Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Mathematics B

Unit 1: Statistics and Probability (Calculator)

Higher Tier

Wednesday 9 November 2011 – Afternoon
Time: 1 hour 15 minutes

Paper Reference
5MB1H/01

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

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.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

Advice

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

Turn over ▶

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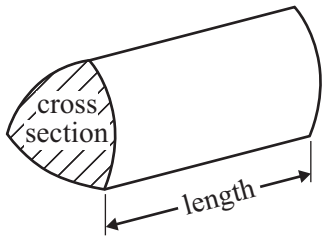
GCSE Mathematics 2MB01

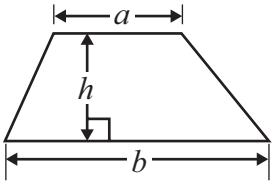
Formulae – Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of prism = area of cross section × length

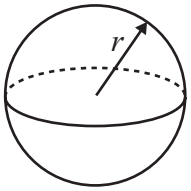


Area of trapezium $= \frac{1}{2}(a + b)h$



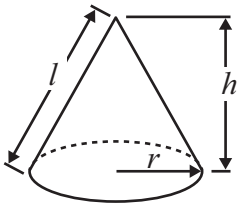
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$

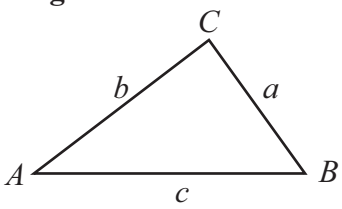


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$



In any triangle *ABC*



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle $= \frac{1}{2}ab \sin C$

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 There are yellow discs, red discs, blue discs and green discs in a bag.
Dinesh is going to take at random a disc from the bag.

The table shows each of the probabilities that Dinesh will take a red disc, or a blue disc, or a green disc.

Colour	yellow	red	blue	green
Probability		0.40	0.25	0.15

(a) Work out the probability that he will take a yellow disc.

.....

(2)

Dinesh takes at random a disc from the bag.
He writes down the colour of the disc.
He puts the disc back into the bag.

He will do this 60 times.

(b) Work out an estimate for the number of times he takes a red disc from the bag.

.....

(2)

(Total for Question 1 is 4 marks)

2 A pile of sand has a weight of 60 kg.
The sand is put into a small bag, a medium bag and a large bag in the ratio 2 : 3 : 7

Work out the weight of sand in each bag.

small bag ..... kg

medium bag ..... kg

large bag ..... kg

(Total for Question 2 is 3 marks)

3 Julie is x years old.
Kevin is $x + 3$ years old.
Omar is $2x$ years old.

Write an expression, in terms of x, for the mean of their ages.

.....

(Total for Question 3 is 2 marks)

4 James wants to find out how long his friends spend using the internet.

He uses this question on his questionnaire.

How many hours do you spend using the internet?

☐ 1 – 5 ☐ 5 – 10 ☐ 10 – 20

(a) Write down two things wrong with this question.

1 .....

.....

2 .....

.....

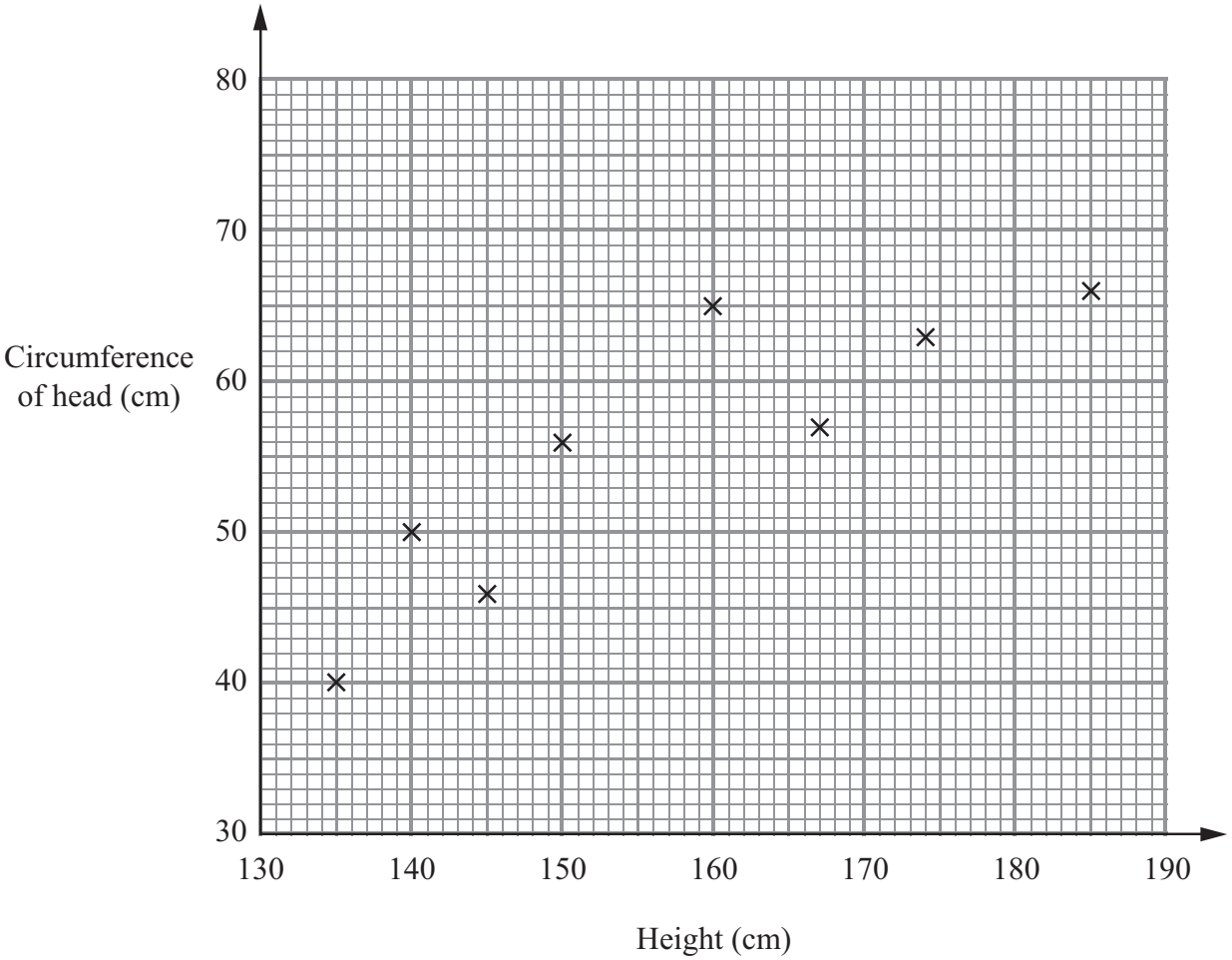
(2)

(b) Write a better question for James to use on his questionnaire to find out how long his friends spend using the internet.

(2)

(Total for Question 4 is 4 marks)

5 The scatter graph shows information about 8 people.
It shows each person's height and the circumference of their head.



The table gives this information for 2 other people.

Height (cm)	180	170
Circumference of head (cm)	72	65

(a) On the scatter graph, plot the information from the table.

(1)

(b) Describe the correlation.

.....

(1)

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

(1)

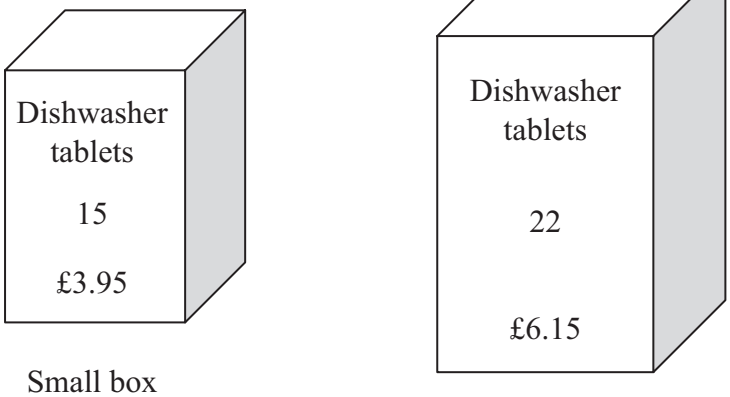
(d) Estimate the circumference of the head of a person who is 156 cm tall.

..... cm

(1)

(Total for Question 5 is 4 marks)

6 Dishwasher tablets are sold in two sizes of box.



A small box contains 15 tablets and costs £3.95
A large box contains 22 tablets and costs £6.15

*(a) Which size of box gives the better value for money?
You must show all your working.

(4)

The weight of the large box is 357 grams, to the nearest gram.

(b) (i) What is the minimum possible weight of the box?

..... grams

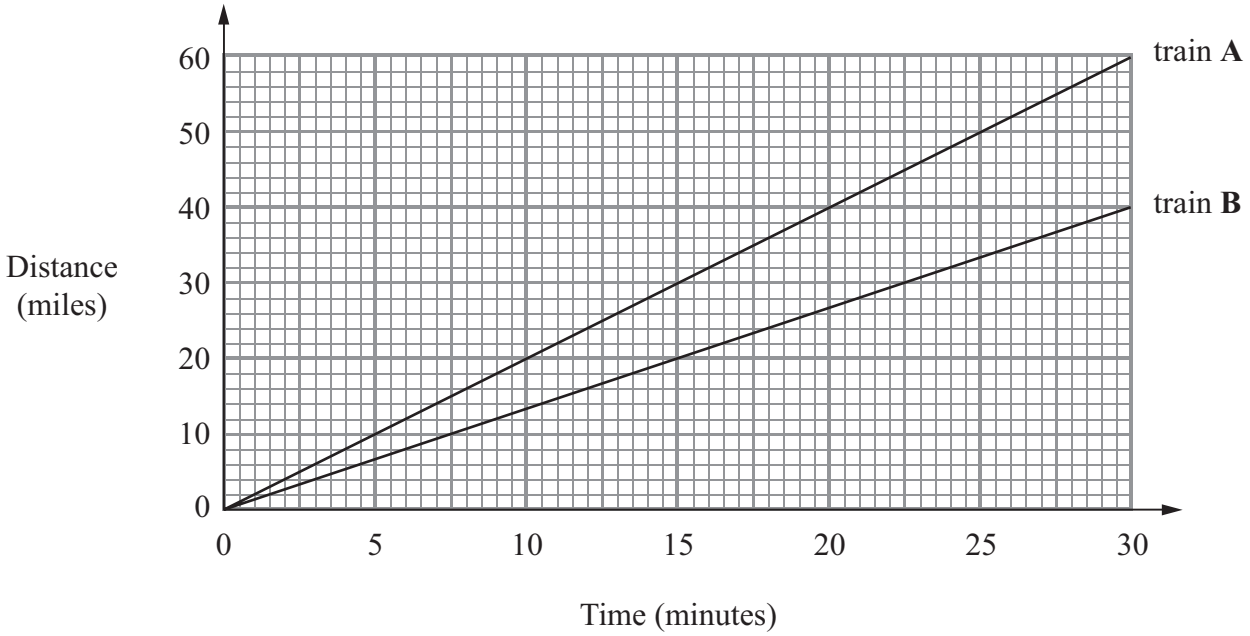
(ii) What is the maximum possible weight of the box?

..... grams

(2)

(Total for Question 6 is 6 marks)

7 The graph shows the distance travelled by two trains.



(a) Work out the gradient of the line for train **A**.

.....

(2)

(b) Which train is travelling at the greater speed?
You must explain your answer.

.....

.....

.....

(1)

(c) After how many minutes has train **A** gone 10 miles further than train **B**?

..... minutes

(1)

(Total for Question 7 is 4 marks)

8 Josh plays a game with two sets of cards.

Set A	1	2	4	5	7
Set B	3	6	8	9	

Josh takes at random one card from each set.
He adds the numbers on the two cards to get the total score.

(a) Complete the table to show all the possible total scores.

		Set A				
		1	**2**	**4**	**5**	**7**
Set B	**3**	4	5	7	8	10
	6	7	8	10		
	8					
	9					

(1)

(b) What is the probability that Josh's total score will be greater than 12?

.....

(2)

Josh's year group are raising money for a sponsored skydive.

60 students are each going to play Josh's card game once.
Each student pays 50p to play the game.

Josh pays £1.50 to any player getting a total of 8

(c) Show that Josh can expect to make a profit of £21 from his game.

(4)

(Total for Question 8 is 7 marks)

9 Lyndsey records the number of miles (m) she drives each day for 120 days.

Some information about the results is given in the table.

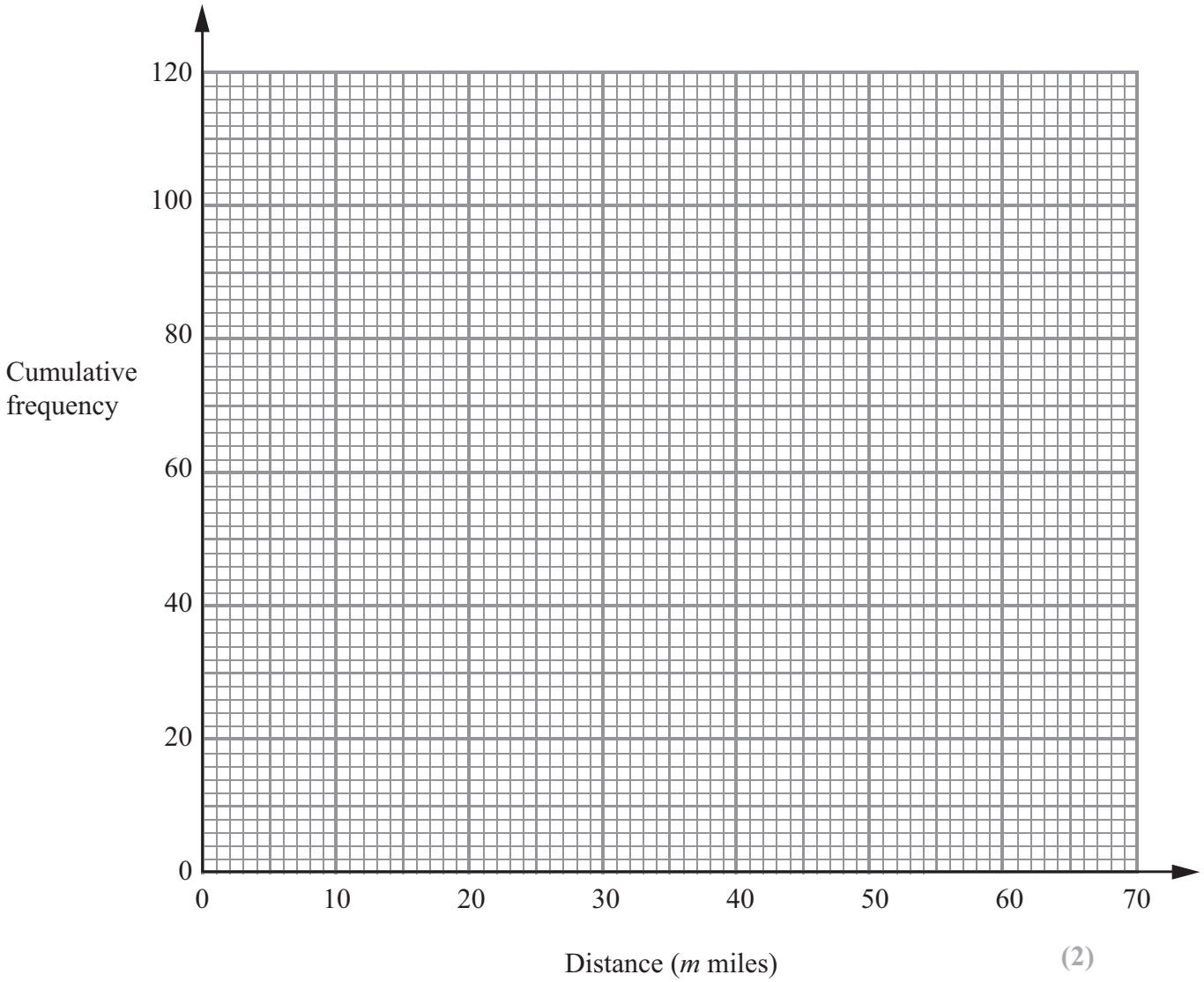
Distance (m miles)	**Frequency**
$0 < m \leqslant 10$	4
$10 < m \leqslant 20$	18
$20 < m \leqslant 30$	24
$30 < m \leqslant 40$	40
$40 < m \leqslant 50$	24
$50 < m \leqslant 60$	10

(a) Complete the cumulative frequency table.

Distance (m miles)	**Cumulative frequency**
$0 < m \leqslant 10$	
$0 < m \leqslant 20$	
$0 < m \leqslant 30$	
$0 < m \leqslant 40$	
$0 < m \leqslant 50$	
$0 < m \leqslant 60$	

(1)

(b) On the grid, draw a cumulative frequency graph.



(2)

(c) Work out an estimate for the number of days on which Lyndsey drives more than 36 miles.

..... days

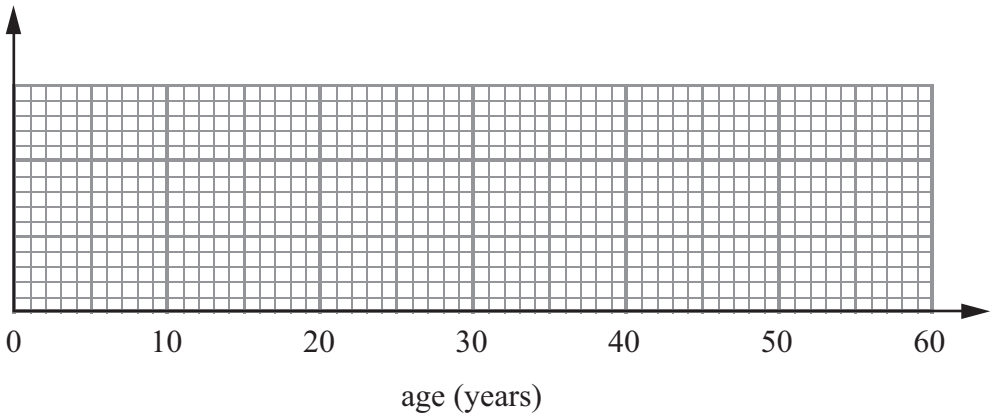
(2)

(Total for Question 9 is 5 marks)

10 Here are the ages, in years, of 15 women at West Ribble Tennis Club.

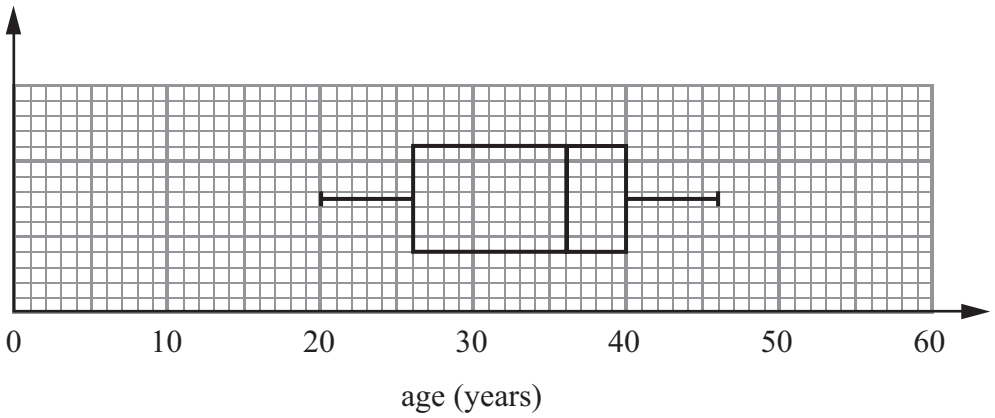
16, 18, 18, 20, 25, 25, 27, 28, 30, 35, 38, 42, 45, 46, 50

(a) On the grid, draw a box plot for this information.



(3)

The box plot below shows the distribution of the ages of the men at West Ribble Tennis Club.



***(b)** Use the box plots to compare the distributions of the ages of these women and the distributions of the ages of these men.

.....

.....

.....

.....

.....

(2)

(Total for Question 10 is 5 marks)

11 There are a total of 300 students in Year 7, Year 8 and Year 9 at Mathsville High School.

The table shows information about the students.

	Boys	**Girls**
Year 7	60	45
Year 8	55	40
Year 9	41	59

The Headteacher takes a sample of 50 students.
His sample is stratified by year and by gender.

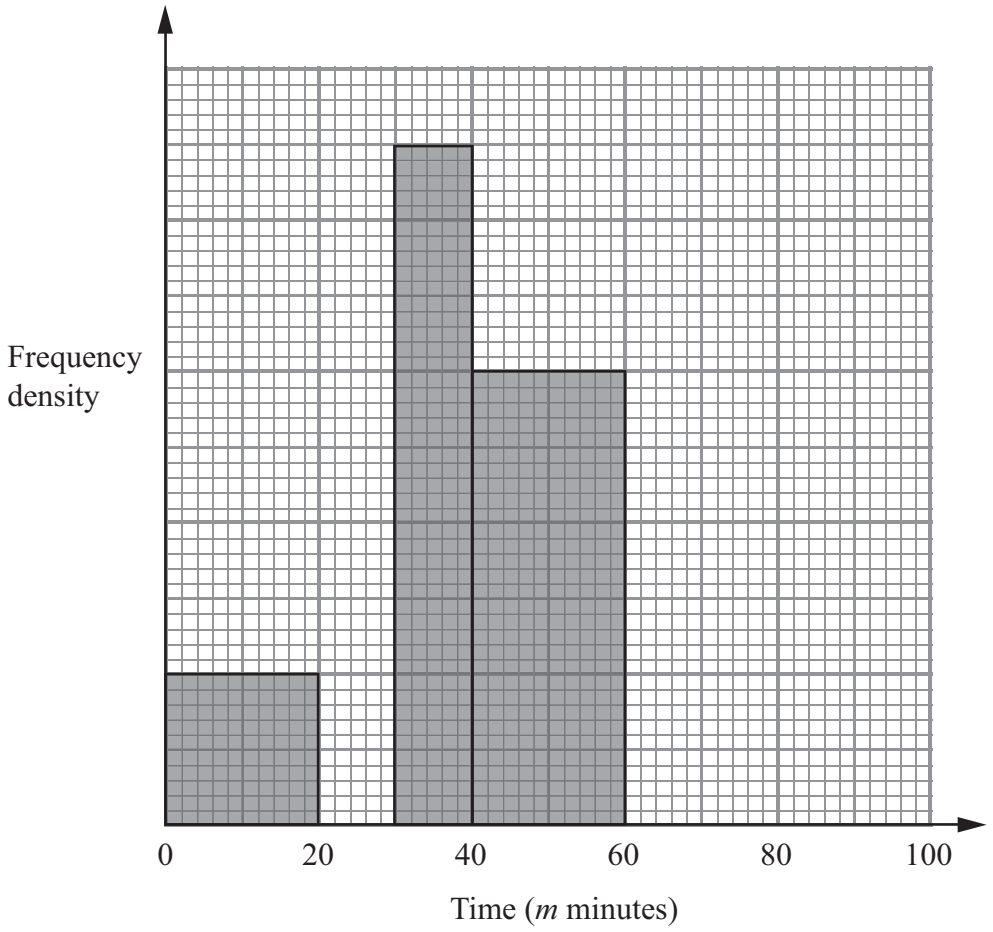
Work out the number of girls from Year 9 in the Headteacher's sample.

.....

(Total for Question 11 is 2 marks)

12 The table and the histogram show some information about the time, in minutes, taken by a group of students to travel to college in one week.

Time (m minutes)	Frequency
$0 < m \leqslant 20$	20
$20 < m \leqslant 30$	30
$30 < m \leqslant 40$	
$40 < m \leqslant 60$	
$60 < m \leqslant 100$	48



(a) Use the histogram to complete the table.

(2)

(b) Use the table to complete the histogram.

(2)

(c) Work out an estimate for the median time.

..... minutes

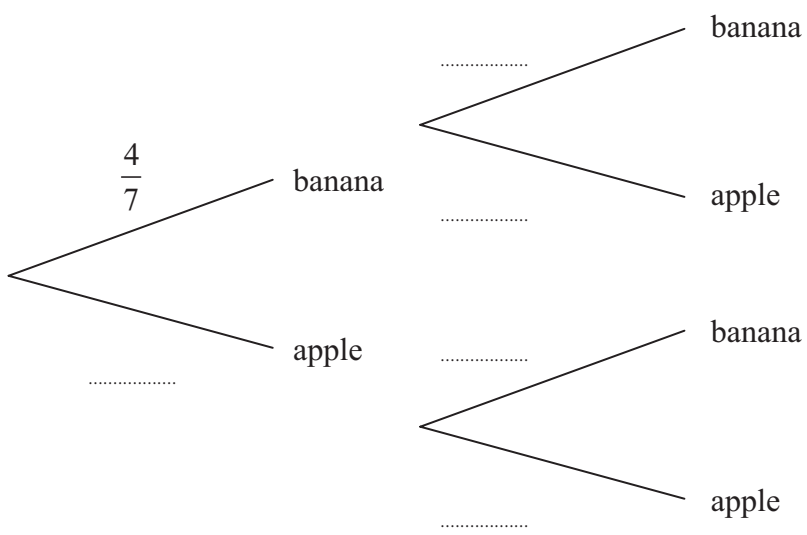
(2)

(Total for Question 12 is 6 marks)

13 There are 4 banana smoothies and 3 apple smoothies in a box.

Jenny takes at random 1 smoothie from the box.
She writes down its flavour, and puts it back in the box.
Jenny then takes at random a second smoothie from the box.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that both smoothies are apple flavour.

.....

(2)

(Total for Question 13 is 4 marks)

***14** A farmer wants to estimate the number of rabbits on his farm.

On Monday he catches 120 rabbits.
He puts a tag on each rabbit.
He then lets the rabbits run away.

On Tuesday the farmer catches 70 rabbits.
15 of these rabbits have a tag on them.

Work out an estimate for the total number of rabbits on the farm.
You must write down any assumptions you have made.

(Total for Question 14 is 4 marks)

TOTAL FOR PAPER IS 60 MARKS