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Centre Number						Candidate Number					
Candidate Signature											

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General Certificate of Secondary Education  
November 2004



**MATHEMATICS (SPECIFICATION A) 3301/11**  
**Intermediate Tier**  
**Paper 1 Non-Calculator**

Friday 5 November 2004 9.00 am to 11.00 am

<p><b>In addition to this paper you will require:</b> mathematical instruments. You must <b>not</b> use a calculator.</p>	
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For Examiner's Use	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22 – 23	
TOTAL	
Examiner's Initials	

Time allowed: 2 hours

**Instructions**

- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this booklet.

**Information**

- The maximum mark for this paper is 100.
- Mark allocations are shown in brackets.
- Additional answer paper, graph paper and tracing paper will be issued on request and must be tagged securely to this answer booklet.
- The use of a calculator is **not** permitted.

**Advice**

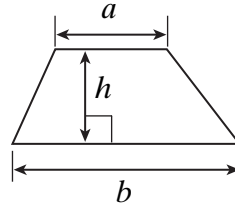
- In all calculations, show clearly how you work out your answer.

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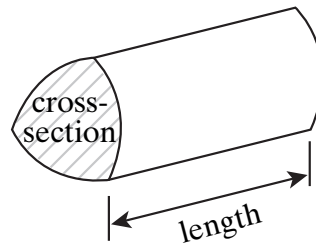
**Formulae Sheet: Intermediate Tier**

You may need to use the following formulae:

