Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number	Candidate Number

Tuesday 16 June 2020

Morning (Time: 1 hour 30 minutes) | Paper Reference **1ST0/2F**

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

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 ▶

R62713A

1/1/1/1/

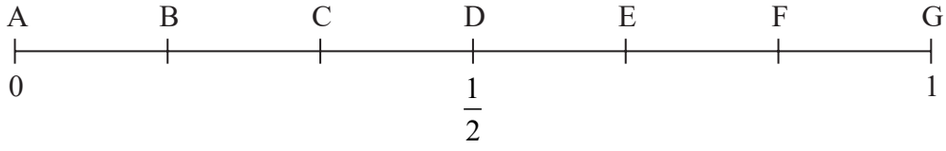
Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The probability scale below shows information about 7 events, each represented by a different letter.



Ruth rolls a fair 6-sided dice once.

(a) Complete the table.

The event that the dice lands on	Letter on the probability scale
a number less than 7	G
an even number	.....
a number 2 or 3 or 4 or 5	.....
.....	B
a number that is **not** 3	.....

(4)

This question must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

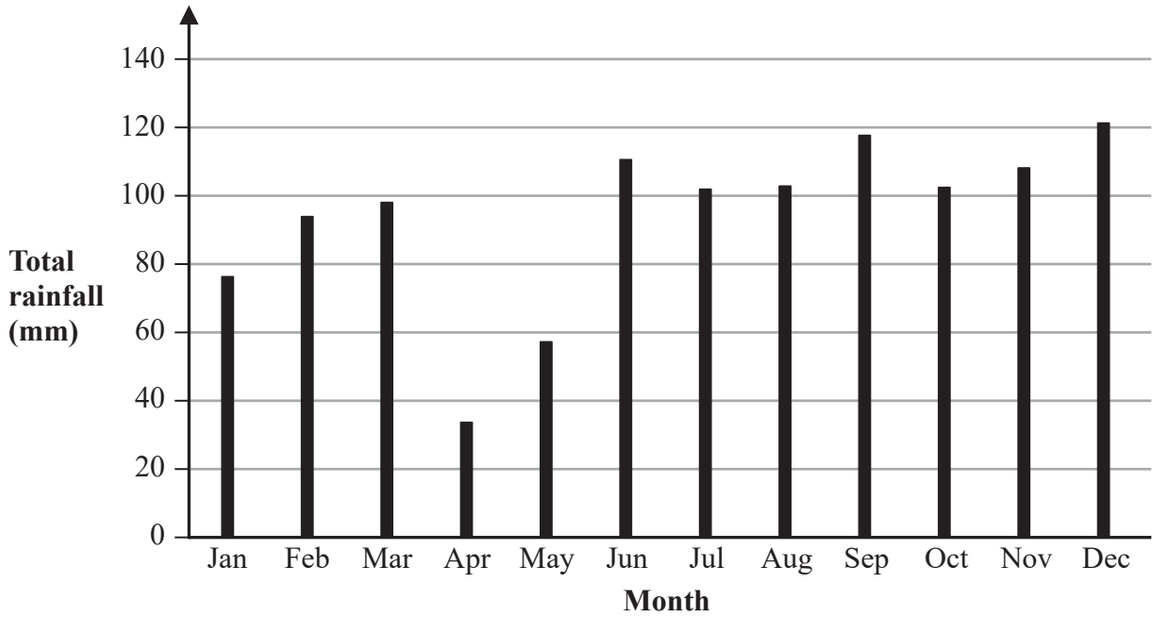
(b) Which word from the list below best describes the probability of event G?

evens ☐ **unlikely** ☐ **certain** ☐ **likely** ☐ **impossible** ☐

(1)

(Total for Question 1 is 5 marks)

2 The bar line graph gives information about the total rainfall, in mm, in the UK for each month in 2017



(Source: *statista.com*)

(a) In which month was there the greatest total rainfall?

.....

(1)

Here are some words to describe data.

discrete **bivariate** **categorical** **continuous**

(b) Select the word from the list to complete correctly the sentence.

Total rainfall, in mm, is an example of ..... data.

