

Please check the examination details below before entering your candidate information

Candidate surname		Other names	
Centre Number		Candidate Number	
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Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Time 1 hour 30 minutes	Paper reference	1ST0/2F
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Statistics

PAPER 2

Foundation Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, scientific calculator.	Total Marks <div style="border: 1px solid black; height: 40px; width: 80px; margin: 0 auto;"></div>
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Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Scientific calculators may be used.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.



Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** For a survey, Kayleigh counted the number of people in each of the 20 cars that arrived at her office car park one morning.

Here are her results.

1 1 2 2 3 3 1 3 1 1
1 5 1 3 2 1 3 1 2 2

- (a) Fill in the tally chart for this information **and** complete the frequency column.

Number of people	Tally	Frequency
1		
2		
3		
4		
5		

- (b) Write down the mode.

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(1)

At Kayleigh's office there is a scheme to reduce the number of cars arriving at the office car park which have only 1 person in the car.

Kayleigh concludes from her survey that the scheme is not working.

(c) Explain whether or not Kayleigh's results support her conclusion.

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(2)

John suggests that Kayleigh's results are not suitable for her to reach a reliable conclusion.

(d) Give one reason why John may be correct.

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(1)

(Total for Question 1 is 6 marks)

1 For a survey, Layla counted the number of people in each of the 20 cars that arrived at her local gym one morning.

Here are her results.

3

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2

2

3

5

5

3

2

2

5

4

5

1

2

5

4

5

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2

(a) Fill in the tally chart for this information **and** complete the frequency column.

Number of people	Tally	Frequency
1		
2		
3		
4		
5		

(b) Write down the mode.

.....

(1)

At Layla's Gym there is a scheme to increase the number of people that travel to the gym in the morning with friends.

Layla concludes from her survey that the scheme is working.

- (c) Explain whether or not Layla's results support her conclusion.

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(2)

Ben suggests that Layla's results are not suitable for her to reach a reliable conclusion.

- (d) Give one reason why Ben may be correct.

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(1)

(Total for Question 1 is 6 marks)

- 2 The table shows information about the results of a survey into ‘Charitable Giving and Social Activity’ over a four week period.

For example, 40% of all of those surveyed said that they had donated money to charity, but for 16–24 year olds this was only 26%

Some people in the survey said that they took part in more than one of the given activities.

Activity	All people	Gender		Age			
		Male	Female	16–24	25–44	45–64	65+
Donated money to charity	40%	38%	43%	26%	39%	44%	48%
Given goods to charity	21%	15%	27%	9%	21%	24%	26%
Sponsored someone for a charity	11%	9%	13%	7%	13%	14%	7%
Bought an ethical product	8%	7%	9%	3%	9%	10%	6%
Volunteered for a charity	6%	5%	8%	5%	6%	8%	5%
Signed a petition	6%	5%	6%	5%	7%	6%	4%
Participated in a local consultation	2%	2%	1%	0%	2%	1%	2%
Participated in a public protest	1%	1%	1%	1%	1%	0%	0%
None of the above	43%	48%	37%	58%	44%	37%	38%

(Source: *UK Giving 2014*)

7% of those aged 16–24 took part in one of the activities.

(a) Which activity?

(1)

(b) Of those who Volunteered for a charity, which age group had the greatest percentage?

.....

(1)

One of the people surveyed is selected at random.

This person had Bought an ethical product.

(c) Describe the most likely gender and age group for this person.

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(2)

(d) Describe the relationship suggested by the data between age and having Given goods to charity.

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.....
(1)

Laura is going to do a Sponsored bike ride for charity.

She uses the information in the table to suggest that more than half the people who sponsor her will be female.

(e) Explain how the information in the table supports this suggestion.

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(1)

(Total for Question 2 is 6 marks)

- 2 The table shows information about the results of a survey into ‘Charitable Giving and social activity’ over a four week period.

For example, 21% of all of those surveyed said that they had given goods to charity, but for 16–24 year olds this was only 9%

Some people in the survey said that they took part in more than one of the given activities.

Activity	All people	Gender		Age			
		Male	Female	16–24	25–44	45–64	65+
Donated money to charity	40%	38%	43%	26%	39%	44%	48%
Given goods to charity	21%	15%	27%	9%	21%	24%	26%
Sponsored someone for a charity	11%	9%	13%	7%	13%	14%	7%
Bought an ethical product	8%	7%	9%	3%	9%	10%	6%
Volunteered for a charity	6%	5%	8%	5%	6%	8%	5%
Signed a petition	6%	5%	6%	5%	7%	6%	4%
Participated in a local consultation	2%	2%	1%	0%	2%	1%	2%
Participated in a public protest	1%	1%	1%	1%	1%	0%	0%
None of the above	43%	48%	37%	58%	44%	37%	38%

(Source: UK Giving 2014)

1% of those aged 16–24 took part in one of the activities.

- (a) Which activity? (1)
- (b) Of those who signed a petition, which age group had the least percentage?