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

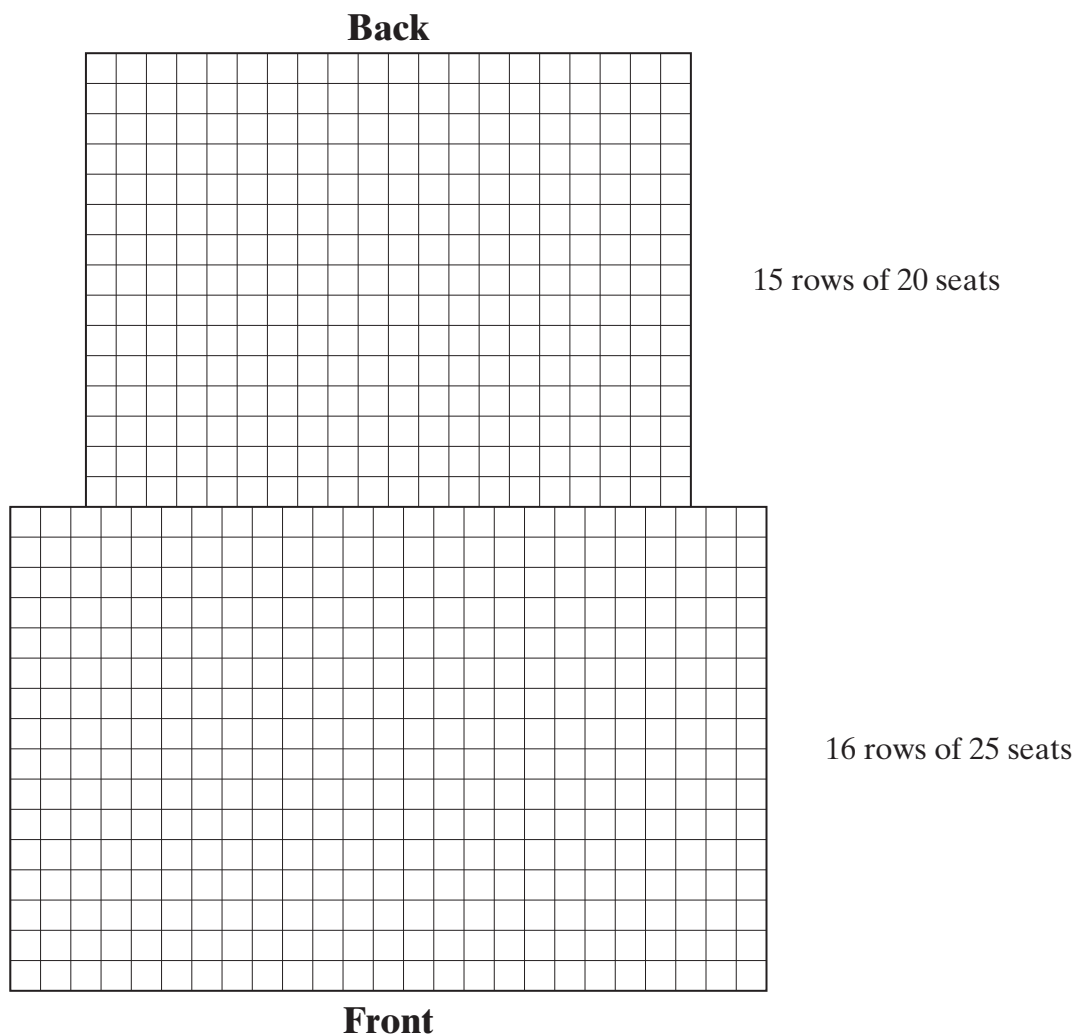


**Volume of prism** = area of cross-section  $\times$  length



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

- 1 The diagram shows how the seats in a theatre are arranged.



There are 687 people sitting in the theatre.  
All of the rows except the back row are completely filled.  
How many people are sitting in the back row?

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Answer .....

(4 marks)

Turn over ►

2 If  $x = 5$  and  $y = -7$ , find the value of

(a)  $4x + 3y$

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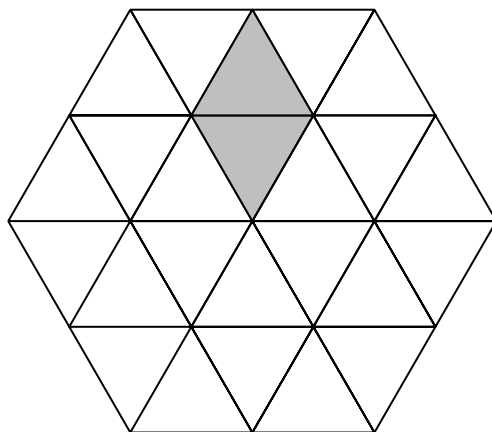
Answer ..... (2 marks)

(b)  $\frac{x - y}{4}$

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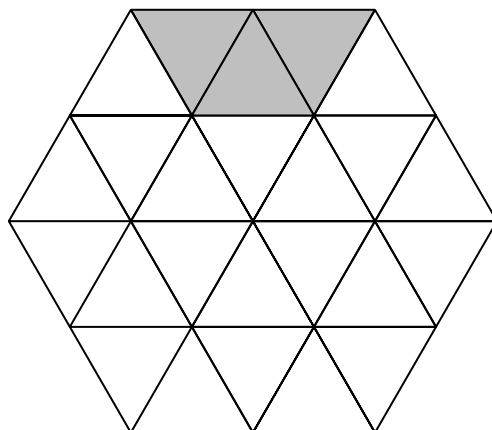
Answer ..... (2 marks)

3 (a) Shade **four more** triangles to make a pattern with 3 lines of symmetry.



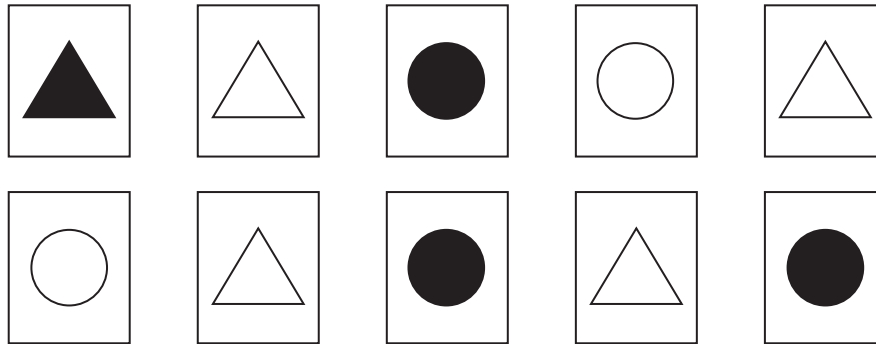
(1 mark)

(b) Shade **six more** triangles to make a pattern with rotational symmetry order 3.