(1)

A wet month is a month in which the total rainfall for the month is greater than 100 mm.

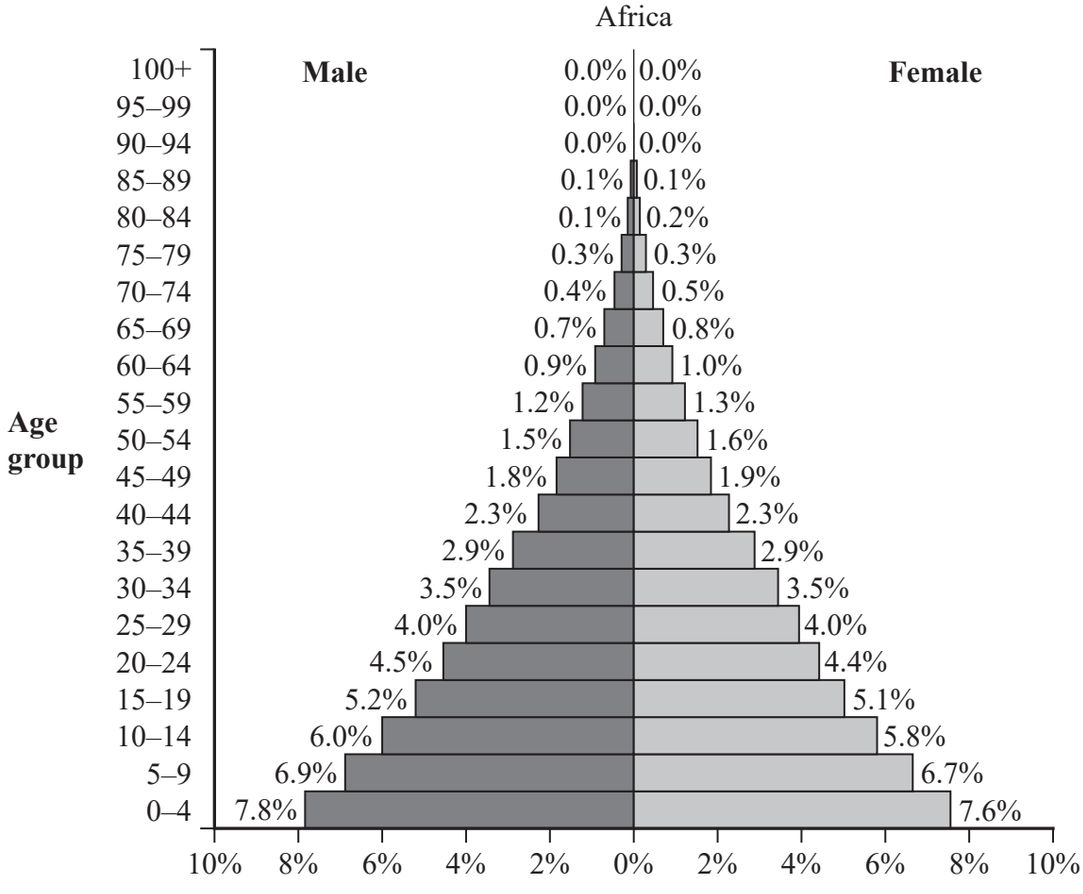
(c) Determine whether or not more than half of the months in 2017 were wet months.
You must show how you reach your conclusion.

(2)

(Total for Question 2 is 4 marks)

3 A population pyramid for Africa in 2017 is shown below.

The pyramid shows the percentage of males and females in each age group, where each percentage is based on the total population of Africa.



(Source: *populationpyramid.net*)

(a) For females, write down the percentage of the population in the age group 10–14

.....%

(1)

(b) For males, write down the age group that has 1.5% of the population.

.....

(1)

(c) Find the age group that has 11.8% of the population.

.....

(1)

(d) Compare the percentage of the population aged 25–44 for females with the percentage of the population aged 25–44 for males.

(1)

The sum of all of the percentages on the population pyramid is 100.1%

(e) Give a reason why this figure differs from 100%

(1)

(Total for Question 3 is 5 marks)

4 Richard finds information from the internet about the most popular colours for cars in the UK in 2017

Table 1 gives this information.

Rank	Colour	Percentage of all cars (%)
1	Black	20.3
2	Grey	19.7
3	White	19.0
4	Blue	16.0
5	Silver	10.0
	Total	85.0

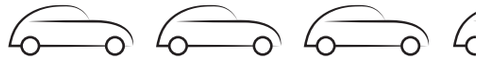
Table 1

(Source: *bbc.co.uk*)

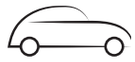
(a) Explain why the information in Table 1 is secondary data.

(1)

Richard drew this pictogram to represent his information about the most popular car colours.

Black	
Grey	
White	
Blue	
Silver	

(b) Complete this key for the pictogram.

Key  represents .....%

(1)

Jill says that a pictogram is not the most appropriate way to display Richard's information.

(c) Is Jill correct?
Give a reason for your answer.

(2)

Richard decides to collect some data about car colours by recording the colour of each of the 60 cars in a car park.

Table 2 gives information about his results.

Car colour	Frequency
Black	10
Grey	17
White	6
Blue	19
Silver	8

Table 2

The modal car colour from Table 2 is blue.

(d) Explain whether or not blue is the expected modal car colour based on the information in Table 1

(2)

(e) Explain why, for the information in Table 2, the mode is the most appropriate average to use.

(1)

(f) Using the information in Table 1 and Table 2, compare the number of silver cars in the car park with the expected number of silver cars in a car park with 60 cars.

(3)

(Total for Question 4 is 10 marks)

5 Some people were asked to complete three puzzles, Puzzle X, Puzzle Y and Puzzle Z.

The table shows some summary statistics about the times taken, in minutes, to complete Puzzle X and Puzzle Y.

Puzzle	Median time (minutes)	Range of times (minutes)
X	30	10
Y	25	40

The shortest time taken to complete Puzzle X was 26 minutes.

(a) Work out the longest time taken to complete Puzzle X.

..... minutes

(1)

(b) Use the information in the table to compare the median time to complete Puzzle X with the median time to complete Puzzle Y.
You should interpret your comparison.

(2)

The list below gives the times taken, in minutes, for these people to complete Puzzle Z.

25 27 31 39 32 32 37 34

38 31 46 45 47 42 41

(c) Work out the range of these times.

..... minutes

(1)

(d) Which puzzle, X, Y or Z, is completed with the most consistent times by these people?
Explain your answer.

Puzzle because

(1)

Hannah wants to find the median of the 15 times taken, in minutes, to complete Puzzle Z.

She draws this stem and leaf diagram for these 15 times.

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

Key 2 | 5 represents 25 minutes

She says that as there are 15 values, the median is the 8th value, which is 34 minutes.

(e) Explain what Hannah has done wrong.
You should give the correct value of the median.

(2)

(Total for Question 5 is 7 marks)

6 The incomplete table gives some information about the number of births in the UK, the total population of the UK and the crude birth rate for the UK in 1960 and in 2016

Year	Number of births	Total population	Crude birth rate
1960	943 200	52 400 000	.....
2016	.....	66 022 273	12

(Source: *www.data.worldbank.org*)

Using the formula below, complete the table.

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

(Total for Question 6 is 4 marks)

7 Sue is interested to know how much time children in the UK spend doing chores around the house each week.

She plans to ask a sample of 20 students at her school to record the number of hours they each spend doing chores in a week.

(a) Explain why it is more appropriate for Sue to take a sample rather than a census in this case.

(1)

She will ask each of the 20 students to write down on a piece of paper the time they each spent doing chores around the house in one week.

(b) Describe one problem Sue might encounter during the statistical enquiry process with regard to non-response **or** unexpected outcomes.

You should explain how Sue could try to overcome the problem.

(2)

(Total for Question 7 is 3 marks)

8 Mehmet wants to conduct an investigation about school meals at his school.
He wants to take a sample of students from his school.

(a) Write down a sampling frame he could use.

(1)

Mehmet has two hypotheses:

- Younger students have school meals, rather than packed lunches, more often than older students do.
- More female students than male students are vegetarian.

Here are sections A, B and C of his plan for his investigation.

A. Sampling method:

Take a sample of 10 students from each of the year groups at school.

B. Questions:

1. What is your gender? Please tick (✓)
   Male ☐ Female ☐
2. What is your year group? Please tick (✓)
   Year 7 ☐ Year 8 ☐ Year 9 ☐ Year 10 ☐ Year 11 ☐ Year 12 ☐ Year 13 ☐
3. What is your favourite meal?.....
4. Do you think eating meat is cruel to animals? Please tick (✓)
   Yes ☐ No ☐
5. How often do you eat school meals? Please tick (✓)
   Once ☐ Two times ☐ Three times ☐ Four times ☐ Five times ☐

C. Presenting data:
Draw a bar chart with age on horizontal axis and total number of school meals on vertical axis (to see if younger students have taller bars).

Draw a pictogram showing number of vegetarian females and number of vegetarian males.

(b) Name the sampling method that Mehmet plans to use.

.....

(1)

(c) Discuss whether or not Mehmet's plans are appropriate.
You must comment on each of the three sections A, B and C.

(5)

Mehmet also collects information about the amounts that the students pay for their school meals.

He sorts the costs of the meals into classes with equal widths of 5p.

The table gives some of his results.

Cost of meal	Number of meals
£1.50 – £1.54	2
£1.55 – £1.59	3
£1.60 – £1.64	0
£1.65 – £1.69	1
£1.70 – £1.74	3

Mehmet decides to use classes with equal widths of 10p instead of 5p.

(d) Write down one advantage and one disadvantage of doing this.

Advantage:

Disadvantage:

(2)

(Total for Question 8 is 9 marks)

9 Daniel is interested in the price of houses.

He collects data on the average selling price of houses in the UK for four months in 2017

His results are shown in the table.

Month	Average selling price
May	£219792
June	£221670
July	£224554
August	£225572

(Source: *landregistry.data.gov.uk*)

(a) Work out the mean of the four prices in the table.

£.....

(2)

Daniel uses statistical software to work out these summary statistics.

Time period	Mean of the monthly average selling price
January 2017 to December 2017	£221244
January 2018 to June 2018	£225648

(Source: *landregistry.data.gov.uk*)

Daniel writes these two conclusions.

Conclusion 1:

The average selling price for each of the other 8 months in 2017 must be less than £221 244

Conclusion 2:

The mean of the monthly average selling price for all of 2018 is greater than the mean of the monthly average selling price for all of 2017

(b) Using the information from the tables and your answer to part (a), assess the validity of Daniel's two conclusions.

1

2

(2)

Daniel is also interested in how the prices of detached houses have changed since he bought his house in 2011

Using the internet, he finds that the index number for the price of a detached house in 2018, using 2011 as the base year, is 132

(c) Give an interpretation of this index number.

(2)

This question must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The price of the detached house that Daniel bought in 2011 was £260 000

(d) Which is the correct calculation to find an estimate for the price of this house in 2018?

260 000 × 132 ☐ 260 000 × 1.32 ☐ 260 000 ÷ 132 ☐ 260 000 ÷ 1.32 ☐

(1)

Daniel could not find an index number for the prices of flats in 2018, using 2011 as the base year.

He knows the price of a flat in 2011

He plans to use the index number 132 that he found for the price of detached houses in order to find an estimate for the price of this flat in 2018

(e) Assess the suitability of Daniel's plan.