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(1)

One of the people surveyed is selected at random.

This person had given goods to charity

- (c) Describe the most likely gender and age group for this person.

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(2)

- (d) Describe the relationship suggested by the data between age and having donated to charity.

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(1)

Joanna is going to do a sponsored run for charity.

She uses the information in the table to suggest that 20% of the people who sponsor her will be aged between 16-44

- (e) Explain how the information in the table supports this suggestion.

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(1)

(Total for Question 2 is 6 marks)

3 The following four sentences are about different events.

A The likelihood of an event is even.

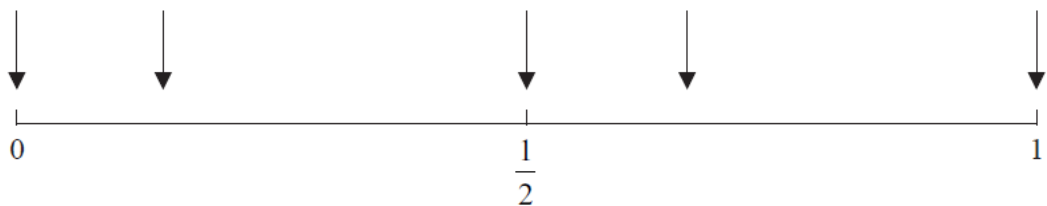
B An event is certain to happen.

C When a fair dice numbered 1 to 6 is rolled, it lands on a number greater than 2

D The next birthday of a person picked at random is on a Monday.

The number line below has arrows marking five probabilities.

(a) Write the letter for each event on the arrow that is in the best position to show the probability of each of the four events.



(3)

Eddie has a biased coin.

He wants to find an estimate for the probability that when he throws the coin it will land Heads.

(b) Explain briefly how he could do this.

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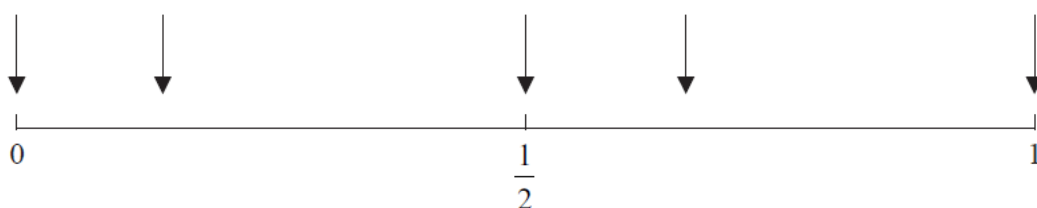
(1)

(Total for Question 3 is 4 marks)

- 3** The following four sentences are about different events.
- A** The likelihood of throwing an even number when throwing a fair die labelled 1-6
 - B** Getting either a heads or a tail on a coin
 - C** When a fair spinner numbered 1 to 3 is spun, it lands on a number greater than 1
 - D** The next birthday of a person picked at random is on a Friday

The number line below has arrows marking five probabilities.

- (a) Write the letter for each event on the arrow that is in the best position to show the probability of each of the four events.



(3)

Ben has a biased coin.

He wants to find an estimate for the probability that when he throws the coin it will land Tails.

- (b) Explain briefly how he could do this.

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(1)

(Total for Question 3 is 4 marks)

4 Nikola asks 50 male and 50 female drivers arriving at a car park if the type of car they are driving is petrol, diesel or electric.

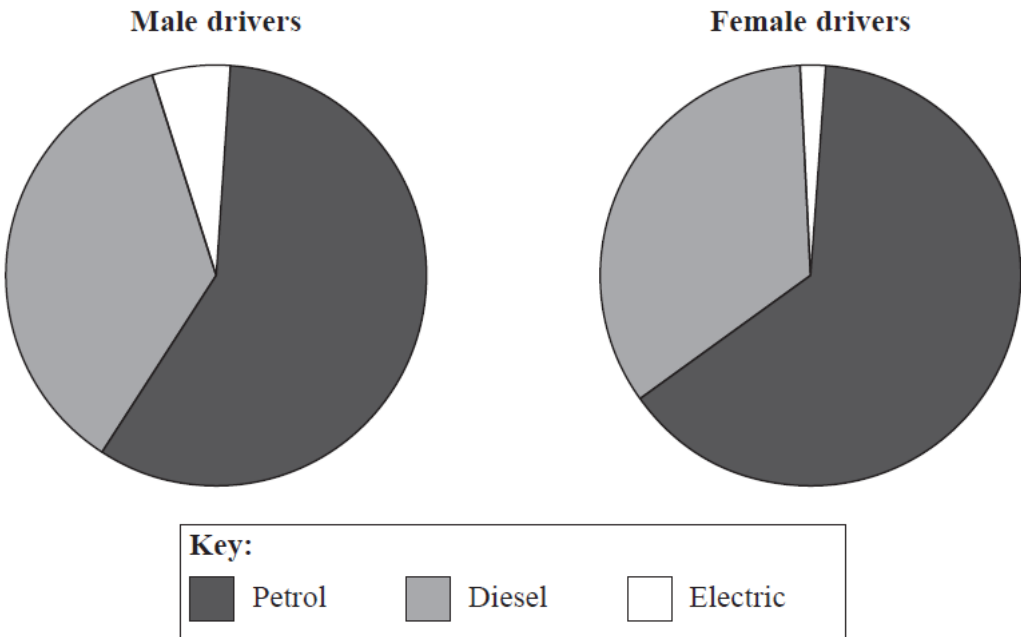
The two-way table shows some information about her results.

	Car type			Total
	Petrol	Diesel	Electric	
Male driver	29		3	50
Female driver		17	1	50
Total	61		4	100

(a) Complete the two-way table.

(2)

Nikola wants to compare her results for male drivers with her results for female drivers. To do this she uses the information she collected to draw the two pie charts shown below.



(b) Work out the angle for electric cars in the pie chart for male drivers.
You must show the calculation.

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(2)

- (i) The most common type of car is diesel.
- (ii) Males are more likely than females to be drivers of electric cars.

(c) Use the information in the **pie charts** to assess Seb's two conclusions. You should also consider how Nikola's data collection method affects the reliability of Seb's conclusions.

This image shows a single page of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

(Total for Question 4 is 9 marks)

- 4 Nicky asks 50 male and 50 female drivers arriving at a car park if the type of car they are driving is petrol, diesel or electric.

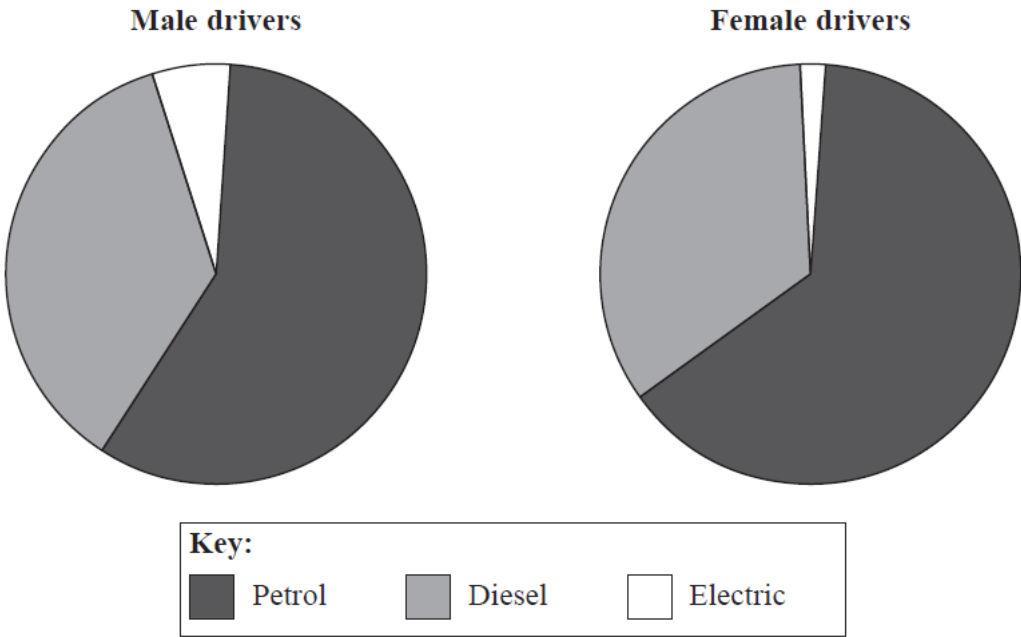
The two-way table shows some information about her results.

	Car type			Total
	Petrol	Diesel	Electric	
Male driver	30		5	50
Female driver		17	4	50
Total	59		9	100

- (a) Complete the two-way table.

(2)

Nicky wants to compare her results for male drivers with her results for female drivers. To do this she uses the information she collected to draw the two pie charts shown below.



- (b) Work out the angle for electric cars in the pie chart for male drivers.
You must show the calculation.

..... °

(2)

Nicky told Sam how she collected her data. She then gave Sam a copy of each of her two pie charts and asked him to tell her what they showed.

Sam used the pie charts to reach the following conclusions.

- (i) The most common type of car is petrol.
- (ii) Males are more likely than females to be drivers of diesel cars.

- (c) Use the information in the **pie charts** to assess Sam's two conclusions.
You should also consider how Nicky's data collection method affects the reliability of Sam's conclusions.

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(5)

(Total for Question 4 is 9 marks)

5 (a) Explain what is meant by a simple random sample.

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(1)

The manager of a health centre is reviewing the amount of time allowed for each patient to be seen by a doctor.

The manager wants to get the opinions of the people registered at the health centre.

She plans to give a questionnaire to each patient who has an appointment with a doctor next Monday. She wants each patient to complete the questionnaire at home and return the completed questionnaire to the health centre.

(b) Assess the manager’s plan to get the opinions of the people registered at the health centre.

