

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE STATISTICS

Higher tier Paper 2

H

Date of Exam

Morning

Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of the page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross out any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer booklet.

Answer **all** questions in the spaces provided.

1 Paul gives a survey to every 5th student on the school registers.

Circle the name for this type of sampling.

[1 mark]

Random

Stratified

Systematic

Quota

2 The mean of six numbers is 4

The first five of the numbers are

2

0

0

4

10

Circle the value which is the median of the **six** numbers.

[1 mark]

0

2

3

5

3 Circle the name of the diagram that can be correctly used for grouped continuous data.

[1 mark]

Bar chart

Frequency
polygon

Pie chart

Bar line chart

- 4 A doctor investigates how likely children are to have hay fever.
She collects the following information from her patients.

Girls
$\frac{1}{8}$ have hay fever

Boys
90 have hay fever
270 do not have hay fever

How many times more likely is hay fever in boys compared with in girls?

Circle the answer.

[1 mark]

0.5

2

2.67

32

Turn over for the next question

5 Jenny is doing a survey on people (tenants) who rent flats.
She uses two rental companies 'Letsmove' and 'Supaflat'.
Her hypothesis is,
"‘Letsmove’ tenants make fewer complaints than ‘Supaflat’ tenants."

5 (a) Give **two** reasons why Jenny should take a sample and not ask every tenant. **[2 marks]**

Reason 1 _____

Reason 2 _____

5 (b) Jenny decides to take a sample using stratification.

5 (b) (i) Name **one** category which she could use to stratify her sample. **[1 mark]**

Answer _____

5 (b) (ii) Give a reason for your answer. **[1 mark]**

- 5 (c)** Write a question which Jenny could use to find out the number of complaints a tenant had made.

Include a response section.

[4 marks]

- 5 (d)** Jenny is considering collecting the data using either telephone interviews, door to door interviews or an internet survey.

Which method would you choose from her list?

Data collection method _____

Give **one** advantage of your method over the other two methods.

[1 mark]

- 6 (a)** Bag A contains 8 red and 7 blue counters.
Bag B contains 12 red and 10 blue counters.

A bag is chosen at random.

A counter is taken at random from the chosen bag.

Work out the probability that it is red.

[3 marks]

Answer _____

- 6 (b)** Bag C contains only green and yellow counters.

- $P(\text{green}) = \frac{3}{4}$
- There are more than 20 but fewer than 30 counters in the bag.

Work out a possible value for the number of **yellow** counters there could be in the bag.

[2 marks]

Answer _____

7 A company makes a metal alloy by combining three metals, A, B and C , in the ratio 19 : 4 : 2

The table shows the index numbers for the cost of each metal in 2016 using 2011 as the base year.

Metal	Weighting	Index
A	19	84.9
B	4	93.5
C	2	81.2

7 (a) Calculate a weighted index number for the combined cost of the metals in the alloy. **[3 marks]**

Answer _____

7 (b) The company claims that the combined cost of the metals in the alloy has fallen by over 15% between 2011 and 2016

Is the company correct?

Tick a box.

Yes No

Explain your answer.

[1 mark]

8 A population pyramid is drawn to show the percentages of the UK population by age and gender in 2011

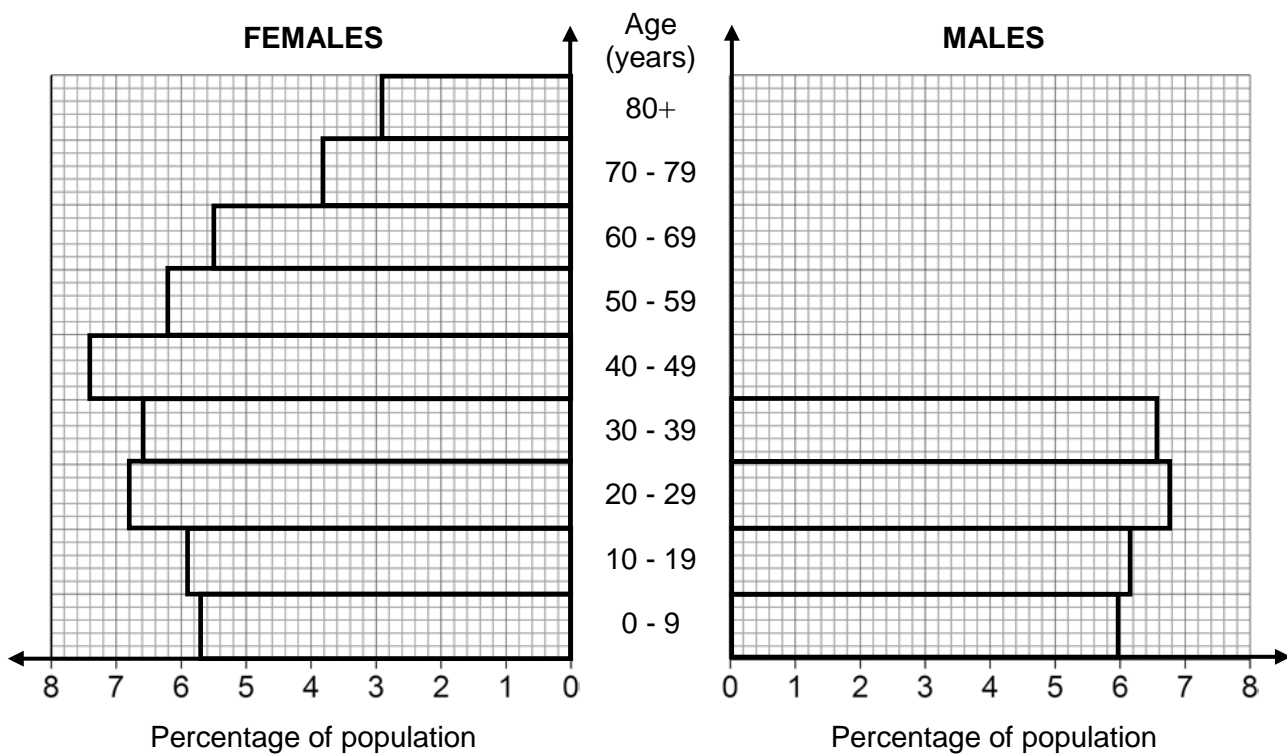
The data for females and for some of the male ages has already been drawn.

8 (a) Use the table to complete the population pyramid for males.

[2 marks]

Age (years)	Percentage of population (males)
0 - 9	6.0
10 - 19	6.2
20 - 29	6.8
30 - 39	6.6
40 - 49	7.2
50 - 59	6.0
60 - 69	5.3
70 - 79	3.3
80+	1.2

[Source: Office for National Statistics]



8 (b) What percentage of the UK population are between the ages of 20 and 39?

[2 marks]

Answer _____ %

8 (c) In 2011, the number of males aged 80 and over was 760 000

Calculate the number of males aged 10 – 19 years.

[2 marks]

Answer _____

Turn over for the next question

Turn over ►

- 9** Jane and Phil are studying house prices to compare Cumbria and Cornwall.
- They are going to send their findings to a local newspaper in Cumbria.
- Their hypothesis is 'house prices in Cornwall are more expensive than house prices in Cumbria.'
- They collect their data from a website which gives the house prices for all houses for sale in each area.
- They sort each list into price order and then collect their samples.

- 9 (a)** Jane uses the first 30 house prices from each area.

What is the name of this sampling method?

[1 mark]

- 9 (b)** State **one** reason why this method will **not** produce a sample which is representative of the house prices in each area.

[1 mark]

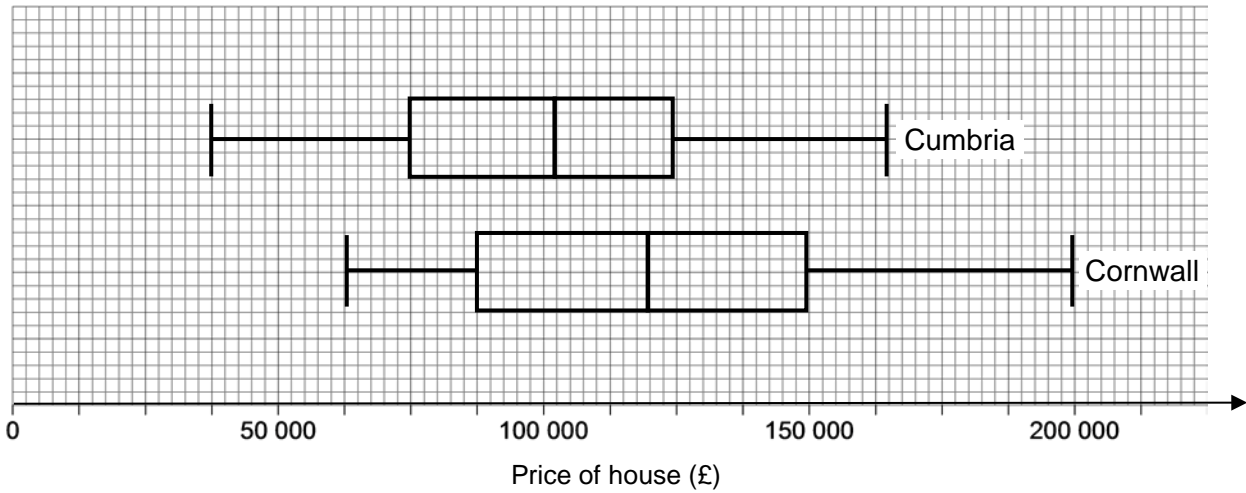
- 9 (c)** Phil decides to use a different method to collect his sample.

Describe **one** method that Phil could use to collect a sample of 30 which is likely to be more representative of the house prices in each area.

You should include the name of your sampling method, and a reason why a sample using this method is likely to be more representative.

[4 marks]

Phil draws these boxplots.



9 (d) Give reasons why these diagrams.

- are appropriate to comment on their hypothesis
- support their hypothesis.

[3 marks]

9 (e) Phil says,
"House prices are more varied in Cornwall."

Is Phil correct?

Give a reason for your answer.

[1 mark]

Jane calculates the mean and range for each of her two sets of data.

	Mean	Range
Cumbria	£74 300	£48 500
Cornwall	£64 800	£50 000

9 (f) Write down **two** different interpretations that Jane could make using these values.

Give **one** reason for **each** interpretation, write your answers so they can be understood by the readers of the local newspaper.

[4 marks]

9 (g) Jane decides to develop her study to include the number of bedrooms each house has.

State **one** other variable that she could include to develop her study.

[1 mark]

10 It is claimed that feeding tomato plants with a new plant food, 'Growfast', will increase the number of tomatoes the plants produce.

An experiment is to be set up to test this claim.

Here is a list of variables that may be connected to the experiment.

A – How often the plant is watered.

B – The number of tomatoes a plant produces.

C – How much sunlight the plant gets.

D – The colour of the pot the tomatoes grow in.

E – Use of the plant food 'Growfast'.

For this experiment

10 (a) circle the explanatory variable,

[1 mark]

A

B

C

D

E

10 (b) circle the response variable.

[1 mark]

A

B

C

D

E

10 (c) In the experiment, 50 tomato plants are fed 'Growfast' and 50 tomato plants are put into a control group.

10 (c) (i) Explain the purpose of using a control group in this context.

[1 mark]

10 (c) (ii) Identify **one** possible extraneous variable from the list A, B, C, D, E and state how this might be controlled.

[1 mark]

11 Mike asked a sample of 100 people which of the following countries they had visited.

Spain

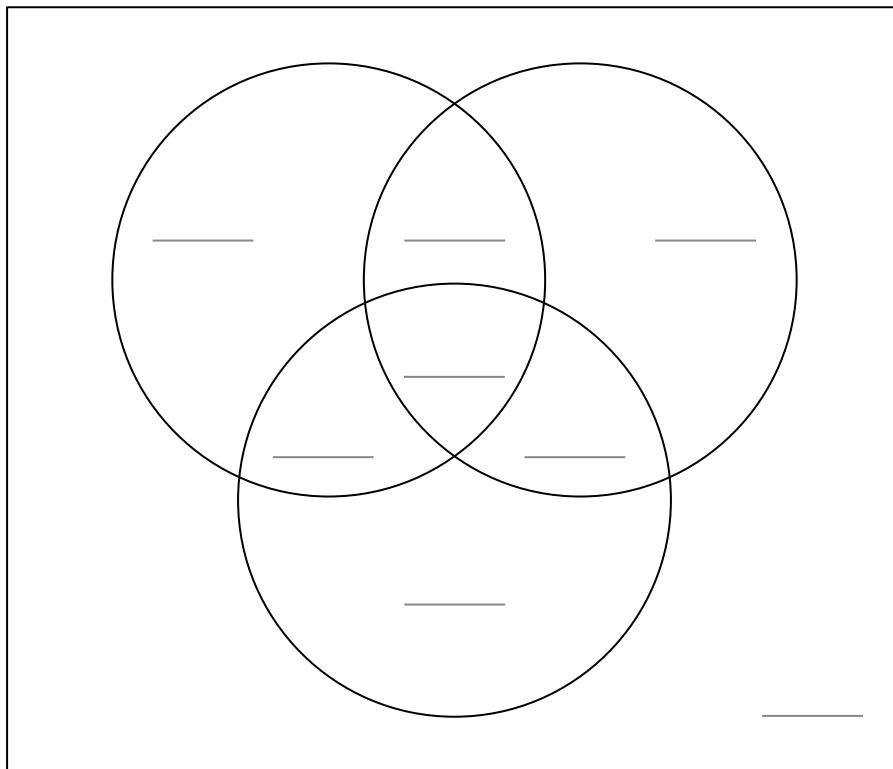
France

Italy

- 6 had visited Spain and France and Italy
- 18 had visited France and Italy
- 36 had visited Spain and France
- 4 had visited Spain and Italy but not France
- 74 had visited Spain, 56 had visited France and 24 had visited Italy

11 (a) Use the data to complete the Venn diagram.

[5 marks]



11 (b) How many people had visited none of the three countries?

[1 mark]

Answer _____

11 (c) One of the 100 people is chosen at random.
Find the probability that the chosen person has visited

11 (c) (i) Spain or France but not Italy.

[2 marks]

Answer _____

11 (c) (ii) Spain given that they had visited Italy.

[2 marks]

Answer _____

11 (c) (iii) all three countries, given that they had visited at least two.

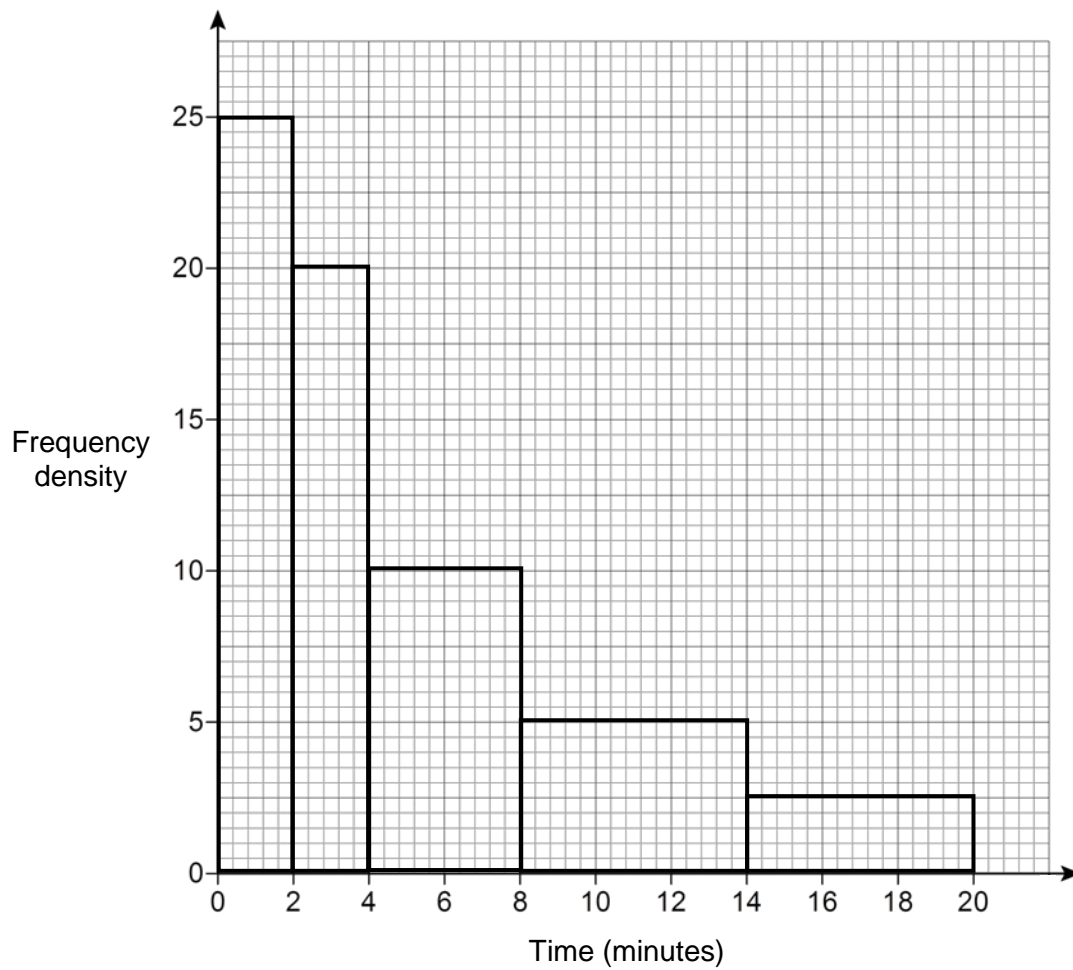
[2 marks]

Answer _____

Turn over for the next question

Turn over ►

- 12** The histogram shows information about the time (minutes) that a sample of 175 passengers had to wait for a bus.



- 12 (a)** Estimate the probability that a passenger, chosen at random from those who had to wait 6 minutes or more for a bus, actually had to wait 12 minutes or more. **[3 marks]**

Answer _____

12 (b) Give **one** reason why the median may be a better measure of average than the mean in this situation.

[1 mark]

Turn over for the next question

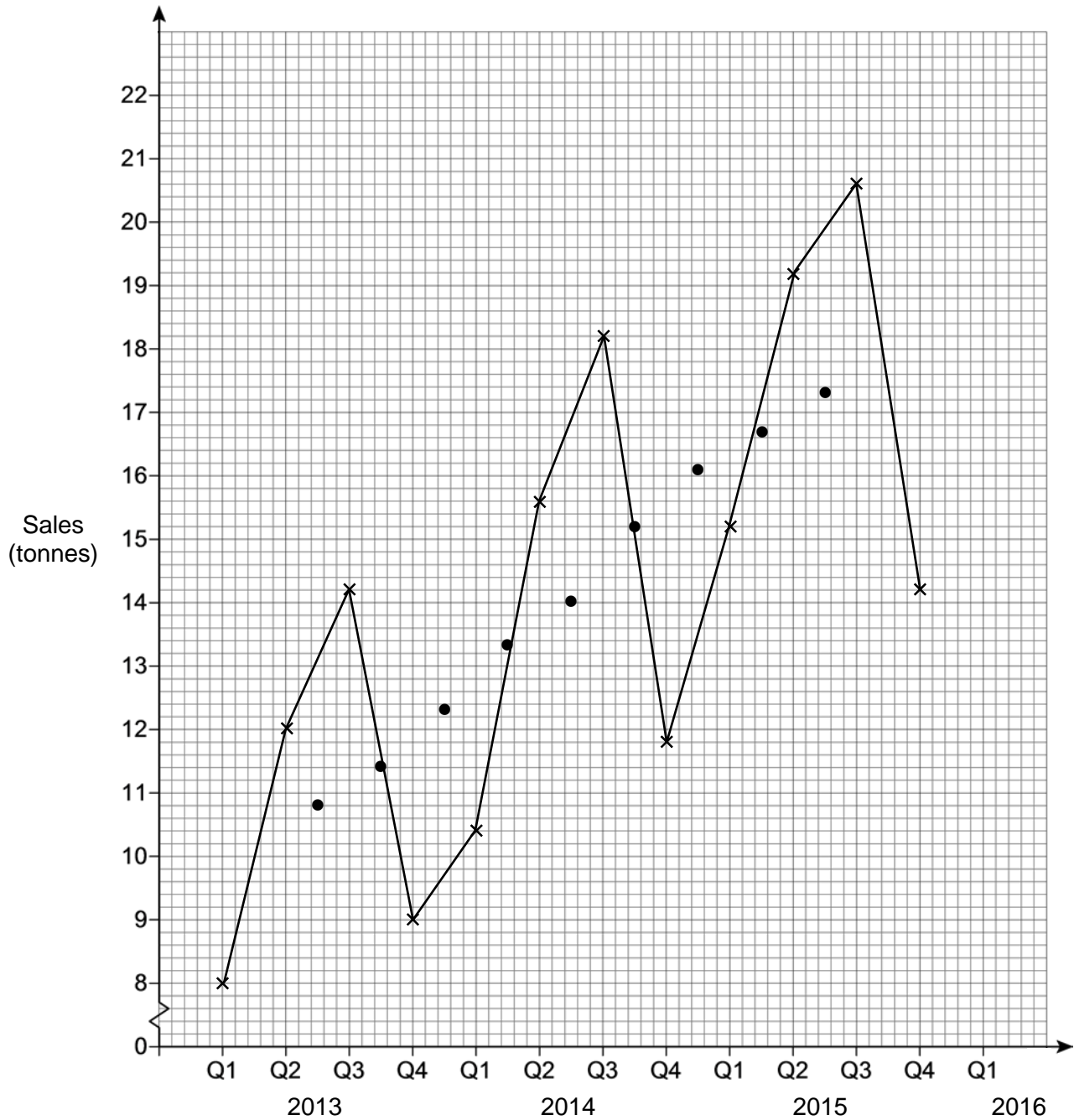
Turn over ►

13

A local firm makes yoghurt.

The graph shows the sales of yoghurt, in tonnes, from Quarter 1 of 2013 to Quarter 4 of 2015

The four-point moving averages are also shown on the graph.



13 (a) Draw the trend line.

[1 mark]

13 (b) Calculate the mean seasonal variation for Quarter 1 for the three years.

[3 marks]

Answer _____ tonnes

13 (c) Use your answer to **part (b)** and the trend line to predict the sales of yoghurt in Quarter 1 of 2016

[2 marks]

Answer _____ tonnes

13 (d) Discuss the accuracy of the prediction you made in **part (c)**.

[2 marks]

14 Each weekday morning, Jon drives to work.

His journey includes going over a railway level crossing where on any given day there is a 25% chance he is delayed.

14 (a) Explain why the number of days in one working week that he is delayed at the level crossing follows a binomial distribution.

[1 mark]

14 (b) Show that the probability, in one working week, that he is delayed exactly once is 0.40 to two decimal places.

[2 marks]

- 15** Kirstie is estimating the population of fish in a lake.
She catches some fish and marks them with an harmless dye.
She then returns them to the lake.
- One week later she catches a smaller sample of 50 fish and sees that 6 of them are marked.
She correctly estimates there are 1125 fish in the lake.

15 (a) How many fish did she originally mark?

[3 marks]

15 (b) State **two** assumptions Kirstie makes to ensure this process is valid.
Evaluate **one** of these assumptions; stating clearly which one it is.

[3 marks]

Assumption 1 _____

Assumption 2 _____

Evaluation _____

END OF QUESTIONS

There are no questions printed on this page

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