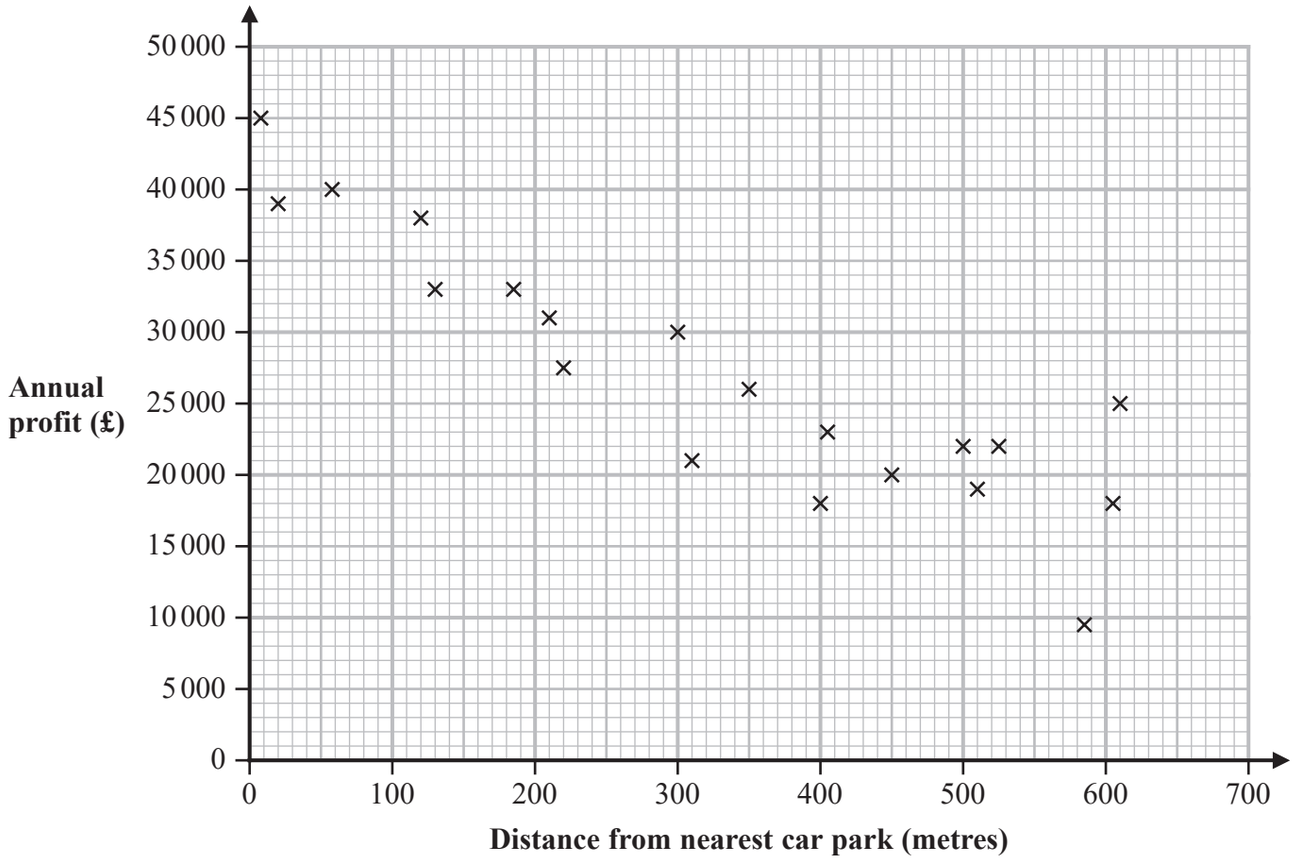
(1)

(Total for Question 9 is 8 marks)

10 Mike is investigating whether or not there is a relationship between the distance from the nearest car park to a restaurant and the annual profit made by the restaurant.

He finds out the distance, in metres, from the nearest car park to a restaurant and the annual profit, in £, made by the restaurant. He does this for twenty restaurants in a city.

Mike then draws a scatter diagram for this information.



(a) Explain why annual profit is the response variable for this scatter diagram.

(1)

Mike's hypothesis is that, for these restaurants, the further the restaurant is from its nearest car park the less is its annual profit.

(b) Explain, giving a statistical reason, whether or not the scatter diagram supports Mike's hypothesis.

(2)

Mike wants to draw a line of best fit on the scatter diagram. Using statistical software he obtains the following information about these restaurants.

Mean distance from the nearest car park	325 m
Mean annual profit	£27 000
Intercept of the line of best fit on the Annual profit axis	40 000

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

(2)

(ii) Interpret the value of the intercept of the line of best fit on the Annual profit axis.