(2 marks)

4 Here is a pack of ten cards.



(a) Complete this two-way table to show the number of different cards in the pack.

	Shaded	Unshaded
Circles		
Triangles		

(2 marks)

(b) One of the cards is picked at random.  
What is the probability that it has either a shaded circle **or** an unshaded triangle?

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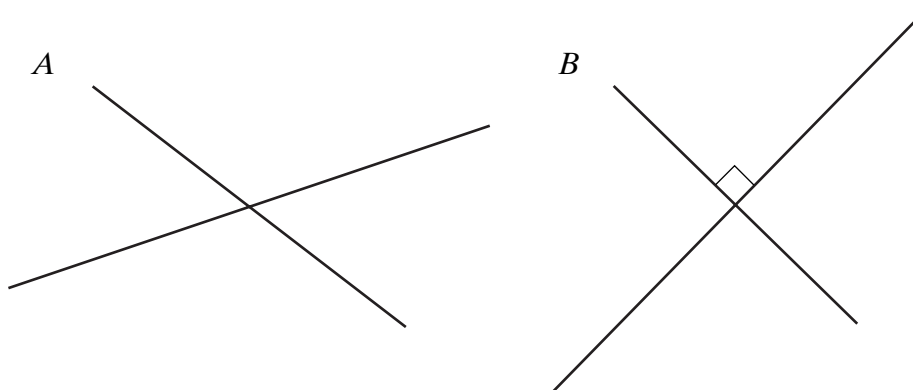
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Answer ..... (2 marks)

Turn over ►

- 5 (a) The diagrams show the diagonals of two different quadrilaterals.

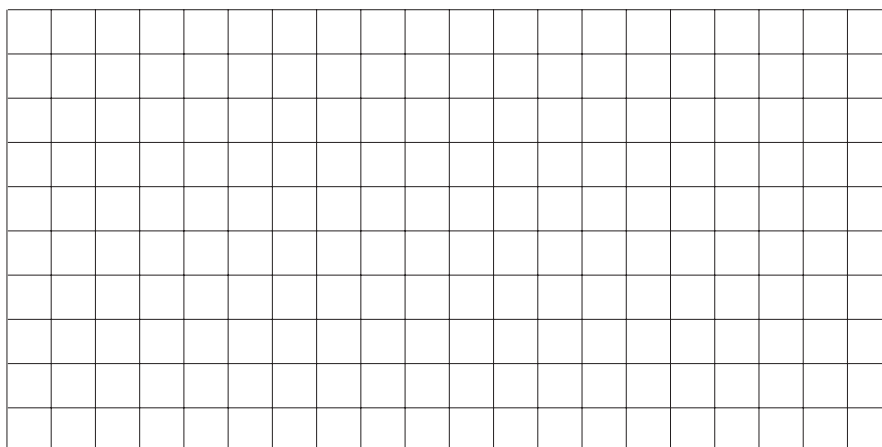


Write down the names of these quadrilaterals.

Answer Quadrilateral A .....

Quadrilateral B .....  
(2 marks)

- (b) (i) On the grid below draw a quadrilateral that has only one pair of parallel lines and exactly two right angles.



(1 mark)

- (ii) Write down the name of this quadrilateral.

Answer ..... (1 mark)

- 6 (a) There are 40 sweets in a bag.

Ben eats  $\frac{1}{8}$  of the 40 sweets.

Jerry eats  $\frac{1}{5}$  of the 40 sweets.

What fraction of the sweets do Ben and Jerry eat altogether?

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Answer ..... (3 marks)

- (b) Work out  $\frac{2}{5} - \frac{3}{8}$

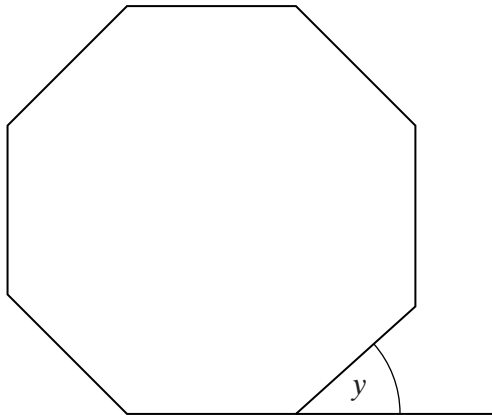
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Answer ..... (2 marks)

- 7 The diagram shows a regular octagon.



