

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

4370/05

**MATHEMATICS – LINEAR  
PAPER 1  
HIGHER TIER**

A.M. MONDAY, 9 June 2014

2 hours

**CALCULATORS ARE  
NOT TO BE USED  
FOR THIS PAPER**

**ADDITIONAL MATERIALS**

A ruler, a protractor and a pair of compasses may be required.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

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

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take  $\pi$  as 3.14.

**INFORMATION FOR CANDIDATES**

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 9(b).

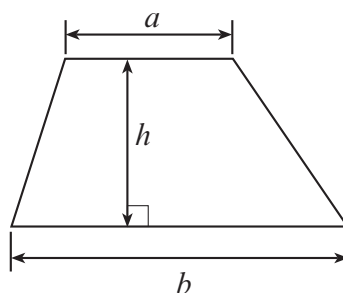
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	7	
2.	6	
3.	4	
4.	4	
5.	4	
6.	10	
7.	3	
8.	3	
9.	8	
10.	5	
11.	5	
12.	6	
13.	5	
14.	5	
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19.	4	
<b>Total</b>	<b>100</b>	



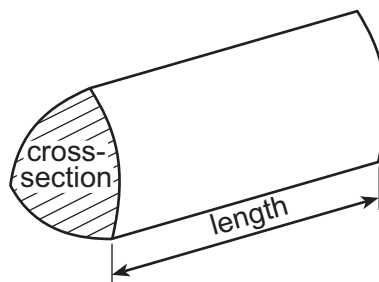
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## Formula List

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

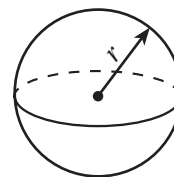


**Volume of prism** = area of cross-section  $\times$  length



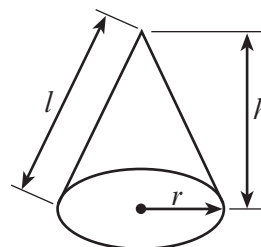
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



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

**Curved surface area of cone** =  $\pi r l$

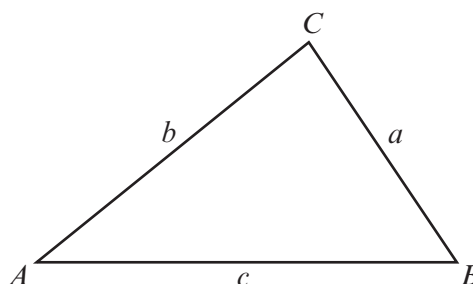


**In any triangle ABC**

**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** =  $\frac{1}{2}ab \sin C$



### The Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$

where  $a \neq 0$  are given by

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



1. (a) Estimate the value of  $\frac{43.3 \times 49.8}{200}$ . [2]

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- (b) Estimate the value of  $\frac{0.963}{0.482}$ . [1]

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- (c) Given that  $54 \times 732 = 39528$ , find the exact value of the following.

- (i)  $0.054 \times 73.2$  [1]

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- (ii)  $\frac{39528}{0.54}$  [1]

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- (d) Write down the value of one half of  $3\frac{1}{2}$ . [2]

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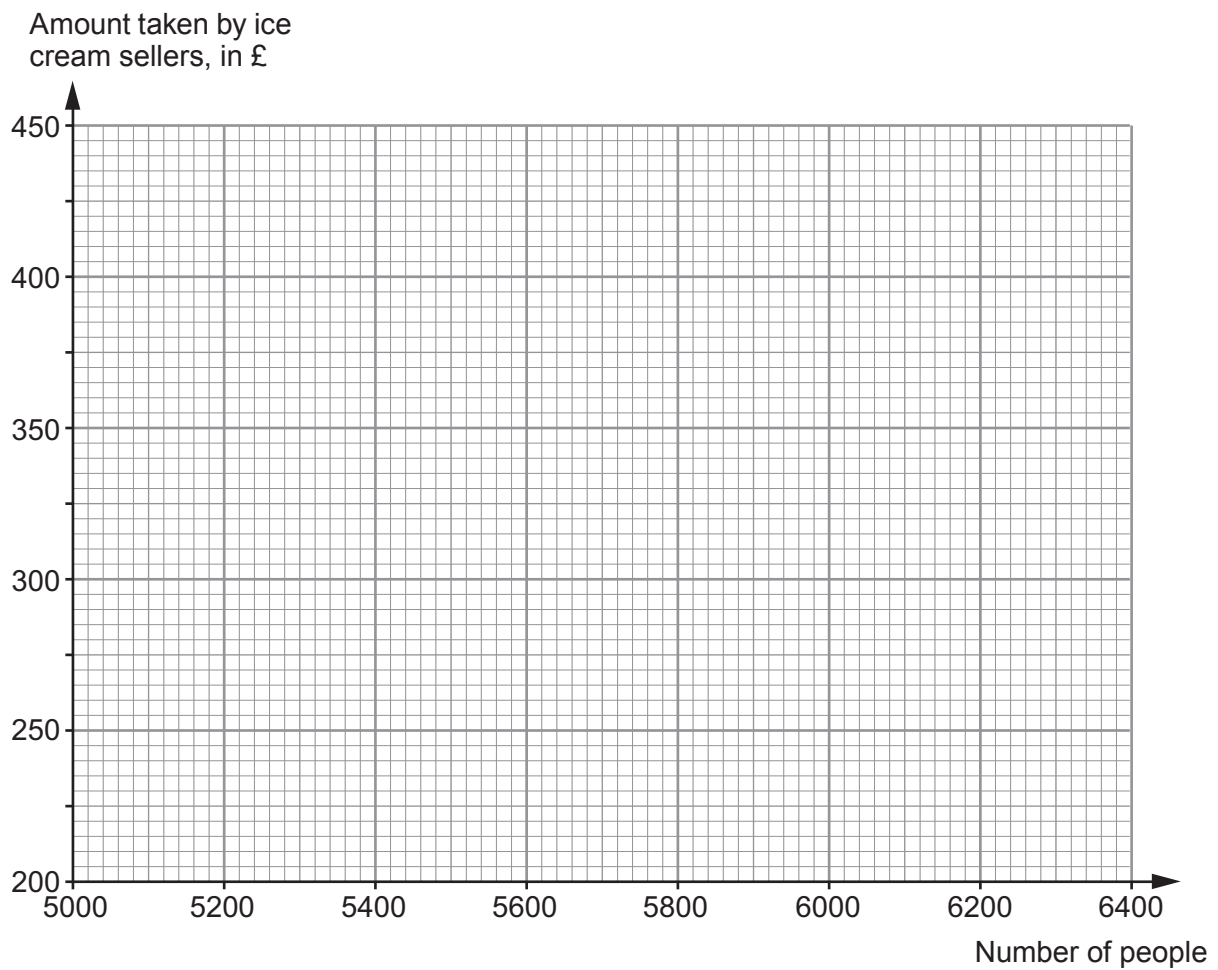


2. A festival took place over 7 days in August. Each day, the number of people at the festival and the amount of money taken by the ice cream sellers were recorded. The table below shows the results.

Number of people	5500	6000	5600	5200	5800	6400	6200
Amount taken by ice cream sellers, in £	280	400	280	210	320	420	410

- (a) On the graph paper below, draw a scatter diagram of these results.

[2]



(b) Write down the type of correlation that is shown by the scatter diagram. [1]

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(c) Draw, by eye, a line of best fit on your scatter diagram [1]

(d) Estimate the amount of money that may have been taken by ice cream sellers during one day had 6100 people attended the festival on that day. [1]

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(e) Explain why it is not possible to work out how much a typical ice cream costs at the festival. [1]

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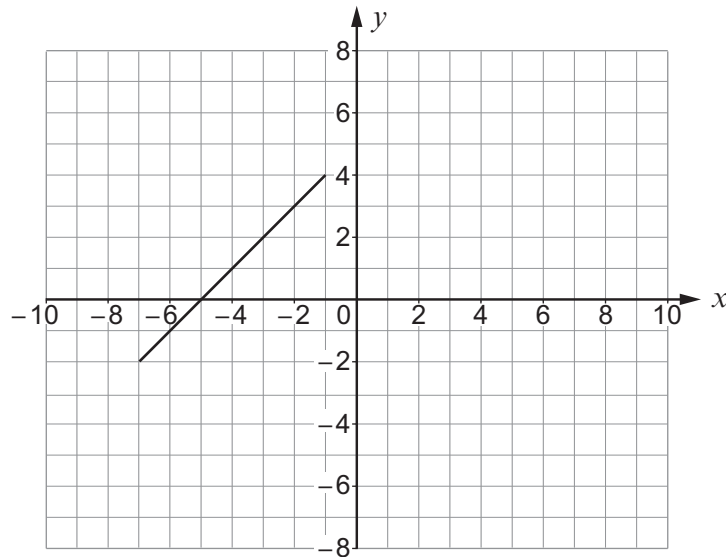


3. Lorna has begun to draw two quadrilaterals, one on each of two grids. She had drawn a **diagonal** of a quadrilateral on each grid.

She then gives clues to help you draw the quadrilaterals.

By completing the drawings, write down the coordinates of the vertices of each of the quadrilaterals.

(a)



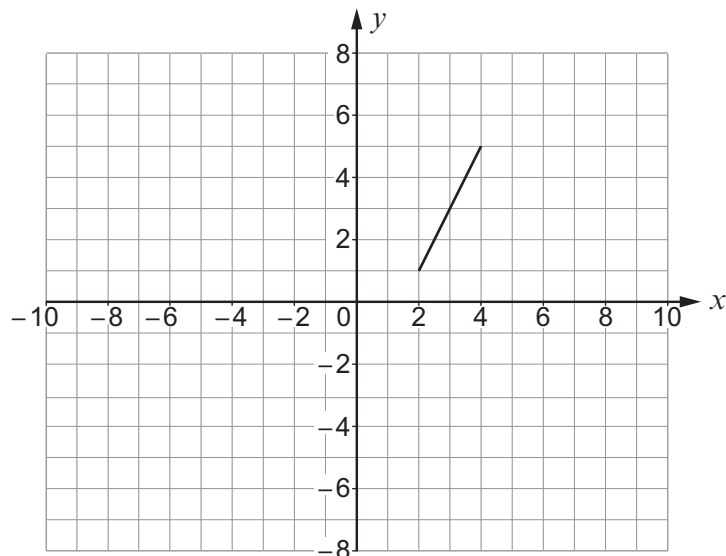
'My shape is a kite. One of the diagonals is shown.  
One of the vertices of the kite is at  $(-5, 4)$ .'

The vertices of the kite are at

$(-5, 4)$ , ( ..... , ..... ), ( ..... , ..... ) and ( ..... , ..... )

[2]

(b)



'My shape is a rhombus. The shorter diagonal is shown.  
The other diagonal is twice as long as the one I have already drawn.'

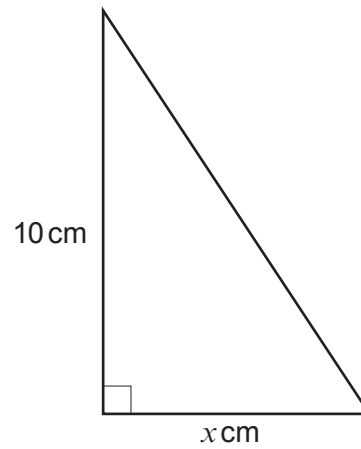
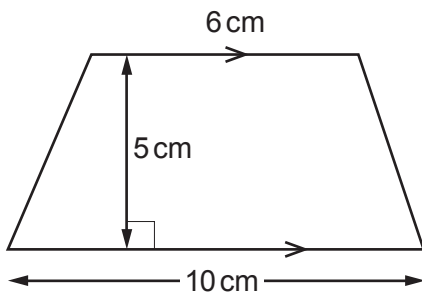
The vertices of the rhombus are at

( ..... , ..... ), ( ..... , ..... ), ( ..... , ..... ) and ( ..... , ..... )

[2]



4. The area of the trapezium is equal to the area of the right-angled triangle.



*Diagrams not drawn to scale*

Calculate the value of  $x$ .

[4]

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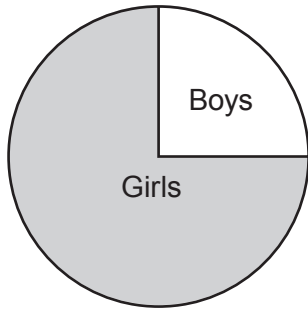
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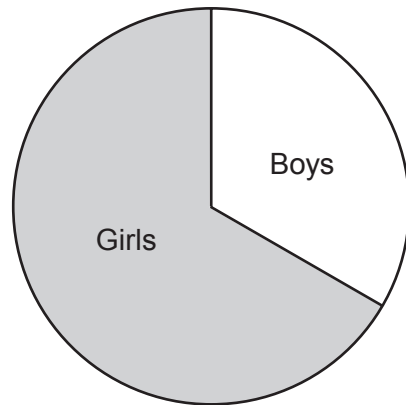
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5. The pie charts show the proportion of boys to girls in class A and class B.



Class A



Class B

There are more pupils in class B than in class A.

There are 4 boys in class A.

There are  $1\frac{1}{2}$  times as many girls in class B than in class A.

How many boys are there in class B?

[4]

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6. (a) Solve  $6x - 27 = 4x - 13$ .

[3]

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(b) Solve  $\frac{x}{2} + 18 = 26$ .

[2]

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(c) Factorise  $y^2 - 5y$ .

[1]

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(d) Expand  $y(y^2 + 4)$ .

[2]

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(e) Solve  $5x - 6 < 30$ .

[2]

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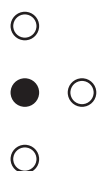
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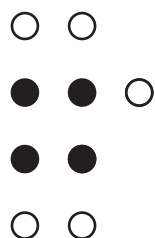


7. Patterns made with black and white circles are shown below.

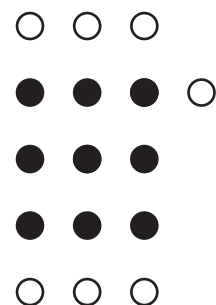
Pattern 1



Pattern 2



Pattern 3



Complete the following statements, in terms of  $n$ .

[3]

'There will be ..... black circles in Pattern  $n$ .'

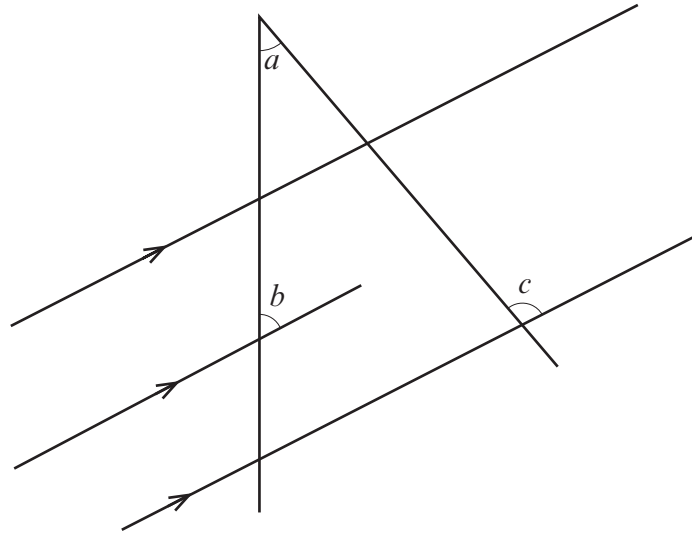
'There will be ..... white circles in Pattern  $n$ .'

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8. In the diagram, angles  $a$ ,  $b$  and  $c$  are measured in degrees.



*Diagram not drawn to scale*

Find the size of angle  $c$  in terms of  $a$  and  $b$ .  
You must show all your working, which may be indicated on the diagram.

[3]

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9. Amelia regularly buys bird food to place on her bird table.



- (a) The winter mix bird food contains buckwheat, millet and sunflower seeds. For every 2g of buckwheat there are 3g of millet and 5g of sunflower seeds. How much millet is there in an 850g bag of winter mix bird food? [2]

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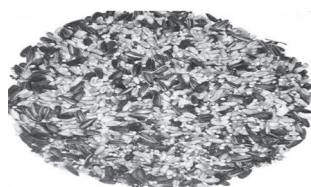
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- (b) *You will be assessed on the quality of your written communication in this part of the question.*

The summer mix bird food is sold in different sized bags. The sizes of the bags and the prices are shown below.



Size	Price
250g	49p
300g	54p
4 kg	£7.60

Amelia bought exactly 5 kg of the summer mix bird food. She found the cheapest option for buying the bird food.

How much did Amelia pay for the bird food?  
You must show how many bags of each size Amelia bought.  
You must show all your working. [6]



Examiner  
only

A large rectangular area containing horizontal dotted lines for writing.

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10. Maggie has lots of tiles.  
All of her tiles are in the shape of regular polygons.  
The edges of all the tiles have the same length.

She places two 12-sided tiles to meet edge-to-edge.  
Maggie places a different-shaped tile with these two tiles.  
She finds that the 3 tiles tessellate.

By calculation, find the number of sides of this third tile.  
You must show all your working.

[5]

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11. Iona and Dafydd went shopping.

They each bought some bottles of the same blackcurrant cordial and the same soda water.

Iona bought 2 bottles of blackcurrant cordial and 3 bottles of soda water.

Dafydd bought 4 bottles of blackcurrant cordial and 1 bottle of soda water.

Iona spent £2.04 and Dafydd spent £2.48.

Use an algebraic method to calculate the cost of a bottle of blackcurrant cordial and the cost of a bottle of soda water. [5]

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Cost of a bottle of blackcurrant cordial is .....

Cost of a bottle of soda water is .....



12. (a) Solve  $\frac{6+x}{2} + \frac{2-3x}{3} = \frac{31}{6}$  .

[4]

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(b) Factorise  $2(x+3)^2 - 4(x+3)$ .

[2]

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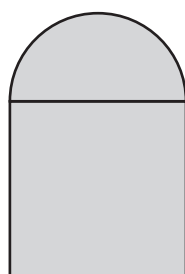
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13. (a) The diagram shows a semicircle joined to a square.



8 cm

*Diagram not drawn to scale*

Calculate the total area of the shaded shape, leaving your answer in terms of  $\pi$ . [2]

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- (b) Evaluate  $8^0$ . [1]

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- (c) Evaluate  $\frac{4.5 \times 10^8}{9 \times 10^{12}}$ , giving your answer in standard form. [2]

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14. (a) Last month, Klaus sold his car.  
He was the only driver of the car.

His car's data readings for the past year showed that

- he had travelled 3000 miles, correct to the nearest 100 miles, and
- he had spent 80 hours driving, correct to the nearest hour.

- (i) Write down the greatest and least values for the time spent and distance travelled by Klaus in his car during the past year, [2]

Distance travelled:

Least distance ..... Greatest distance .....

Time spent:

Least time ..... Greatest time .....

- (ii) Write down the calculation Klaus would need to enter into his calculator to work out the greatest value for the average speed reading for his car during these journeys. You do not need to calculate the answer. [1]

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- (b) Last week, Klaus bought a new car.

Klaus's first journey in his new car was 60 miles.  
This journey was made in a time of 2 hours.  
His second journey in his new car was  $x$  miles.  
This second journey was made in a time of  $y$  hours.

The times are correct, but each of the journey distances is only correct to the nearest mile.

Klaus wants to calculate the least value for the average speed for these two journeys combined.

Write down an expression in terms of  $x$  and  $y$  for the calculation Klaus would have to perform. [2]

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15.



Fifteen small ceramic pebbles are arranged in a straight row.  
Each pebble touches the next pebble in the row.  
All of the pebbles are identical in size and shape.  
Each of the pebbles has a volume of  $2 \text{ cm}^3$ .

A **similar** larger ceramic pebble is made with a volume of  $54 \text{ cm}^3$ .  
A straight row of these pebbles is made in the same way as with the smaller pebbles.

How many of these larger pebbles will be needed to form a straight row equal in length to the row of 15 smaller pebbles?

You must show all your working.

[3]

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16. (a) Express each of the following as a **decimal**.

(i)  $2.1 \times 10^{-2}$  [1]

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(ii)  $400^{-\frac{1}{2}}$  [2]

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(b) Express  $\frac{12}{99}$  as a recurring decimal. [2]

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(c) Given that  $a = \sqrt{5}$ ,  $b = \sqrt{7}$  and  $c = \sqrt{70}$ , find the value of  $abc$ .

Write your answer in the form  $n\sqrt{2}$  where  $n$  is a whole number. [2]

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17. Given that  $y$  is inversely proportional to  $x$ , and that  $y = 50$  when  $x = 2$ ,

(a) find an expression for  $y$  in terms of  $x$ ,

[3]

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(b) use the expression you found in (a) to complete the following table.

[2]

$x$	$\frac{1}{2}$	2	
$y$		50	12.5

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18. The time taken to answer a short questionnaire was measured for each person in a group of 200 ten-year-olds.  
The following grouped frequency distribution was obtained.

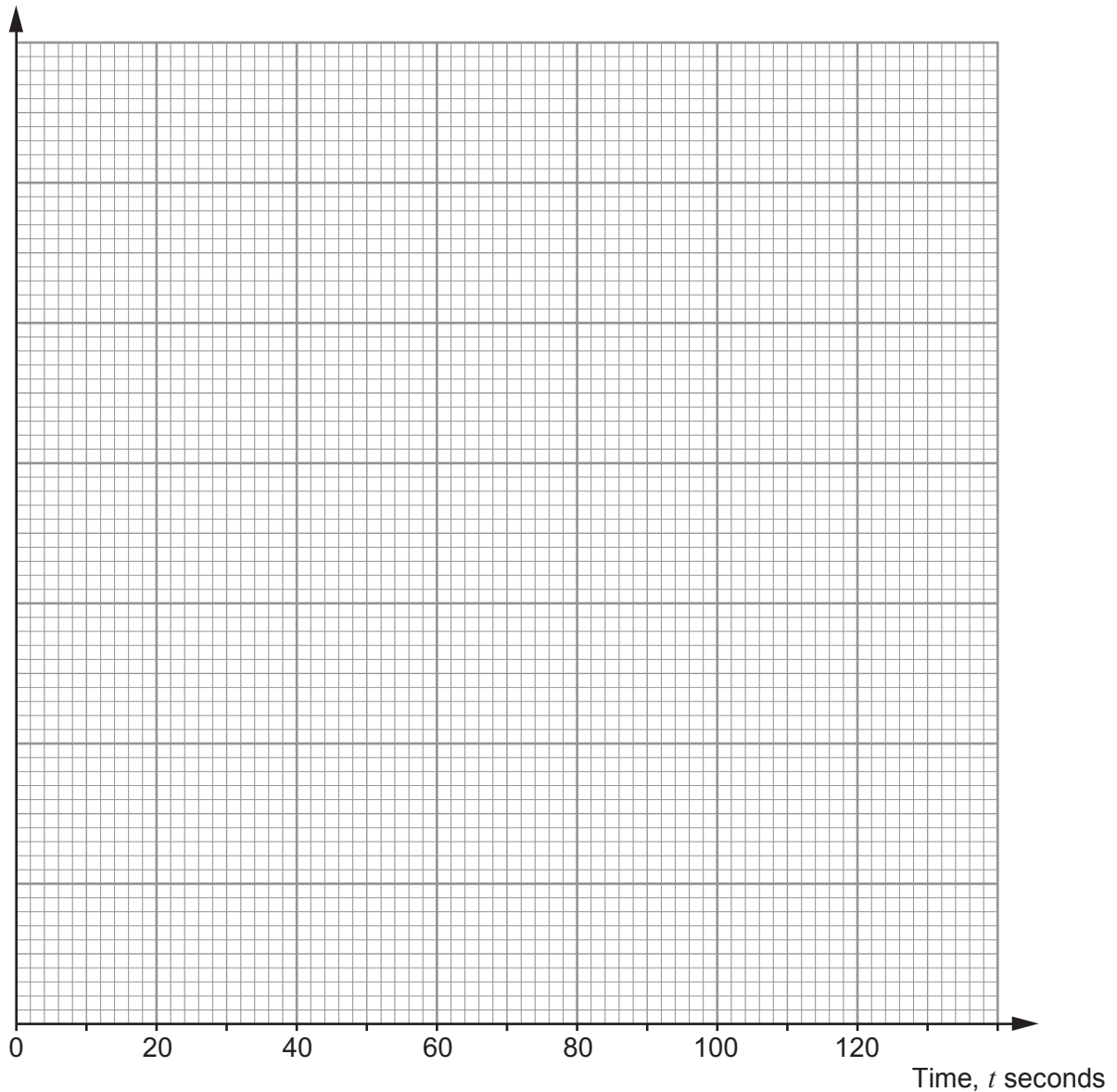
Time, $t$ seconds	$0 < t \leq 20$	$20 < t \leq 40$	$40 < t \leq 60$	$60 < t \leq 80$	$80 < t \leq 120$
Number of ten-year-olds	36	44	100	12	8

- (a) Draw a histogram to illustrate the distribution on the graph paper below. [4]

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(b) 200 twenty-year-olds were set an identical task.  
The times taken to answer the short questionnaire were also recorded using the same time intervals as were used for the ten-year-olds.  
The median time taken by the twenty-year-olds to answer the short questionnaire was 58 seconds.

Gemma says,

'The median for the 10-year-olds is the same as the median for the 20-year-olds.'

Fred disagrees. He says,

'The median for the 10-year-olds could be less than the median for the 20-year-olds.'

Explain why either Gemma or Fred could be correct. [2]

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**19.** Ralph does not like strawberry flavoured chocolates.  
In a dark cinema during a film, Ralph selects two chocolates at random from a box.  
There are 20 chocolates in the box.  
Of these chocolates, 5 are strawberry flavoured.  
Calculate the probability that at least one of the chocolates that Ralph selects is strawberry flavoured. [4]

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