(1)

Restaurant A and restaurant B are two other restaurants in the city.

Restaurant A is 250 m from its nearest car park.
Restaurant B is 700 m from its nearest car park.

Mike uses the scatter diagram to find an estimate for the annual profit of each of these restaurants.

(d) Explain which of these two estimates will be the more reliable estimate.

(2)

Mike finds a positive correlation between the number of tables at a restaurant and its annual profit.

He concludes that as the number of tables increases this causes the annual profit to increase.

(e) Explain whether or not this conclusion is valid.

(1)

Mike reads an article in a newspaper that says that restaurant profits for the top 100 restaurants had fallen from £345 million to £125 million in the past year.

(Source: *telegraph.co.uk*)

(f) Using the data in the newspaper article, calculate the percentage decrease in restaurant profits for the top 100 restaurants in the past year.

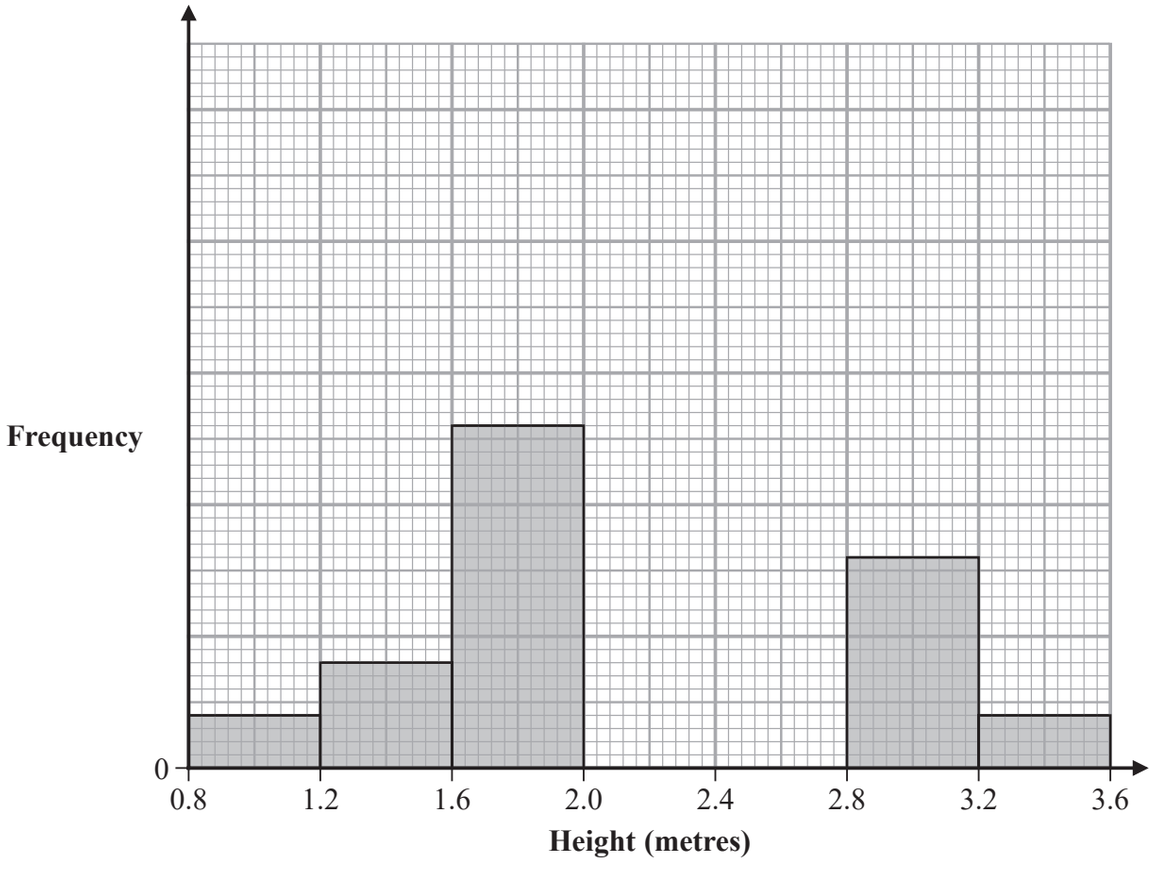
.....%

(1)

(Total for Question 10 is 10 marks)

11 The Forestry Commission planted Field Maple trees and Silverleaf Maple trees in region A. They measured the heights of the trees after 14 years.