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(3)

Here is an open question that the manager is considering for her questionnaire.

What do you think about the 5 minutes currently allowed for appointments?

This is not a good question.

(c) Give one reason why.

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(1)

- (d) Design a suitable closed question for the manager to use on her questionnaire so that she can decide how long should be allowed for each patient to be seen by a doctor.

(2)

When the manager has designed her questionnaire, she decides to pre-test it by using a pilot survey with a small sample of patients.

- (e) From the five options below, tick (✓) the **three** that are the best reasons for the manager to pre-test her questionnaire in this way.

- ☐ To check for spelling mistakes
- ☐ To check the questions are understood
- ☐ To see if she gets the information she needs
- ☐ To check the questions are not offensive
- ☐ To see how long the questionnaire takes to complete

(2)

(Total for Question 5 is 9 marks)

5 (a) Explain what is meant by a stratified random sample.

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(1)

The manager of a leisure centre is reviewing the amount of time the personal trainer spends with clients.

The manager wants to get the opinions of the people using the personal trainer.

She plans to give a questionnaire to each person who has an appointment with the personal trainer next Monday. She wants each person to complete the questionnaire at home and return the completed questionnaire to the leisure centre.

(b) Assess the manager’s plan to get the opinions of the people registered at the leisure centre.

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(3)

Here is an open question that the manager is considering for her questionnaire.

What do you think about the 45 minutes currently allowed for appointments?

This is not a good question.

(c) Give one reason why.

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(1)

- (d) Design a suitable closed question for the manager to use on her questionnaire so that she can decide how long each person should spend with the personal trainer.

(2)

When the manager has designed her questionnaire, she decides to pre-test it by using a pilot survey with a small sample of people.

- (e) From the five options below, tick (✓) the **three** that are the best reasons for the manager to pre-test her questionnaire in this way.

- | | |
|--------------------------|---|
| <input type="checkbox"/> | To check for spelling mistakes |
| <input type="checkbox"/> | To check the questions are understood |
| <input type="checkbox"/> | To see if she gets the information she needs |
| <input type="checkbox"/> | To check the questions are not offensive |
| <input type="checkbox"/> | To see how long the questionnaire takes to complete |

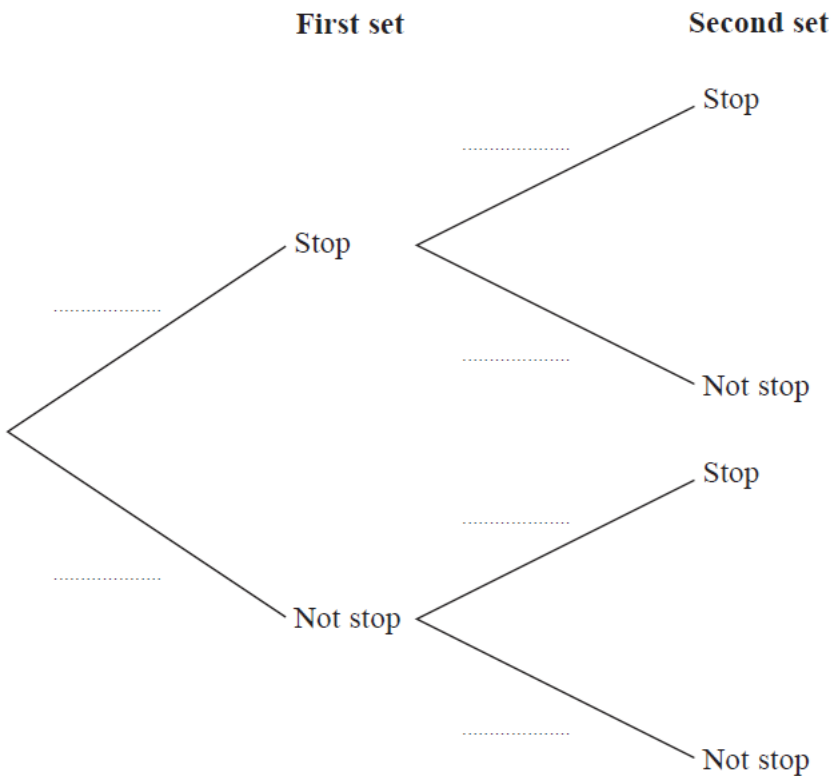
(2)

(Total for Question 5 is 9 marks)

- 7 On her drive to work Hinata passes through two sets of traffic lights.
The traffic lights work independently.

On any day that Hinata drives to work
the probability that she has to stop at the first set of traffic lights is 0.6
the probability that she has to stop at the second set of traffic lights is 0.5

- (a) Complete the probability tree diagram for this information.



(2)

- (b) Find the probability that Hinata does **not** have to stop at the first set of traffic lights
and does **not** have to stop at the second set of traffic lights on her way to work.

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(2)

Each week, Hinata drives to work on 5 days.

She says that she can expect to drive to work without having to stop at either set of traffic lights on exactly one day of the week.

(c) Is Hinata correct?

You must show how you get your answer.

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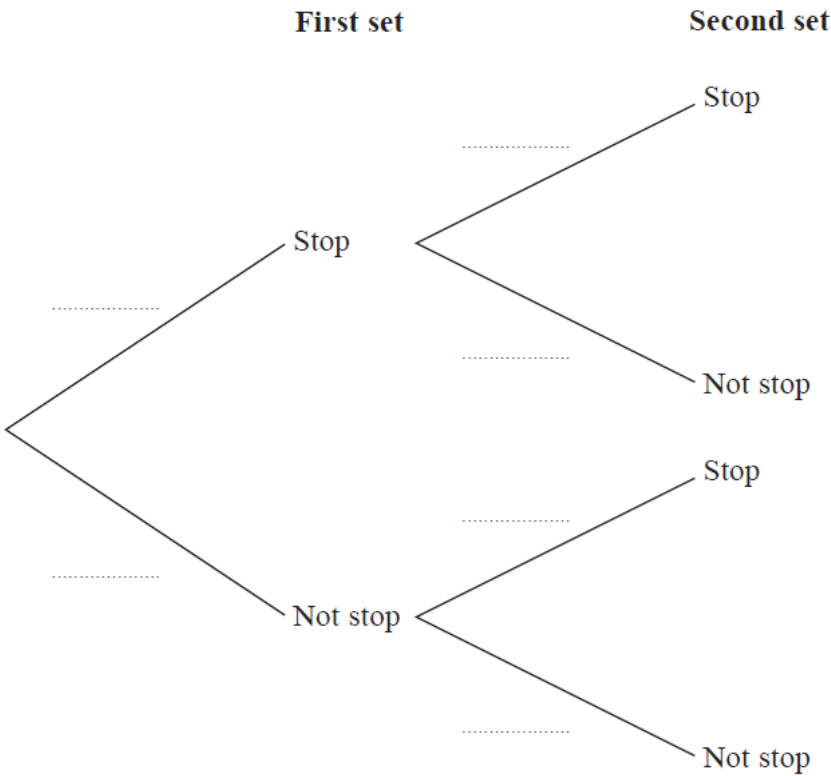
(2)

(Total for Question 7 is 6 marks)

7 Mina passes through two sets of traffic lights whilst on the way to school on the bus.
The traffic lights work independently.

On any day that Mina catches the bus to school
the probability that she has to stop at the first set of traffic lights is 0.4
the probability that she has to stop at the second set of traffic lights is 0.6

(a) Complete the probability tree diagram for this information.



(2)

(b) Find the probability that Mina **does not** have to stop at the first set of traffic lights and **does have** to stop at the second set of traffic lights on her way to school.

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(2)

Each week, Mina takes the bus to school all 5 days.

She expects to stop at both sets of traffic lights on the way to school on exactly one day of the week.

(c) Is Mina correct?

You must show how you get your answer.

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(2)

(Total for Question 7 is 6 marks)

- 8 The table gives the populations, in thousands, and the crude birth rates for two regions of the United Kingdom in 2016

Region	Population (thousands)	Crude birth rate
Cumbria	497.9	9.6
Norfolk	892.9	10.1
United Kingdom	65 648.0

(Source: *Office for National Statistics*)

In 2016 the number of births in the United Kingdom was 774 835`

$$\text{crude birth rate} = \frac{\text{number of births} \times 1000}{\text{total population}}$$

- (a) Using the formula above, work out the crude birth rate for the United Kingdom in 2016
Give your answer correct to one decimal place and write your answer in the table.

(2)

- (b) Work out the number of births in Cumbria in 2016

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(2)

Stephen says that **without** doing any calculations he knows there were more births in Norfolk than in Cumbria, in 2016

(c) Using the information in the table, explain why Stephen is correct.

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(2)

(Total for Question 8 is 6 marks)

- 8 The table gives the populations, in thousands, and the population density for two regions of the United Kingdom in 2021

Region	Population (thousands)	Population density (people / km ²)
Essex	1832.7	499
West Yorkshire	2320.2	1143
England and Wales	59597.0	395

$$\text{Population density} = \frac{\text{number of people}}{\text{land area}}$$

- (a) Using the formula above, work out the land area for England and Wales.
Give your answer correct to one decimal.

(2)

- (b) If Penton has a population of 3 609 000 and a land area of 600 km² what would Penton's population density be?

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(2)

Lynn says that **without** doing any calculations she knows that West Yorkshire has a larger land area than Essex.

- (c) Using the information in the table, explain why Lynn is correct.

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(2)

(Total for Question 8 is 6 marks)

- 9** The table gives, for the Isle of Skye, the number of days with rainfall during the 30 days of April 2019 and during the 30 days of June 2019

Month	April	June
Number of days with rainfall	9	13

(Source: www.isleofskyeweather.co.uk)

- (a) Use the information in the table to find the absolute risk of rainfall for a day in April.

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(1)

- (b) Use the information in the table to work out an estimate for the relative risk of rainfall for any June day compared with any April day.

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(1)

Glen plans to visit the Isle of Skye next year, in either June or July.

The relative risk of rainfall for any July day compared with any June day is 0.8

He does not want it to rain when he visits.

Glen decides to go in July instead of June.

- (c) Explain how the relative risk of 0.8 could be used to justify Glen's decision.

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(1)

(Total for Question 9 is 3 marks)

- 9** The table gives, for the ski resort of Glenshee, the number of days with snowfall during the 28 days of February 2021 and during the 30 days of April 2021

Month	February 2021	April 2021
Number of days with snowfall	12	9

- (a) Use the information in the table to find the absolute risk of snowfall for a day in February.

.....
(1)

- (b) Use the information in the table to work out an estimate for the relative risk of snowfall for any April day compared with any February day.

.....
(1)

Norman plans to visit Glenshee next year, in either January or February.

The relative risk of snowfall for any January day compared with any February day is 1.1

He does want it to snow when he visits.

Norman decides to go in January instead of February.

- (c) Explain how the relative risk of 1.1 could be used to justify Norman's decision.

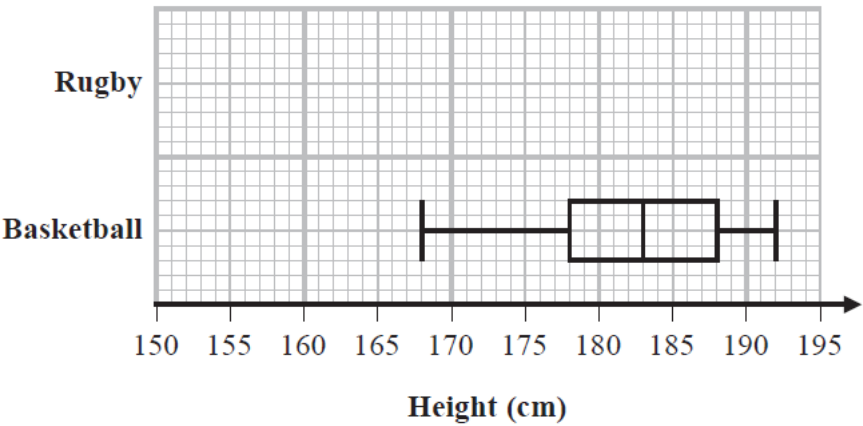
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(1)

(Total for Question 9 is 3 marks)

10 Bill investigated the heights of females competing in different sports.

Using data from the internet, he recorded the height, in cm, of each female in a sample of 15 female rugby players and the height, in cm, of each female in a sample of 15 female basketball players.

He drew the box plot below for the recorded heights of the 15 female basketball players.



(Source: englandrugby.com, gbbasketball.com)

The table gives information about the recorded heights of the 15 female rugby players.

Greatest height	182 cm
Median height	170 cm
Lower quartile	166 cm
Range	26 cm
Interquartile range	10 cm

(a) Using the information in the table, draw on the grid above a box plot for the recorded heights of the 15 female rugby players.

(3)

- (b) Compare the two distributions of heights.
Give **three** comparisons and interpret one of your comparisons.

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(4)

- (c) Considering the method that Bill used to collect his data, comment on the reliability of your comparisons in part (b).

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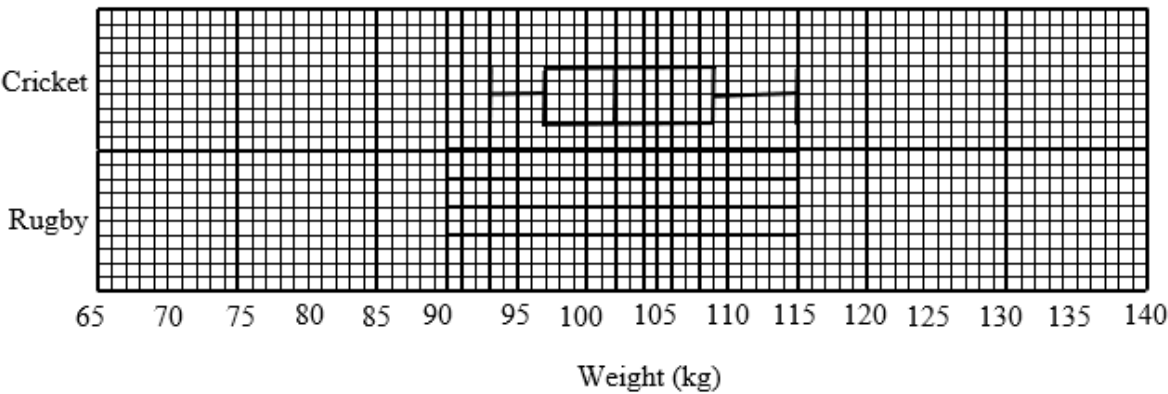
(2)

(Total for Question 10 is 9 marks)

10 Ben investigated the weights of males competing in different sports.

Using data from the internet, he recorded the weight, in kg, of each male in a sample of 15 male rugby players and the weight, in kg, of each male in a sample of 15 male cricket players.

He drew the box plot below for the recorded heights of the 15 male cricket players.



The table gives information about the recorded heights of the 15 male rugby players.

Greatest weight	130 cm
Median weight	120 cm
Lower quartile	108 cm
Range	45 cm
Interquartile range	18 cm

(a) Using the information in the table, draw on the grid above a box plot for the recorded weights of the 15 male rugby players.

(3)

- (b) Compare the two distributions of weights.
Give **three** comparisons and interpret one of your comparisons.

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(4)

- (c) Considering the method that Ben used to collect his data, comment on the reliability of your comparisons in part (b).

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(2)

(Total for Question 10 is 9 marks)

11 Irina is investigating whether the percentage of the population of a country living in urban areas has an effect on the life expectancy in that country.

(a) Suggest a hypothesis Irina could use for her investigation.

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(1)

Irina collected the following information about 10 countries.

The Urban population (%) refers to the percentage of the population of the country who live in urban areas.

Country	Urban population (%)	Life expectancy (years)
Australia	89	82
Bangladesh	34	73
China	56	76
Egypt	43	73
France	80	82
Macedonia	57	76
Norway	81	82
Panama	67	79
Thailand	50	75
USA	82	80

(Source: *CIA World Factbook*)

Irina used statistical software to draw a scatter diagram for the information in the table.

(b) Give a reason why a scatter diagram is an appropriate diagram to use.

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(1)

(c) For this investigation, which variable is the explanatory variable?
Give a reason for your answer.

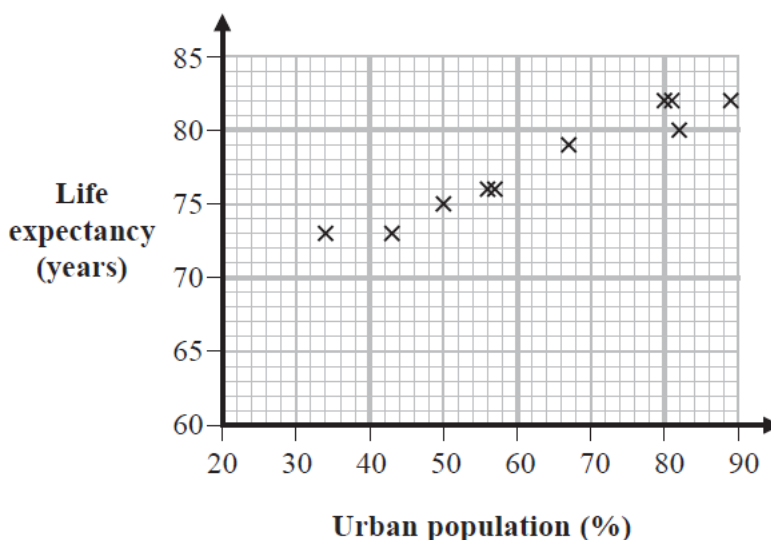
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(2)

The scatter diagram from the statistical software is shown below.



- (d) Explain, giving a statistical reason, whether or not this scatter diagram supports your hypothesis in part (a).

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 (2)

For these 10 countries, the double mean point of the data is (63.9, 77.8).

- (e) Using this information, draw a line of best fit on the scatter diagram.

(2)

Using statistical software, Irina finds that the gradient of the line of best fit should be 0.19

- (f) Interpret the gradient of the line of best fit.

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 (1)

Irina now finds that South Africa has Urban population 65% and Life expectancy 63 years.

- (g) Determine how this information for South Africa fits with the relationship shown in the scatter diagram for the other countries.

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 (2)

(Total for Question 11 is 11 marks)

11 Paula is investigating whether the percentage of the population of a country living in poverty has an effect on the number of years of schooling.

(a) Suggest a hypothesis Paula could use for her investigation.

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(1)

Paula collected the following information about 10 countries.
 The Population (%) refers to the percentage of the population living in poverty.

Country	Population (%)	Number of years of schooling
Genovia	20.0	9.3
Wakanda	17.8	7.4
Lilliput	59.5	3.9
Florin	27.8	6.6
Zubrowka	1.8	10.9
Oceania	12.7	9.0
Gilead	88.3	1.9
Aldovia	40.0	4.4
Panem	52.4	5.2
Zamunda	71.0	3.1

(b) Give a reason why using a dual bar chart is not an appropriate diagram to use.

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(1)

(c) For this investigation, which variable is the response variable?
 Give a reason for your answer.

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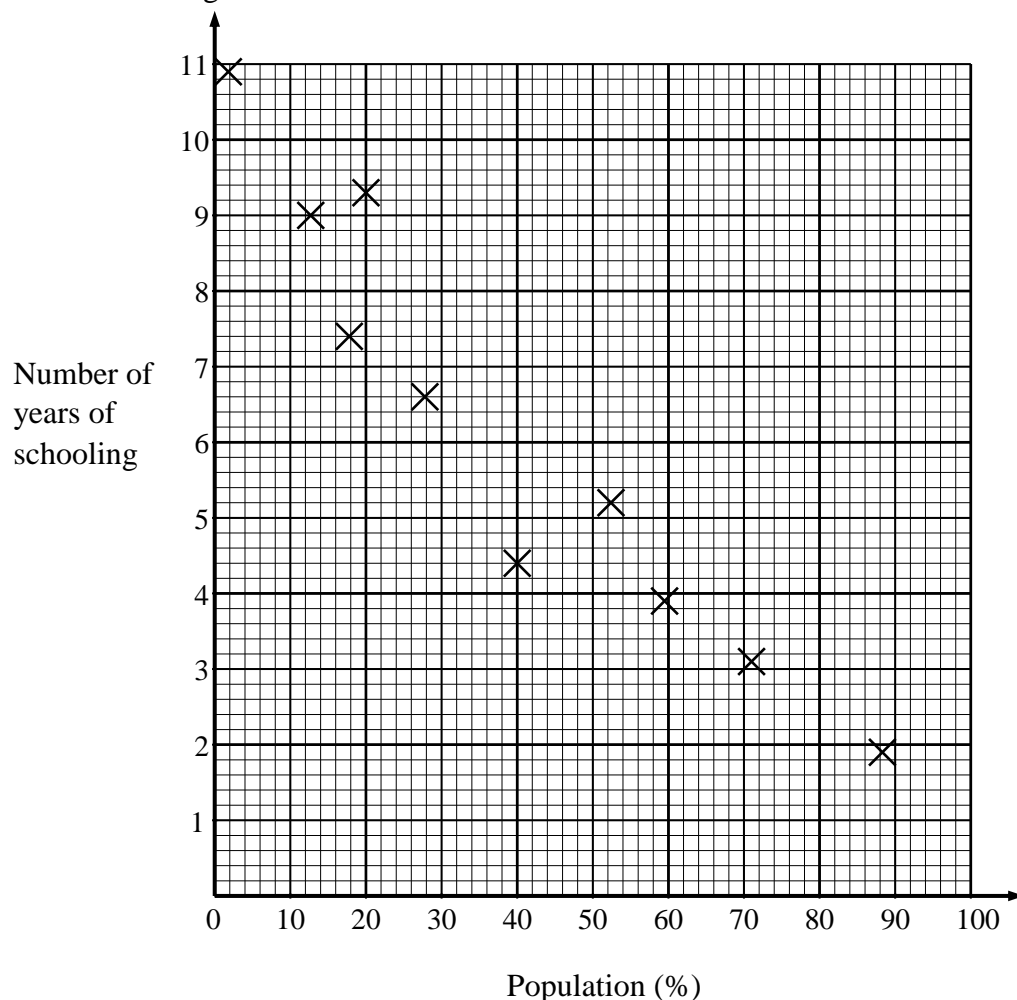
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(2)

Paula used statistical software to draw a scatter diagram for the information in the table.

The scatter diagram from the statistical software is shown below.



- (d) Explain, giving a statistical reason, whether or not this scatter diagram supports your hypothesis in part (a).

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(2)

For these 10 countries, the double mean point of the data is (39.1, 6.2)

- (e) Using this information, draw a line of best fit on the scatter diagram. (2)

Using statistical software, Paula finds that the gradient of the line of best fit has a negative gradient of 0.02

- (f) Interpret the gradient of the line of best fit.
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- (1)

Paula now finds that Caldonia has a poverty population of 83% and the number of years of schooling of 7.4

- (g) Determine how this information for Caldonia fits with the relationship shown in the scatter diagram for the other countries.

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(2)

(Total for Question 11 is 11 marks)

- 12** The table shows the index number for the average cost of a package holiday for 2018 and for 2019, using 2015 as base year.

Year	2015	2018	2019
Index number	100	106.9	110.8

(Source: *Office for National Statistics*)

A family spent a total of £4650 on a package holiday in 2015

- (a) Work out an estimate for the cost of the same holiday in 2018

£

(2)

Thomas does the following calculation to reach a conclusion about the cost of package holidays.

$$110.8 - 106.9 = 3.9$$

The cost of all package holidays increased by 3.9% between 2018 and 2019

- (b) Is Thomas correct?
Give reasons for your answer.

(3)

(Total for Question 12 is 5 marks)

- 12** The table shows the index number for the average cost of gold for 2020 and for 2021, using 2017 as base year.

Year	2017	2020	2021
Index number	100	140.5	142.3

David bought a gold ring for £4570 in 2017

- (a) Work out an estimate for the cost of the same gold ring in 2021

£

(2)

Paul does the following calculation to reach a conclusion about the cost of gold.

$$142.3 - 140.5 = 1.8$$

The cost of gold increased by 1.8% between 2020 and 2021

- (b) Is Paul correct?
Give reasons for your answer.

(3)

(Total for Question 12 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS