{7}$ of £56

(a) £ _____ **[1]**

(b) $\frac{3}{5}$ of 45 kg

(b) _____ kg **[2]**

(c) 15% of £80

(c) £ _____ **[2]**

Question 17

Maggie has a box of chocolates.

It contains milk, plain and white chocolates.

Maggie chooses a chocolate at random.

The probability of choosing a milk chocolate is $\frac{3}{8}$.

(a) There are 40 chocolates in the box.

How many are milk chocolate?

.....

[2]

(b) The probability of choosing a plain chocolate is $\frac{1}{2}$.

What is the probability of choosing a white chocolate? .....

[1]

Question 18

James is planning a camping holiday for 24 people.

Each person will need $\frac{2}{3}$ of a pint of milk each day.

The holiday will last for 6 days.

Work out how many pints of milk will be needed altogether.

Show your working clearly.

.....[2]

Question 19

Ron received his pocket money on Saturday.

He spent $\frac{3}{10}$ of his pocket money on magazines.

He spent $\frac{3}{5}$ of his pocket money on a book.

What fraction of his pocket money did he have left?

.....

(Total 4 marks)

Question 20

In a school there are 220 pupils in Year 9.
120 of these pupils are girls.

What fraction of the 220 pupils are boys?

Give your fraction in its simplest form.

.....

(total 2 marks)

Question 21

Melissa has a bag of marbles.

She shares them with her friends.

She gives $\frac{1}{3}$ of the marbles to Jessica.

She gives $\frac{2}{9}$ of the marbles to Samantha

She has 32 marbles left.

How many marbles did she give to Samantha?

……

(Total 4 marks)

Question 22

On Monday, 150 people came into the cafe.

$\frac{1}{5}$ of the 150 people ordered a coffee.

Work out $\frac{1}{5}$ of 150

(total 2 marks)

Percentages and ratios

Section A

Question 1

Sam bought a car for £700
He sold the car for a 20% profit.

Work out how much Sam sold his car for.

£ .....

(Total 3 marks)

Question 2

Jackie orders a new washing machine.
The washing machine costs £350
Jackie pays a deposit of 20% of the cost.

Work out how much deposit Jackie pays.

£ .....

(total 3 marks)

Question 3

Angela earns £35 240 a year.

She has to pay income tax.

She is allowed to earn £6475 before paying tax.

She pays 20% tax on the rest.

Her employer deducts the income tax each month.

Work out how much income tax Angela gets deducted each month.

£ .....

(Total 5 marks)

Question 4

Christie wants to buy this car.
The salesman reduces the price by 15%.

Work out 15% of £7250.

£ .....

[2]

Question 5

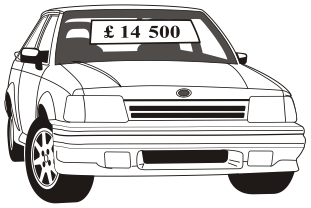
A computer costs £650. This price is reduced by 18%.

Calculate the reduced price of the computer.

£ .....

[3]

Question 6



The price of a new car is £14 600 plus 17.5% VAT. Calculate the total cost of the car.

£ ..... [3]

Question 7

The rate of VAT was reduced in December 2008 from $17\frac{1}{2}$% to 15%.

For sale

Lawnmower £140 + VAT

Work out the difference in price of a lawnmower due to the reduction in VAT.

.....

.....

.....

Answer £ ..... *(3 marks)*

Section B

Question 8

This table gives information about three burgers. Which of these burgers has the highest percentage of carbohydrate by weight? Show your working clearly.

	Total Weight (g)	Carbohydrate (g)
Bumper burger	274	47
Cheese burger	173	29
Veggie burger	252	54

..... [3]

Question 9

Andrew got 42 out of 50 marks in a history test.
He got 48 out of 60 marks in a geography test.

The marks for each test were changed to a percentage.

In which test did Andrew get the higher percentage mark?
You must show all your calculations.

.....

(total 4 marks)

Question 10

Greg goes shopping with £20.
He spends £5.60 on his lunch.
He needs £1.30 for his bus fare.
He sees this advert for shoes.

Shoes

Normal Price £15

Sale price 10% off normal price

Does he have enough money to buy them?

You **must** show your working

.....

.....

.....

.....

.....

.....

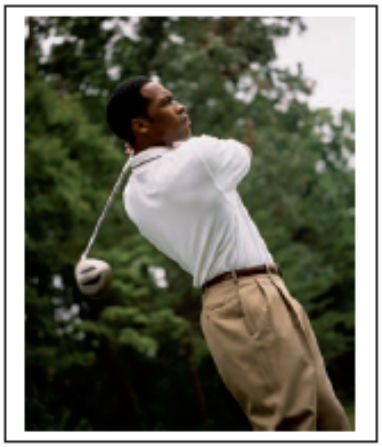
.....

(4 marks)

Question 11

The table shows the membership and annual fees of a local golf club.

	Full members	Weekday members	Lady members	Junior members
Number of members	243	64	77	36
Annual Fee	£600	£300	£250	£120



The club needs to raise £7200 to refurbish the clubhouse next year.

In the committee meeting, the club Captain suggests that the fee for each full member next year should be increased by 5%.
The club President says that next year each member should pay an extra £18

Which is the better suggestion?
You must show all your working.

(total 5 marks)

Section C

Question 12

Two girls share £24.80 in the ratio 3:5

Work out the difference between the larger share and the smaller share.

£ .....

(Total 3 marks)

Question 13

In a classroom the ratio of tables to chairs is 6 : 30

(a) Express the ratio 6 : 30 in its simplest form.

.....

(1)

The ratio of boys to girls in a class is 1 : 2

(b) What fraction of the class are boys?

.....

(1)

(Total 2 marks)

Question 14

Rosa makes pizzas.

She uses cheese, topping and dough in the ratios 2 : 3 : 5
Rosa uses 70 grams of dough.

Work out the number of grams of cheese and the number of grams of topping Rosa uses.

Cheese ..... g

Topping ..... g

(Total 3 marks)

Question 15

A box contains only red pencils and blue pencils.
The ratio of the number of red pencils to the number of blue pencils is 2 : 3

What fraction of the pencils are red?

.....

(Total 2 marks)

Question 16

Ann and Bob shared £240 in the ratio 3 : 5

Ann gave a **half** of her share to Colin.

Bob gave a **tenth** of his share to Colin.

What fraction of the £240 did Colin receive?

.....

(Total 3 marks)

Question 17

Mr Green makes some compost.
He mixes soil, manure and leaf mould in the ratio 3:1:2

Mr Green makes 72 litres of compost.

How many litres of leaf mould does he use?

..... litres

(3)

Question 18

Jenny uses her mother's recipe to make cheese scones.
Her recipe uses a mixture of self-raising flour, butter and cheese in the ratio 6 : 2 : 1 by weight.

In her kitchen, Jenny has:
2 kg of self-raising flour,
500 grams of butter,
200 grams of cheese.

When Jenny makes cheese scones each scone needs about 45 grams of mixture.

Work out the largest number of cheese scones that Jenny can make.

.....

(Total 4 marks)

Product of prime factors, HCF/LCM and BIDMAS

Section A

Question 1

Write 200 as a product of its prime factors.

---

(3)

Question 2

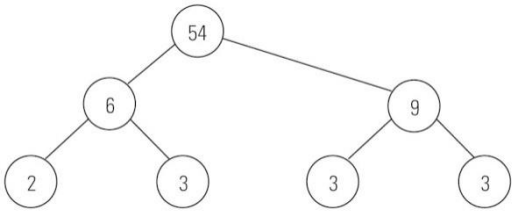
(a) Express 120 as a product of its prime factors.

.....

(2)

Question 3

Use this factor tree to write 54 as a product of its prime factors.



.....

Question 4

Write each of the following numbers as the product of its prime factors.

a 24 ..... **b** 40 .....

c 50 ..... **d** 72 .....

(Total 4 marks)

Question 5

Express 420 as the product of its prime factors.

.....

[2]

Question 6

As a product of prime factors,

$$24 = 2 \times 2 \times 2 \times 3.$$

Write 40 as a product of prime factors.

.....

[2]

Question 7

Write 48 as the product of prime factors.

Give your answer in index form.

.....

.....

.....

.....

.....

.....

Answer .....

(2 marks)

Section B

Question 8

(a) Find the highest common factor (HCF) of 30 and 45

.....

(2)

(b) Find the lowest common multiple (LCM) of 30 and 45

.....

(2)

Question 9

Find the Highest Common Factor (HCF) of 44 and 77

.....

(3)

Question 10

Find the highest common factor (HCF) of 90 and 120

(1)

.....

Question 11

(a) Work out the highest common factor (HCF) of

16 and 20

(1)

.....

(b) Work out the Lowest common multiple (LCM) of

16 and 20

(1)

.....

Question 12

Find the lowest common multiple (LCM) of 25 and 30.

.....

[2]

Question 13

(i) Work out the highest common factor (HCF) of 24 and 40.

.....

[2]

(ii) Work out the lowest common multiple (LCM) of 24 and 40.

.....

[2]

Section C

Question 14

Work out.

(a) $6 - 2 \times 5$

.....

[1]

(b) $(4 + 2)^2$

.....

[1]

(c) $3 \times 5^2 + 4 \times 5$

.....

[2]

Question 15

(a) Anwar and Colin work out this sum.

$$4 + 2 \times 3 =$$

Anwar says the answer is 18.
Colin says the answer is 10.

Who is correct? Give a reason.

Write Anwar or Colin on the first space.

..... because .....

.....

[1]

(b) Work out.

$$(14 - 6) \times 3^2$$

.....

[2]

Question 16

Insert brackets in each of the following calculations so that they are correct.

$2 + 5 \times -4 = -28$

$2 \times 5 + -4^2 = 2$

$2 \times 5 + -4^2 = 36$

[3]

Question 17

Work out the value of $(4 + 5) \times 2 + 3$

.....

(1)

Question 18

Work out the answers to:

a) $4 + 5 \times 3 =$ _____

b) $3^2 + 2^2 =$ _____

c) $\frac{7+3}{5} =$ _____

(Total 3 marks)

Question 19

Work out

a $37 – (6 \times 3)$

b $(7 + 2) - (16 – 9)$

c $7 \times 5 + 3 \times 8$

d $45 \div (8 – 3)$

(Total 4 marks)

Area, surface area and Pythagoras' Theorem

Section A

Question 1

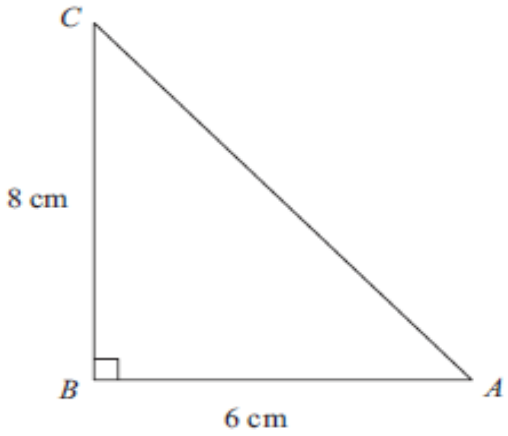


Diagram **NOT** accurately drawn

Calculate the area of the triangle.

..... cm^2
(2)

Question 2

The diagram shows a 6-sided shape made from a rectangle and a right-angled triangle.

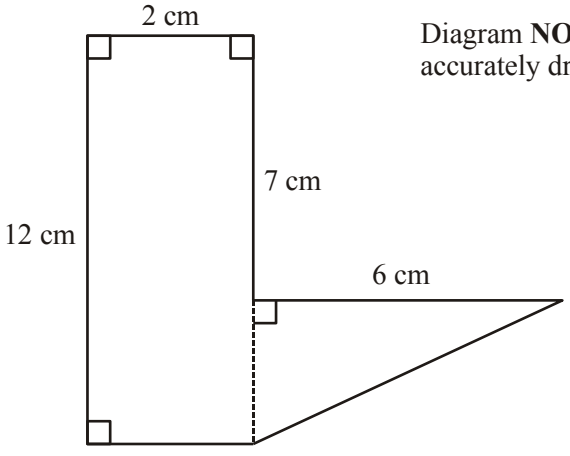


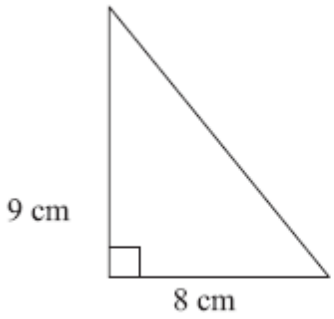
Diagram **NOT** accurately drawn

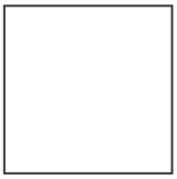
Work out the total area of the 6-sided shape.

.....cm^2
(Total 3 marks)

Question 3

The diagram shows a triangle and a square.





Diagrams **NOT** accurately drawn

Calculate the area of the triangle. The square has the same area.

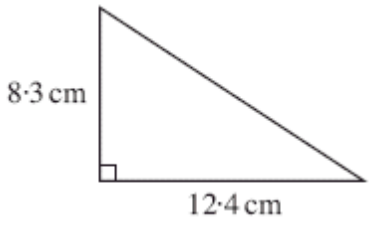
What is the length of one side of the square?

(Total marks 3)

Question 4

Calculate the area of this right-angled triangle.

Give the units of your answer.



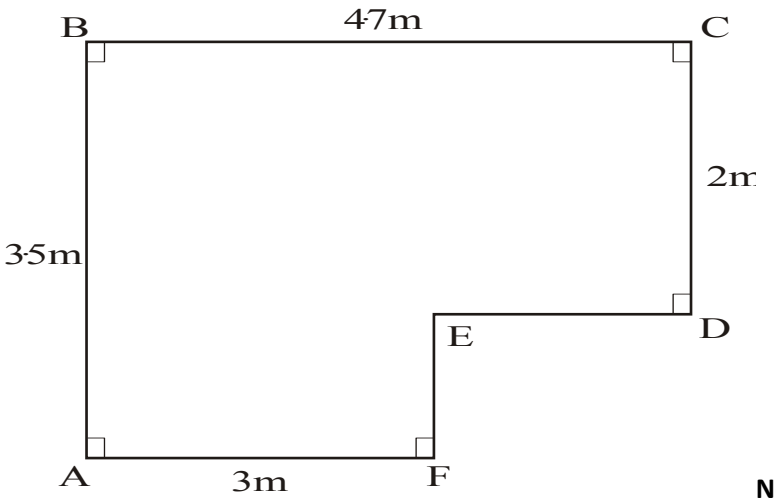
Not scale

.....

[3]

[1]

Question 5



Not to scale

.

Work out the area of this shape.

..... m^2

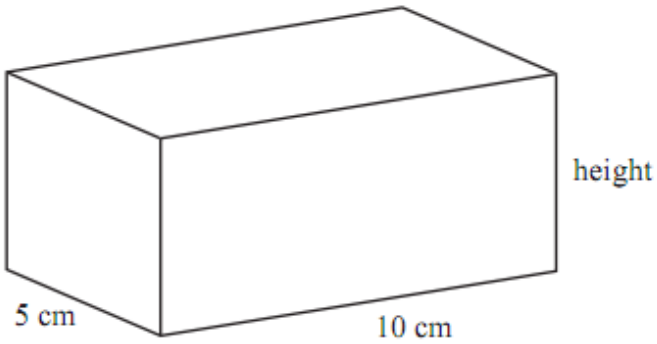
[3]

Section B

Question 6

Here is a solid cuboid.

Diagram **NOT** accurately drawn



The cuboid has a width of 5 cm and a length of 10 cm.
The cuboid has a total surface area of 280 cm^2.

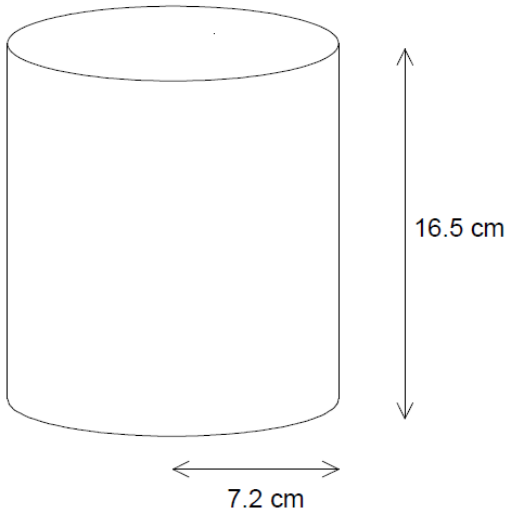
Work out the height of the cuboid.

Question 7

A cylinder has radius 7.2cm and height 16.5cm.

Find the surface area of the cylinder.

Give your answer correct to 3 significant figures. You must state the units.

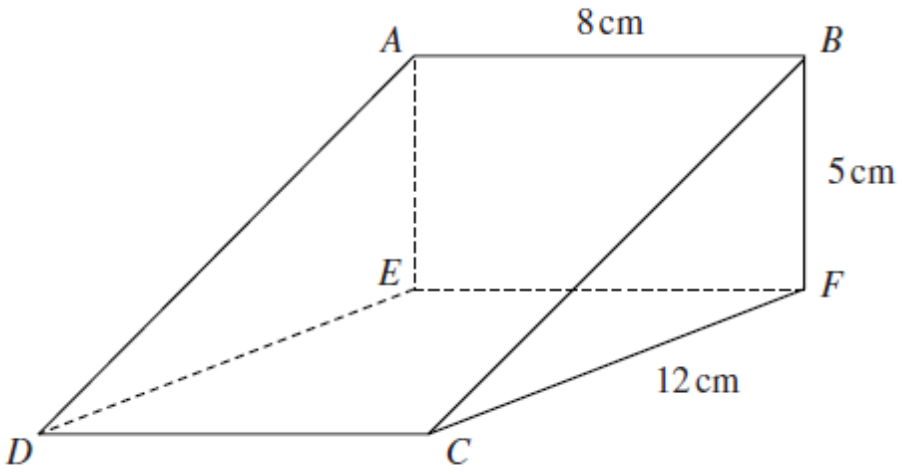


.....

[4]

Question 8

A prism $ABCDEF$ with a right-angled triangular cross section has dimensions as shown.



Not drawn accurately

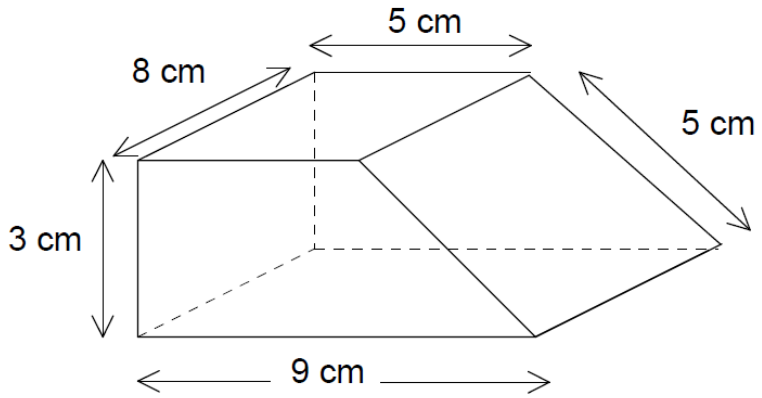
Calculate the surface area

(3 marks)

Question 9

Calculate the surface area of the prism.

You must state the units.



.....

[3]

Section C

Question 10

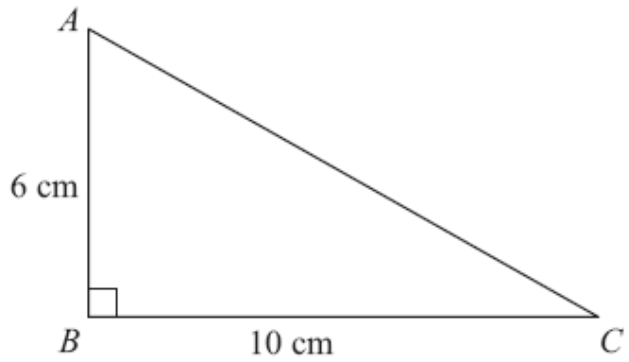


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AB = 6 cm.
BC = 10 cm.
Calculate the length of *AC*.
Give your answer correct to 1 decimal place.

..... cm

(Total 3 marks)

Question 11

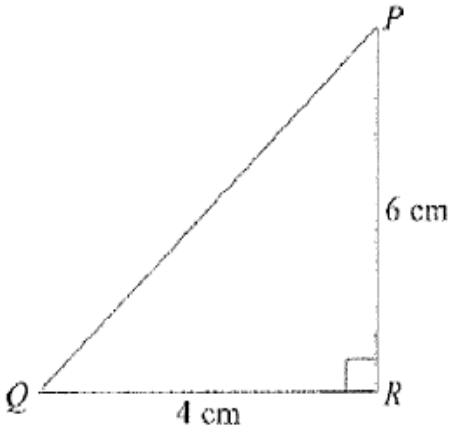


Diagram **NOT** accurately drawn

PQR is a right-angled triangle.

$PR = 6$ cm.
$QR = 4$ cm.

Work out the length of PQ.
Give your answer correct to 3 significant figures.

.....

(3)

Question 12

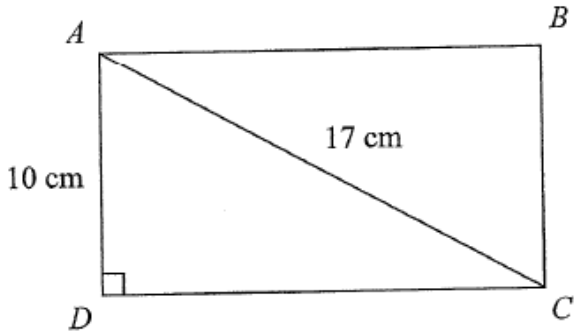


Diagram **NOT** accurately drawn

ABCD is a rectangle.
AC = 17 cm.
AD = 10 cm.

Calculate the length of the side *CD*.
Give your answer correct to one decimal place.

.....

(4)

Question 13

Alan and Bhavana are planning their fitness program.
They plan to run on parts of a field.
The diagram below shows a rectangular field 80 metres by 60 metres.

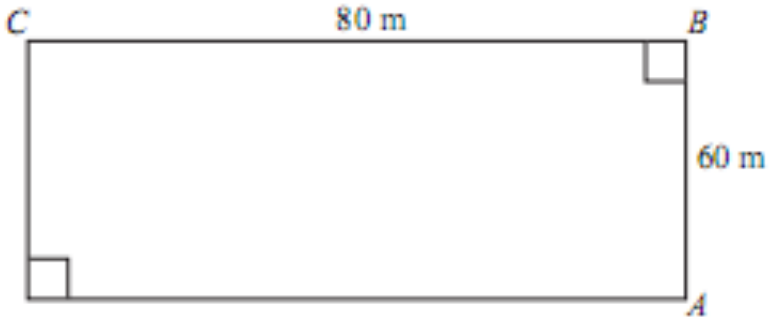


Diagram **NOT** accurately drawn

Alan runs around the field from A to C via B.

Bhavna runs directly across the diagonal of the field from A to C.

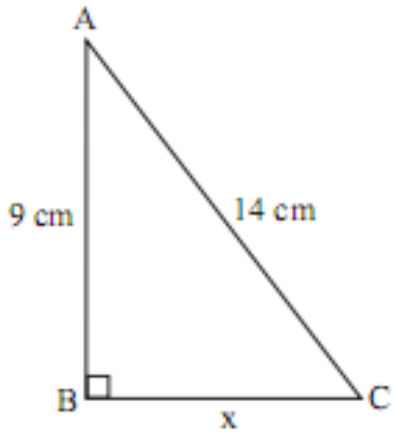
(a) How far does Alan run?
(b) How far does Bhavna run?
(c) Who has to run furthest and by how much?

You must explain your answer.

(Total 3 marks)

Question 14

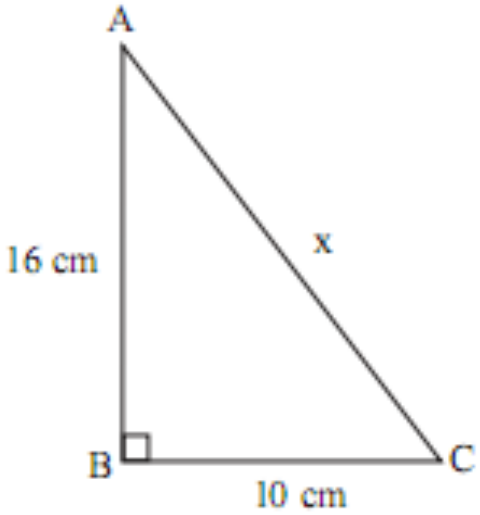
Find the length of side BC.
Give your answer correct to one decimal place.



BC = _____ cm

Question 15

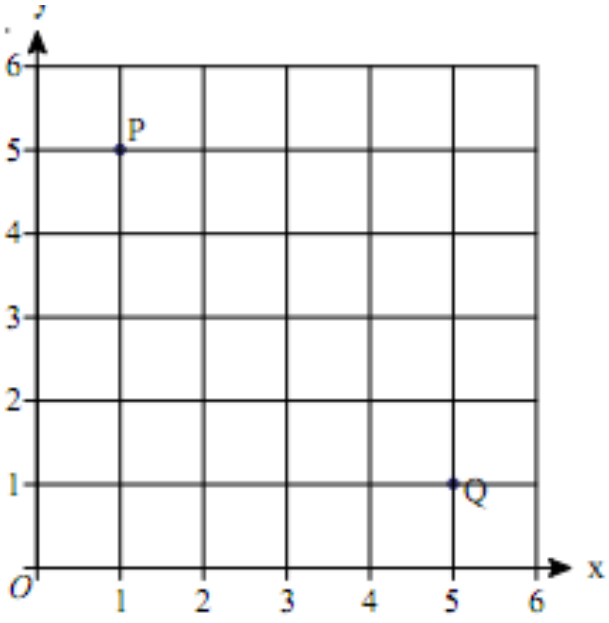
Find the length of side AC.
Give your answer correct to one decimal place.



BC = _____ cm

Question 16

Points P and Q are on a centimetre grid as shown. Find the distance PQ, giving your answer correct to one decimal place.



Distance PQ = _____ 3

(Total 3 marks)

Science

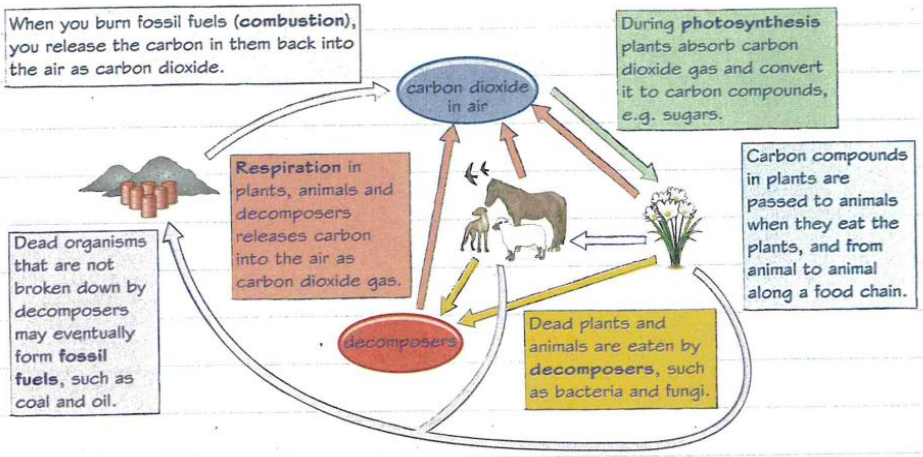
Had a look ☐ Nearly there ☐ Nailed it! ☐

Biology Paper 2

The carbon cycle

Living organisms need substances from the environment. As the amount of these on Earth is limited, they are recycled through both living (**biotic**) and non-living (**abiotic**) parts of the ecosystem. The **carbon cycle** shows how the element carbon passes between the environment and living organisms.

Controls of the carbon cycle



In the air, carbon is part of carbon dioxide gas. In organisms, it is part of complex carbon compounds. The carbon cycle is important because it recycles carbon dioxide released in respiration to be taken in by plants in photosynthesis, to make organic molecules in living organisms.

Worked example

A large forest is cleared by burning. What effects will this have on the amount of carbon dioxide in the air (a) immediately, and (b) over a longer period? **(4 marks)**

(a) Large amounts of carbon dioxide will be released into the air by the burning (combustion) of the trees.

(b) Less carbon dioxide will be removed from the air than before because the trees would have used some for photosynthesis. So the amount of carbon dioxide in the air is likely to remain high.

Two key processes in the carbon cycle are **respiration** and **photosynthesis**. These processes are important in maintaining oxygen and carbon dioxide concentrations in the air. Combustion can change this balance.

Remember that plants photosynthesise in the light but, like all other living organisms, they respire all the time.

Now try this

1 Describe the importance of decomposers in the carbon cycle. **(1 mark)**

Decomposers respire using dead plant and animal matter, releasing carbon dioxide into the atmosphere.

2 Explain the effect of respiration, photosynthesis and combustion in the carbon cycle in transferring carbon dioxide to and from the atmosphere. **(3 marks)**

In each case, explain whether these release carbon dioxide into the atmosphere, or remove it.

Biology Paper 2

Had a look ☐ Nearly there ☐ Nailed it! ☐

Extended response — Ecosystems and material cycles

There will be at least one 6-mark question on your exam paper. For these questions, you will need to think scientifically and structure your answer logically, showing how the points you make are related to each other. You can revise the topics for this question, which is about **the impact of human interactions on ecosystems** and **plant uptake of nitrates**, on pages 81 and 85.

Worked example

Explain why farmers are advised not to spread fertilisers on their crops when heavy rain is due. **(6 marks)**

Fertilisers contain nitrates and other mineral ions that plants need for healthy growth. Mineral ions in fertilisers dissolve in water, and are absorbed from the soil through plant roots.

If it rains heavily, then the mineral ions could be washed away from the crops and drain into nearby water, such as streams or rivers. This means that there will be fewer mineral ions for the crop plants so they will not grow so well. This will have been a waste of money for the farmer.

Extra mineral ions added to the streams and rivers will cause eutrophication. This will cause rapid growth of algae and water plants. The extra growth blocks light to organisms deeper in the water, meaning these organisms die, and takes oxygen from the water for respiration.

Bacteria that decompose dying plants and animals will also take oxygen from the water. If not enough oxygen is left in the water, fish and other animals may die and biodiversity may be reduced.

Remember the importance of mineral ions in plant growth when discussing fertilisers. This is a good way to start this answer.

Command word: Explain

In **explain** answers, make sure you give reasons for the statements you make. Use linking words like **because** or **this means that** to link cause and effect.

Use appropriate science words, such as eutrophication, in your answers, and make sure it is clear what you mean when you use them.

In questions about the environment, remember to consider how the interdependency of organisms, including microorganisms, can result in changes to biodiversity in the ecosystem.

Remember to consider the **advantages** and the **disadvantages** to ecosystems and biodiversity of fish farming.

Now try this

Wild salmon take up to five years to reach adult size. Farmed salmon are kept in conditions so they reach this size in less than two years. Explain the impact of fish farming on ecosystems. **(6 marks)**

Chemistry Papers 3 & 4

Had a look ☐ Nearly there ☐ Nailed it! ☐

Hazards, risks and precautions

You should be able to evaluate the risks in a practical procedure. You should also be able to suggest suitable precautions.

Hazards

A **hazard** is something that could cause:

- damage or harm to someone or something
- adverse health effects, which may occur immediately or later on.

For example, ethanol is flammable. This is a hazard. If the ethanol ignited, it could cause burns or a fire.

Practical skills Risks

A **risk** is the chance that someone or something will be harmed if exposed to a hazard. The amount of risk depends on factors such as:

- ✓ how much someone is exposed to a hazard
- ✓ the way in which exposure happens
- ✓ how serious the effects of exposure are.

The risk from heating ethanol using a hot water bath is less than when using a Bunsen burner.

Hazard symbols

The labels on containers of hazardous substances include **hazard symbols**. These are intended to:

- warn about the dangers associated with the substance in the container
- let people know about the precautions to take when they use the substance.

Some common hazard symbols

Precautions

A **precaution** is something that you can do to reduce the risk of harm from a hazard. Precautions include:

- using a less hazardous substance
- using protective clothing, such as gloves and eye protection
- using a different method or apparatus.

Worked example

A student is preparing a dry sample of copper sulfate. She heats some copper sulfate solution in an evaporating basin. She then allows it to cool. Crystals of copper sulfate appear.

Describe and explain one safety precaution she should use. **(3 marks)**

She should heat the solution gently. This reduces the risk that it will spit out of the evaporating basin. The hot solution could cause skin burns or eye damage.

The answer is specific to this activity.

It is not a general lab rule such as not running or not drinking the solution.

Other suitable precautions that could be mentioned, if linked to the activity, include:

- wearing gloves if toxic substances are used
- tying hair back or tucking in a tie if a Bunsen burner is used for heating.

Now try this

1 State **one** reason why hazard symbols are used. **(1 mark)**

2 A student carries out electrolysis on a concentrated sodium chloride solution. Toxic chlorine gas and flammable hydrogen gas are produced.
Describe **two** precautions the student could take to reduce the risk of harm in this experiment. **(2 marks)**

Relative formula mass

You should be able to calculate relative formula masses when given relative atomic masses.

Calculating relative formula mass

Relative formula mass has the symbol M_r.

To calculate the M_r of a substance, add together the relative atomic masses of all the atoms shown in its formula:

oxygen molecule – formula O_2
relative atomic mass of oxygen = 16
relative formula mass = 2 × 16
= 32

No units

M_r values are just numbers.

This is because an M_r value is the mass of a molecule or unit of a substance compared with 1/12th the mass of a ^{12}C atom. The M in M_r stands for 'molecular'.

You might see or hear the term 'relative molecular mass'. This really applies only to covalent substances.

Worked example

Calculate the relative formula mass of aluminium oxide, Al_2O_3. **(1 mark)**
(relative atomic masses: Al = 27, O = 16)

atoms in Al_2O_3:
(2 × Al) + (3 × O)
M_r = (2 × 27) + (3 × 16)
= 54 + 48
= 102

You do not need to learn any relative atomic masses. You will be given them in questions or you can find them on the periodic table.

This answer shows you the working out needed to obtain the answer.

If you show the working for steps in the calculation you may gain some marks even if your final answer is incorrect.

Worked example

Calculate the relative formula mass of calcium nitrate, $Ca(NO_3)_2$. **(1 mark)**
(relative atomic masses: Ca = 40, N = 14, O = 16)

atoms in $Ca(NO_3)_2$:
(1 × Ca) + (2 × 1 × N) + (2 × 3 × O)
M_r = (1 × 40) + (2 × 14) + (6 × 16)
= 40 + 28 + 96
= 164

Maths skills You may find it easier if you first add up the A_r values for the atoms inside the brackets:

M_r of NO_3 = 14 + (3 × 16)
= 14 + 48
= 62

Then multiply your answer by the number outside, and add that to the remaining A_r values:

M_r of $Ca(NO_3)_2$ = (2 × 62) + 40
= 124 + 40
= 164

Now try this

relative atomic masses: H = 1, C = 12, O = 16, Na = 23, Al = 27, S = 32, Cl = 35.5, Cu = 63.5

Calculate the relative formula masses, M_r, of the following substances.

(a) H_2O **(1 mark)**
(b) CO_2 **(1 mark)**
(c) $NaOH$ **(1 mark)**
(d) CCl_4 **(1 mark)**
(e) $CuCl_2$ **(1 mark)**
(f) Na_2SO_4 **(1 mark)**
(g) $Al(OH)_3$ **(1 mark)**
(h) $Al_2(CO_3)_3$ **(1 mark)**

Empirical formulae

An **empirical formula** is the simplest whole number ratio of atoms of each element in a compound.

Calculating an empirical formula

A 10 g sample of a compound **X** contains 8 g of carbon and 2 g of hydrogen.

		C	H
1	Write the symbol of each element as a header.		
2	Write down the mass of each element in g.	8	2
3	Write down the A_r of each element.	12	1
4	For each element, calculate: mass ÷ A_r	$\frac{8}{12} = 0.667$	$\frac{2}{1} = 2$
5	Divide each answer by the smallest answer (0.667 here).	$\frac{0.667}{0.667} = 1$	$\frac{2}{0.667} = 3$
6	You may then need to multiply all the numbers to remove fractions, then write out the empirical formula.	CH_3	

Finding a molecular formula

You can find the molecular formula of a compound from its empirical formula:
- if you know its relative formula mass, M_r.

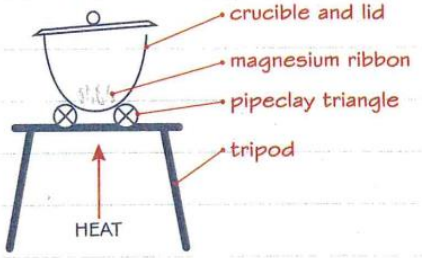
The M_r of **X** in the example above is 30:

1. Calculate the M_r of the empirical formula:
   M_r of CH_3 = 12 + (3 × 1) = 15
2. Divide the M_r of **X** by answer 1:
   $\frac{30}{15} = 2$
3. Multiply each number in the empirical formula by answer 2:
   CH_3 becomes C_2H_6 – the molecular formula

Practical skills: Determining empirical formula

You need to be able to describe an experiment to determine an empirical formula.

The apparatus below can be used to obtain results to do this for magnesium oxide.



The crucible and its contents are weighed before and after heating the magnesium.

Worked example

The table shows the results of an experiment to find the empirical formula of magnesium oxide.

Object	Mass (g)
empty crucible and lid	19.06
crucible, lid and Mg before heating	19.42
crucible, lid and Mg after heating	19.66

(a) Calculate the mass of magnesium used. **(1 mark)**

mass of magnesium = 19.42 – 19.06
= 0.36 g

(b) Calculate the mass of oxygen gained. **(1 mark)**

mass of oxygen = 19.66 – 19.42
= 0.24 g

Now try this

(a) Use the masses given in the Worked example to determine the empirical formula of magnesium oxide. (relative atomic masses: O = 16, Mg = 24) **(3 marks)**

(b) In the experiment described on this page, a lid is needed on the crucible. The lid must be kept slightly open during heating.
Give **two** reasons why. **(2 marks)**

Concentration of solution

You need to be able to calculate the concentration of solutions in g dm^{-3}.

Solute, solvent and solution

A **solution** is a mixture of a solute in a solvent:
- The **solute** is the substance that dissolves.
- The **solvent** is the substance that the solute dissolves in.

Water is the solvent in an **aqueous solution**. The state symbol for an aqueous solution in balanced equations is (aq). The symbol (l) is for substances in the liquid state.

dm^3 and cm^3

Measuring cylinders and other lab apparatus show volumes in cubic centimetres, cm^3. You need to convert these measurements into cubic decimetres, dm^3, when you calculate concentrations. It helps to know that:

- ✓ $1\ dm^3 = 10 \times 10 \times 10 = 1000\ cm^3$
- ✓ To convert cm^3 to dm^3, divide by 1000.

Mass and volume

To calculate the **concentration** of a solution, you need to know:
- the mass of solute in **grams**, g, and
- the volume of solution in **cubic decimetres**, dm^3.

If you are making a solution, you can use the volume of the solvent instead.

Mass, volume and concentration

You use this equation to calculate the concentration of a solution in g dm^{-3}:

$$\text{concentration (g dm}^{-3}\text{)} = \frac{\text{mass of solute (g)}}{\text{volume of solution (dm}^3\text{)}}$$

LEARN IT! IT'S NOT ON THE EQUATIONS LIST

Maths skills Units

The unit g dm^{-3} means 'grams per cubic decimetre'. You may also see it written as g/dm^3.

Maths skills Rearranging equations

You need to be able to change the subject of an equation. For example:

- ✓ mass of solute = concentration × volume
- ✓ $\text{volume} = \frac{\text{mass of solute}}{\text{concentration}}$

Worked example

2.50 g of sodium hydroxide is dissolved in 250 cm^3 of water. Calculate the concentration of the solution formed in g dm^{-3}. **(2 marks)**

$250\ cm^3 = \frac{250}{1000} = 0.250\ dm^3$

$\text{concentration} = \frac{2.50\ g}{0.250\ dm^3} = 10\ g\ dm^{-3}$

Remember to convert the volume to dm^3 if it is given to you in cm^3.

The units are shown in the concentration calculation here. This makes it easier for you to see how it is done. You do not need to show units in your working out, but you must show the units in your final answer.

Now try this

1 Calculate the concentrations of the following solutions formed:
(a) 0.40 g of glucose dissolved in 0.50 dm^3 of water. **(1 mark)**
(b) 1.25 g of copper chloride dissolved in 100 cm^3 of water. **(2 marks)**

2 Calculate the mass of sodium hydroxide needed to make 150 cm^3 of a 40 g dm^{-3} solution. **(2 marks)**

Other resources

If you require any other additional work, please visit the websites below:

English:

https://www.gcsepod.com/

https://www.bbc.co.uk/bitesize/subjects/z3kw2hv

https://www.educationquizzes.com/ks3/english/

https://www.senecalearning.com/

Maths:

www.vle.mathswatch.co.uk

Students have their own log in - Example name and Year (John Smith Year 9 – Johsmit9@lighthall)

123456

www.mathsgenie.co.uk

www.corbettmaths.com

Science:

Primary resources - https://www.gcsepod.com - requires student login (provided by school)

Additional resources:

https://www.bbc.co.uk/bitesize/subjects/zrkw2hv

https://www.youtube.com/channel/UCqbOeHaAUXw9Il7sBVG3_bw

https://www.gcsepod.com - requires student login (provided by school)

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