The incomplete histogram and incomplete grouped frequency table give information about the heights, in metres, of the Field Maple trees in region A.



Height (h metres)	Frequency
$0.8 < h \leqslant 1.2$	2
$1.2 < h \leqslant 1.6$	4
$1.6 < h \leqslant 2.0$	13
$2.0 < h \leqslant 2.4$	25
$2.4 < h \leqslant 2.8$	10
$2.8 < h \leqslant 3.2$	
$3.2 < h \leqslant 3.6$	

(Source: *data.gov.uk*)

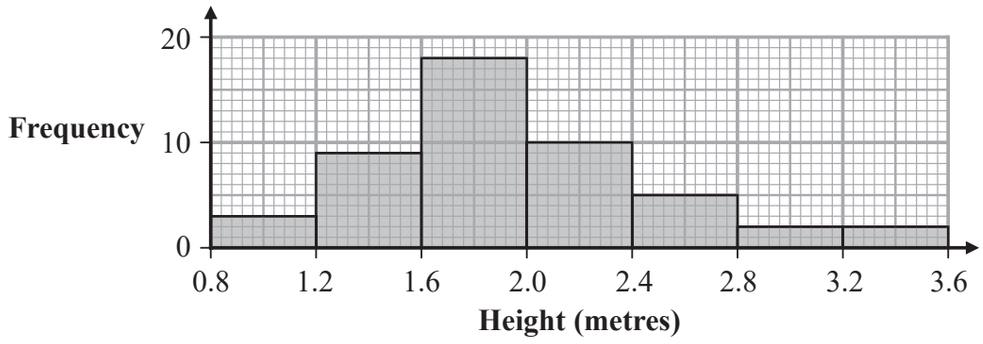
(a) Use the information in the histogram to complete the table.

(2)

(b) Use the information in the table to complete the histogram.

(2)

The histogram below gives information about the heights of the Silverleaf Maple trees after 14 years.



(c) Identify and interpret the type of skew shown in the histogram for Silverleaf Maple trees.

(2)

The Forestry Commission also planted Field Maple trees and Silverleaf Maple trees in region B.
The grouped frequency table below gives information about the heights of these trees.

	Frequency	
Height (h centimetres)	**Field Maple**	**Silverleaf Maple**
$0 < h \leqslant 80$	1	1
$80 < h \leqslant 160$	14	4
$160 < h \leqslant 240$	27	32
$240 < h \leqslant 320$	21	13
Total	**63**	**50**

The estimate of the mean for Field Maple trees is calculated to be 206.3 cm to 1 decimal place.

David thinks that the estimate of the means for Field Maple trees and for Silverleaf Maple trees suggests that Field Maple trees are taller than Silverleaf Maple trees.

(d) Is David correct?
You must show your working.
Give one limitation of your conclusion.

(4)

(Total for Question 11 is 10 marks)

12 Emma asks each person in a group of people on the second day of their summer holiday whether they wear sunblock and whether they have sunburn.

The table gives information about their answers.

	Sunburn	**No sunburn**	**Total**
Wears sunblock	35	365	400
Does not wear sunblock	245	105	350

(a) Find the relative risk of a person who does wear sunblock having sunburn, compared with a person who does not wear sunblock having sunburn.

.....

(3)

(b) Give an interpretation of your answer to part (a).

(1)

Emma also collects information from this group of people about whether they drink the tap water and whether they have had upset stomachs.

She works out the relative risk of a person who drinks the tap water having an upset stomach, compared with a person who does not drink the tap water having an upset stomach.
She gets a value of 1

(c) Give an interpretation of this relative risk with the value of 1

(1)

(Total for Question 12 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS