Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22 – 23	
24 – 25	
26	
TOTAL	

AQA

General Certificate of Secondary Education
Higher Tier
June 2015

Mathematics (Linear) 4365/2H

Paper 2

H

Thursday 11 June 2015 1.30 pm to 3.30 pm

For this paper you must have:
- a calculator
- mathematical instruments.

Time allowed
- 2 hours

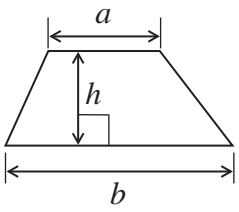
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this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

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 105.
- The quality of your written communication is specifically assessed in Questions 3, 14 and 19. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph paper. These must be tagged securely to this answer book.

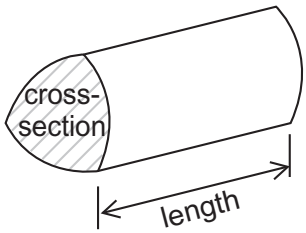
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

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

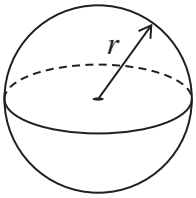


Volume of prism = area of cross-section × length



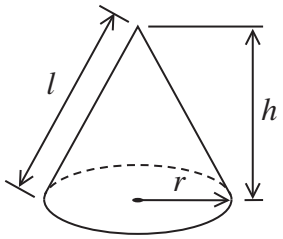
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

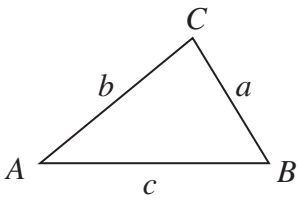
Curved surface area of cone = $\pi r l$



In any triangle ABC

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

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



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

The Quadratic Equation

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

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

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

1 (a) Expand and simplify $3(2x - 1) + 2(x - 3)$

[2 marks]

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Answer .....

1 (b) Write down the whole numbers that satisfy $3 < 2n \leqslant 10$

[2 marks]

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.....

Answer .....

1 (c) Solve $4(3x - 5) = 22$

[3 marks]

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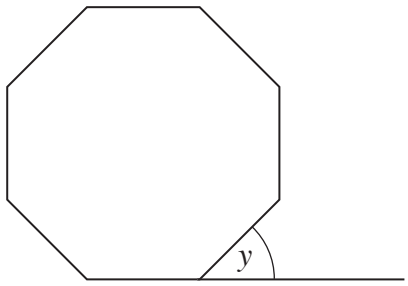
x = ...

7

2 (a) The diagram shows a regular octagon.



Not drawn accurately

The base line of the octagon is extended.

Work out the size of angle y.

[2 marks]

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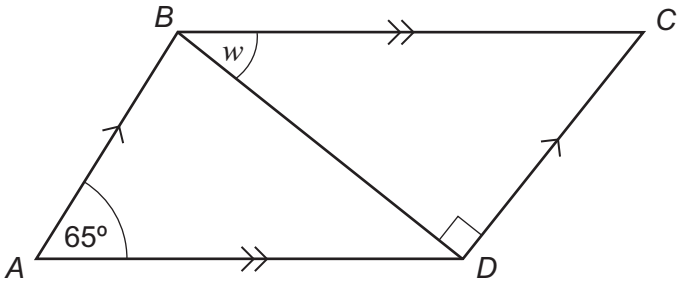
Answer ..... degrees

2 (b) *ABCD* is a parallelogram.
BD is a diagonal.



Not drawn accurately

Work out the size of angle w.

[3 marks]

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Answer ..... degrees

***3** Laura buys a saddle in the UK for £850
Delivery is free.

Steve buys the same saddle from Holland for 990 Euros.
He pays 15 Euros for delivery.

£1 = 1.18 Euros

Including the delivery charge, whose saddle is **cheaper**?
You **must** show your working.

[3 marks]

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Answer .....

8

4 (a) Complete the table of values for $y = 2 + x - x^2$

x	–3	–2	–1	0	1	2	3
y	–10		0	2		0	–4

[2 marks]

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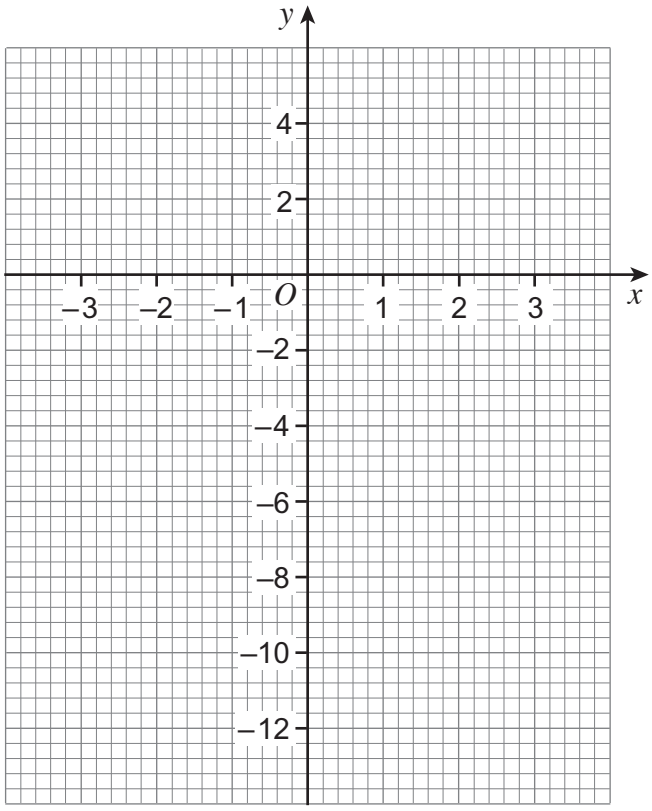
4 (b) Draw the graph of $y = 2 + x - x^2$ for values of x from –3 to 3

[2 marks]



4 (c) Draw the line $y = -3$ on the same grid.

[1 mark]

4 (d) Write down the solutions to the equation $2 + x - x^2 = -3$

[1 mark]

Answer .....

5 A drink is made by mixing 650 ml of water with 150 ml of fruit juice.

What percentage of the drink is fruit juice?

[2 marks]

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Answer ..... %

Turn over for the next question

8

6 (a) Divide £720 in the ratio 5 : 1

[2 marks]

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Answer £ ..... and £ .....

6 (b) Sarah has £135
Gemma has £70
Beth has £35

Sarah gives some money to Gemma and Beth.

The ratio of the amount of money Sarah, Gemma and Beth have **now** is 3 : 2 : 1

How much money did Sarah give to Gemma?

[4 marks]

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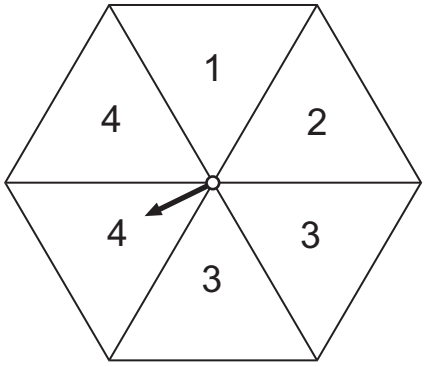
Answer £ .....

7 (a) The arrow on this spinner is equally likely to land on each section.



The arrow is spun 72 times.

How many times do you expect the arrow to land on 4?

[2 marks]

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Answer .....

7 (b) An arrow on a different spinner is spun 250 times.
Some of the results are shown below.

Number shown	1	2	3	4	5
Frequency	25	53	62		

The relative frequency of landing on a 4 is the same as the relative frequency of landing on a 5

Work out the relative frequency of landing on a 4

[3 marks]

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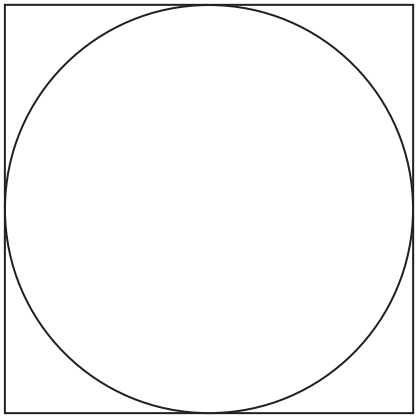
Answer .....

11

8 The area of this square is 36 cm^2



Not drawn accurately

Work out the circumference of the circle.

[3 marks]

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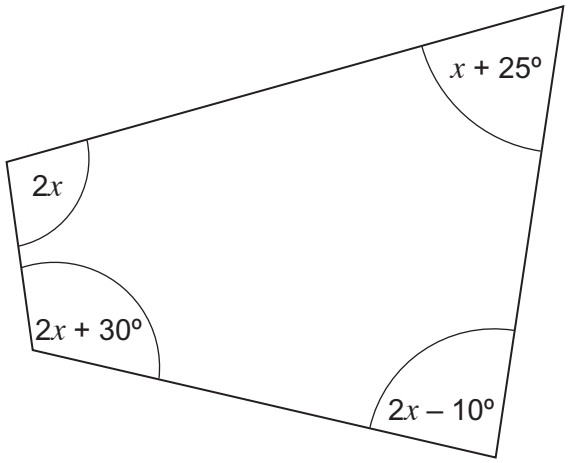
Answer ..... cm

9 The diagram shows a quadrilateral.



Not drawn accurately

Work out the value of x.

[4 marks]

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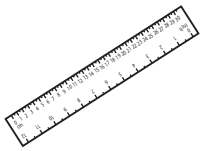
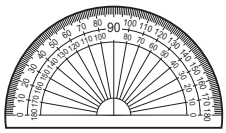
Answer ..... degrees

Turn over for the next question

7

10 A school shop sells these items.

Pen	Ruler	Protractor	Calculator
		 30p	 £1.20

10 (a) Write an expression for the cost of y protractors and w calculators.
Give your answer in pence.

[2 marks]

Answer ..... pence

10 (b) Two pens and one ruler cost £2.65
One pen and five rulers cost £2

Work out the cost of one pen and the cost of one ruler.

[4 marks]

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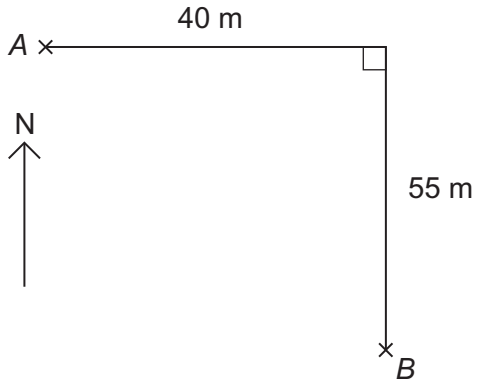
Cost of one pen £ .....

Cost of one ruler £ .....

11 The diagram shows two points *A* and *B*.



Not drawn accurately

Work out the bearing of *B* from *A*.

[4 marks]

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Answer ..... °

10

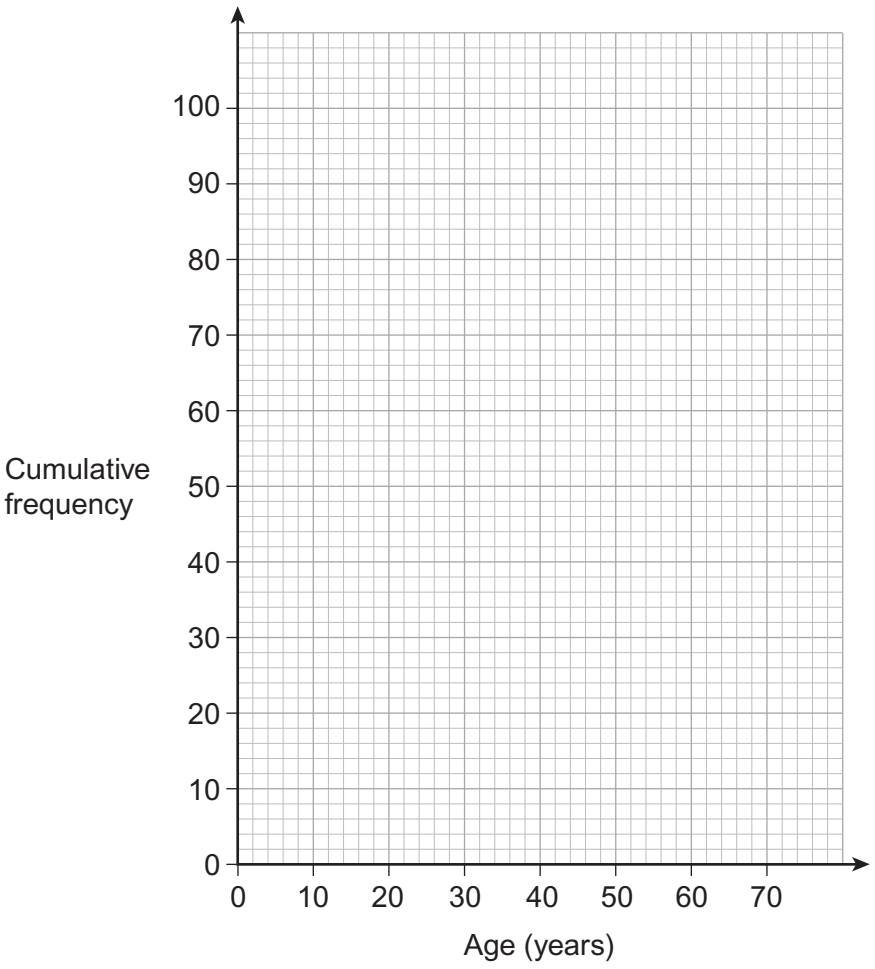
Turn over ▶

12 The table shows information about the ages of 100 rugby supporters.

Age, a (years)	Frequency	
$5 \leqslant a < 15$	12	
$15 \leqslant a < 20$	11	
$20 \leqslant a < 40$	25	
$40 \leqslant a < 55$	39	
$55 \leqslant a < 70$	13	

12 (a) Plot a cumulative frequency diagram for the data.

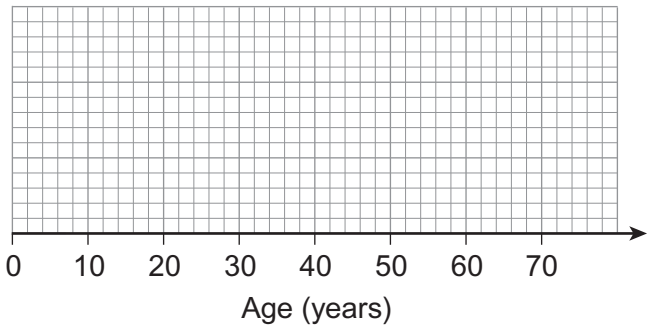
[4 marks]



12 (b) The youngest supporter is 8 years old.
The oldest supporter is 69 years old.

Draw a box plot for the data.

[3 marks]



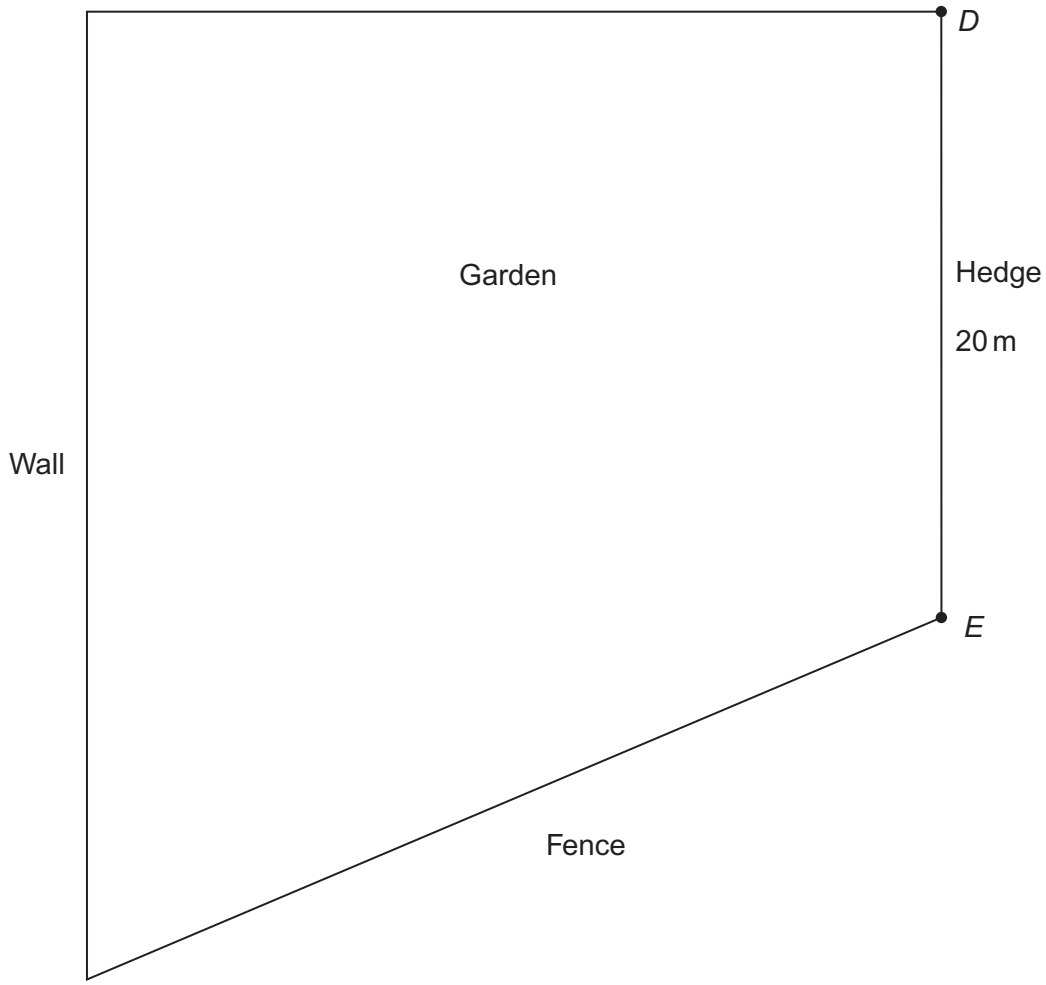
Turn over for the next question

7

13 You will need a ruler and a pair of compasses to answer this question.

The diagram shows a plan of a garden.
The hedge *DE* is 20 metres long.

Drawn to scale



A tree is to be planted so that it is

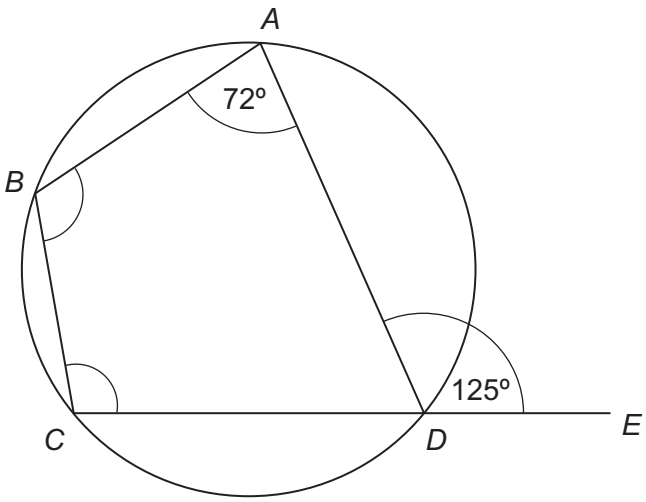
20 metres from *D*

and the same distance from the wall as from the fence.

Construct the position of the tree on the plan.

[3 marks]

14 Points *A*, *B*, *C* and *D* are on the circumference of the circle.
CDE is a straight line.



Not drawn accurately

***14(a)** Work out the size of angle *BCD*.
Give a reason for your answer.

[2 marks]

Answer ..... degrees

Reason .....

14 (b) Work out the size of angle *ABC*.

[1 mark]

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Answer ..... degrees

6

15 (a) Expand and simplify $(2x + 1)(x - 3)$

[2 marks]

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Answer .....

15 (b) Factorise $y^2 + 2y - 24$

[2 marks]

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Answer .....

15 (c) Simplify $\left(2xy^3\right)^5$

[2 marks]

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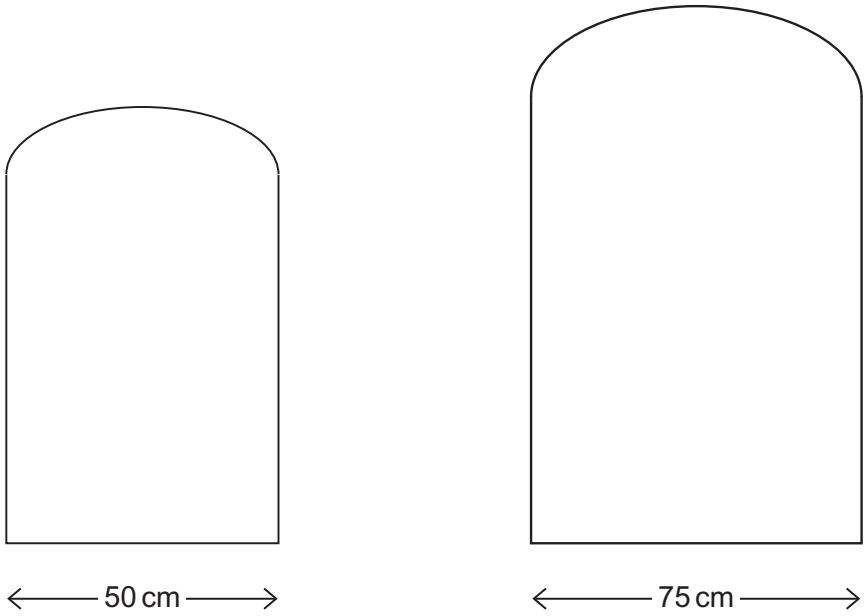
Answer .....

16 The diagram shows two pieces of glass.

Not drawn accurately



The pieces are similar.
The area of the small piece is 6000 cm^2

Glass costs £80 per square metre.

Work out the cost of the large piece.

[5 marks]

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Answer £ .....

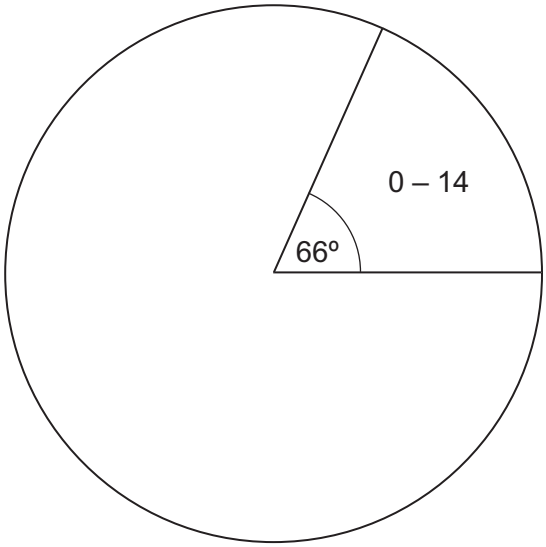
11

Turn over ▶

17 In 2011 there were 3.22×10^7 females in the UK.
This was 51% of the whole population.

The pie chart shows an estimate of the males aged 0 – 14 years old in 2011.

Male population in 2011



Source: http://www.ons.gov.uk

Use this information to work out the number of males aged 0 – 14 years old in 2011.
Write your answer in standard form.

[6 marks]

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Answer .....

18 (a) Write $\frac{7}{13}$ as a recurring decimal.

[1 mark]

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Answer .....

18 (b) Circle the fraction that is equivalent to $0.4\dot{1}$

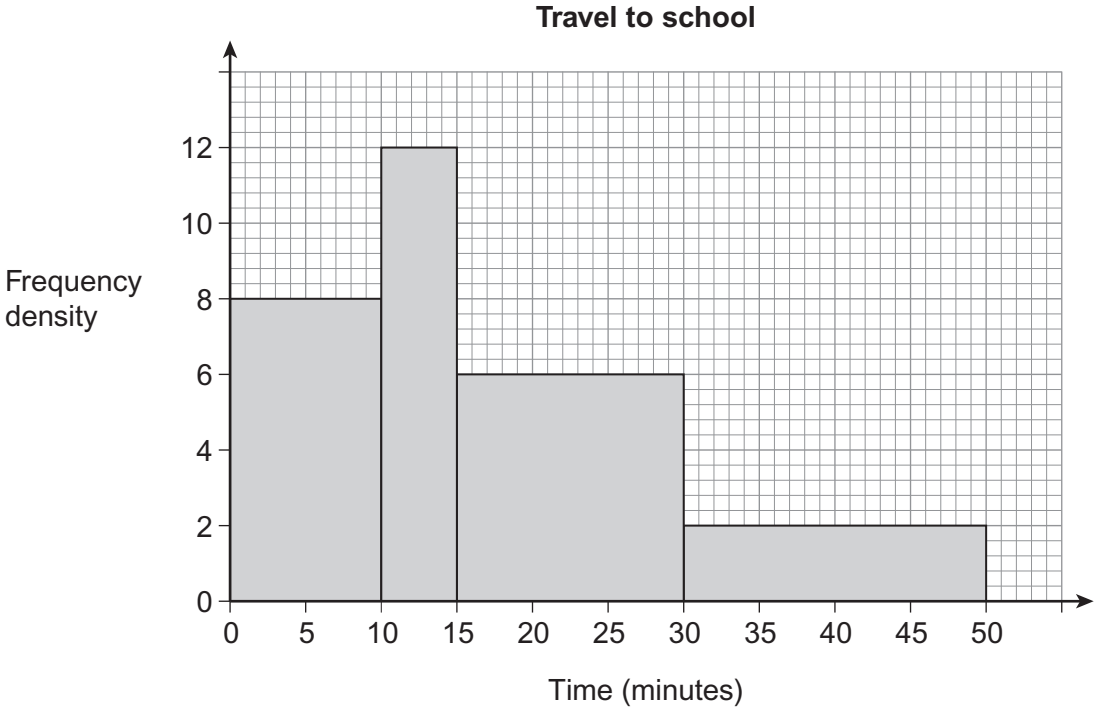
[1 mark]

$\frac{41}{99}$ $\frac{41}{100}$ $\frac{37}{99}$ $\frac{37}{90}$

Turn over for the next question

8

***19** The histogram shows the time it takes 270 students to travel to school.



Kirsty says 30% of the students take more than 25 minutes to travel to school.

Is she correct?
Use the histogram to decide.
You **must** show your working.

[5 marks]

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Answer .....

20 Solve the equation $\frac{1}{x-2} - \frac{1}{x-1} = 2$

Give your answers to 2 decimal places.

[6 marks]

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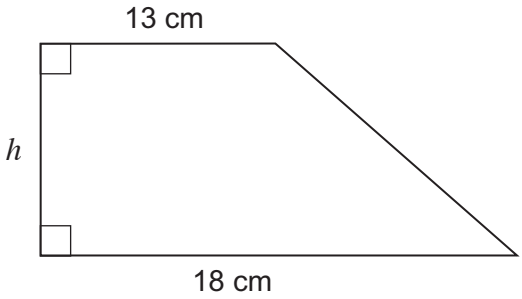
Answer .....

11

21 The area of this trapezium is 280 cm^2 to the nearest 10 cm^2



Not drawn accurately

The lengths 13 cm and 18 cm are given to the nearest centimetre.

Work out the maximum possible value of the height h.

[4 marks]

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Answer ..... cm

22 A bag contains 10 counters.
The counters are blue or red.

A counter is taken out of the bag at random and **not** replaced.
A second counter is taken out at random.

The probability that at least one of the counters is blue is $\frac{48}{90}$

How many of the 10 counters are red?

[3 marks]

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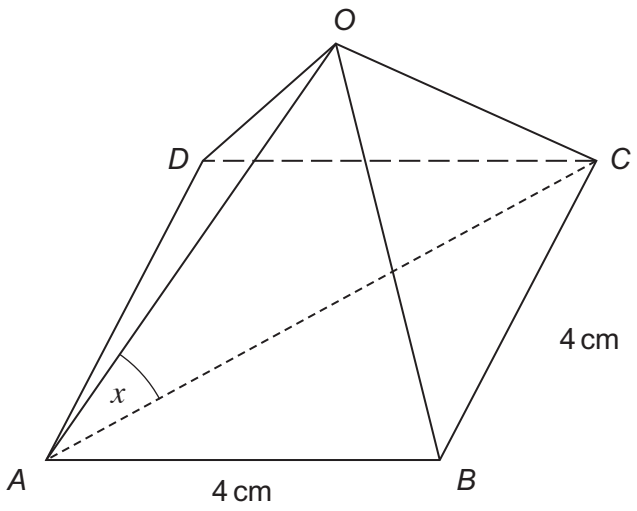
Answer .....

7

Turn over ▶

23 The diagram shows a square-based pyramid *OABCD*.



OA = *OB* = *OC* = *OD* = 6 cm
AB = *BC* = 4 cm

Work out the size of the angle between *OA* and the base *ABCD*, marked x on the diagram.

[4 marks]

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Answer ..... degrees

END OF QUESTIONS

4

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