Not drawn accurately

Calculate the size of the exterior angle of the regular octagon, marked y on the diagram.

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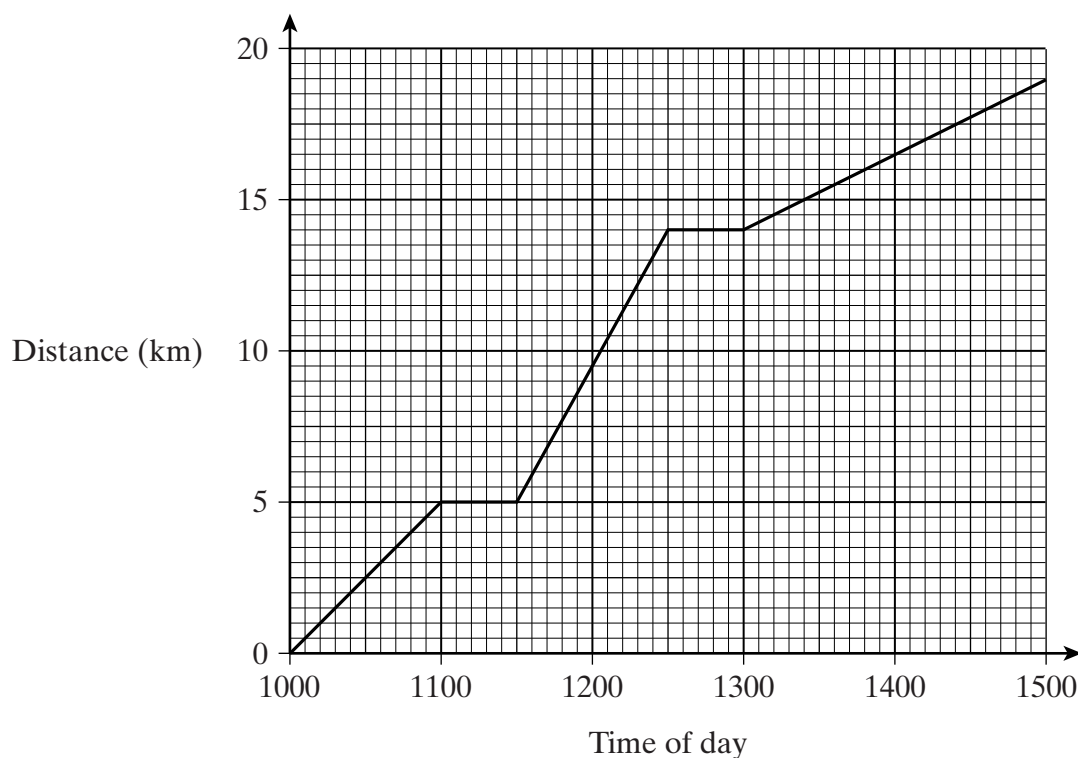
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Answer ..... degrees (2 marks)

Turn over ►

- 8 The graph shows Amy's progress on a sponsored walk.



- (a) How many times does Amy stop during her walk?

Answer ..... (1 mark)

- (b) Between which times does Amy walk the fastest?  
Explain your answer.

Answer .....

Explanation .....

.....  
(2 marks)

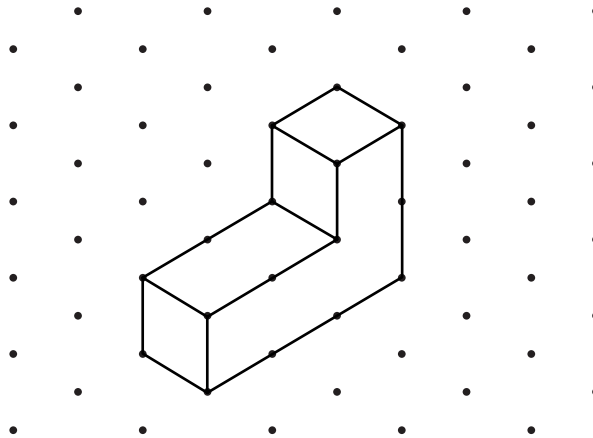
- (c) Bill sponsors Amy for 20 pence per kilometre.  
Kate sponsors Amy for 30 pence per kilometre.  
How much should Amy collect altogether from Bill and Kate after her walk?

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Answer £ ..... (3 marks)



- 9 The diagram shows a solid shape made from 4 one-centimetre cubes.



What is the surface area of the solid shape?

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Answer ..... (3 marks)

- 10 A short necklace has 32 gold beads and 8 black beads.  
A long necklace has a total of 60 beads.  
Both necklaces have the same ratio of gold beads to black beads.

How many black beads are on the long necklace?

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Answer ..... (3 marks)

Turn over ►

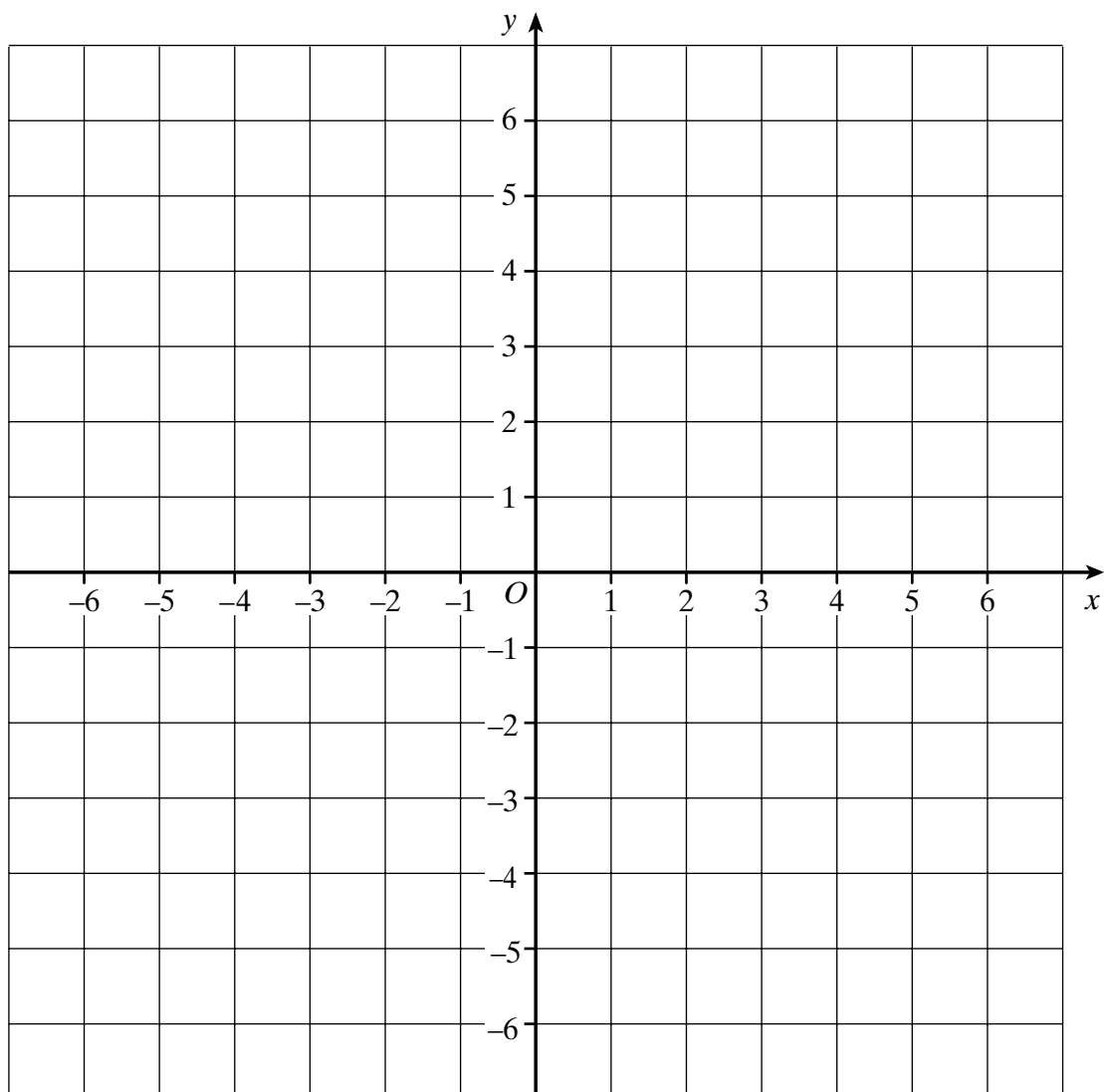
- 11** The line  $y = -3$  crosses the line  $y = x - 2$  at the point  $P$ .  
What are the coordinates of  $P$ ?  
You may use the grid below if you wish.

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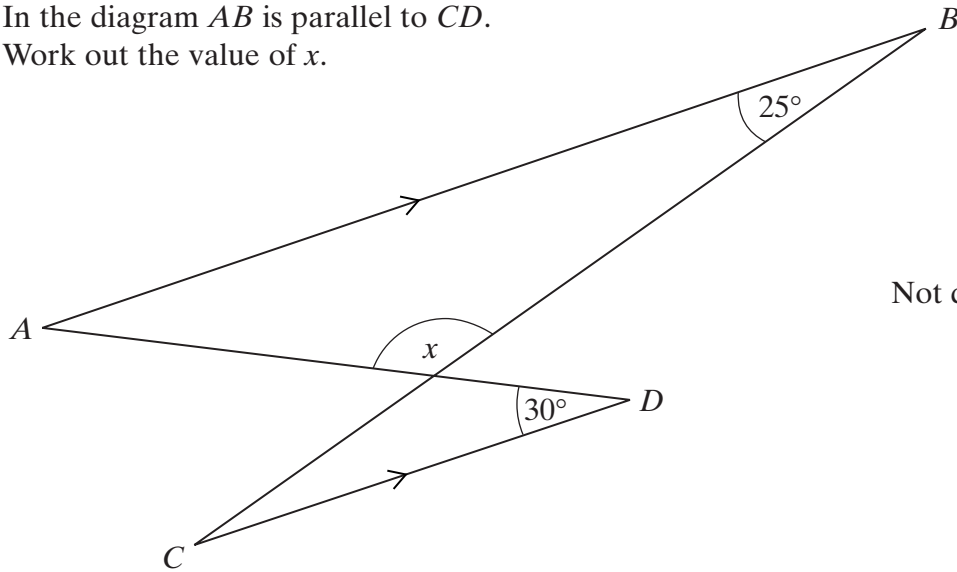
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Answer ( ..... , ..... ) (3 marks)

- 12** In the diagram  $AB$  is parallel to  $CD$ .  
Work out the value of  $x$ .



Not drawn accurately

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Answer  $x =$  ..... degrees (3 marks)

- 13** (a) Factorise  $2x + 6$

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Answer ..... (1 mark)

- (b) Expand  $3(4y + 1)$

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Answer ..... (1 mark)

- (c) Expand  $4x(x^2 + 5)$

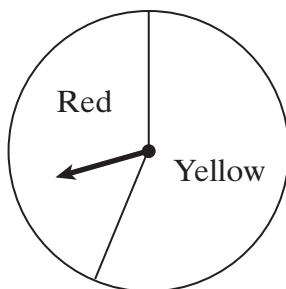
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Answer ..... (2 marks)

Turn over ►

- 14 A spinner has a red sector (R) and a yellow sector (Y).



The arrow is spun 1000 times.

- (a) The results for the first 20 spins are shown below.

R R Y Y Y R Y Y R Y Y Y Y Y R Y R Y Y Y

Work out the relative frequency of a red after 20 spins.  
Give your answer as a decimal.

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Answer ..... (2 marks)

- (b) The table shows the relative frequency of a red after different numbers of spins.

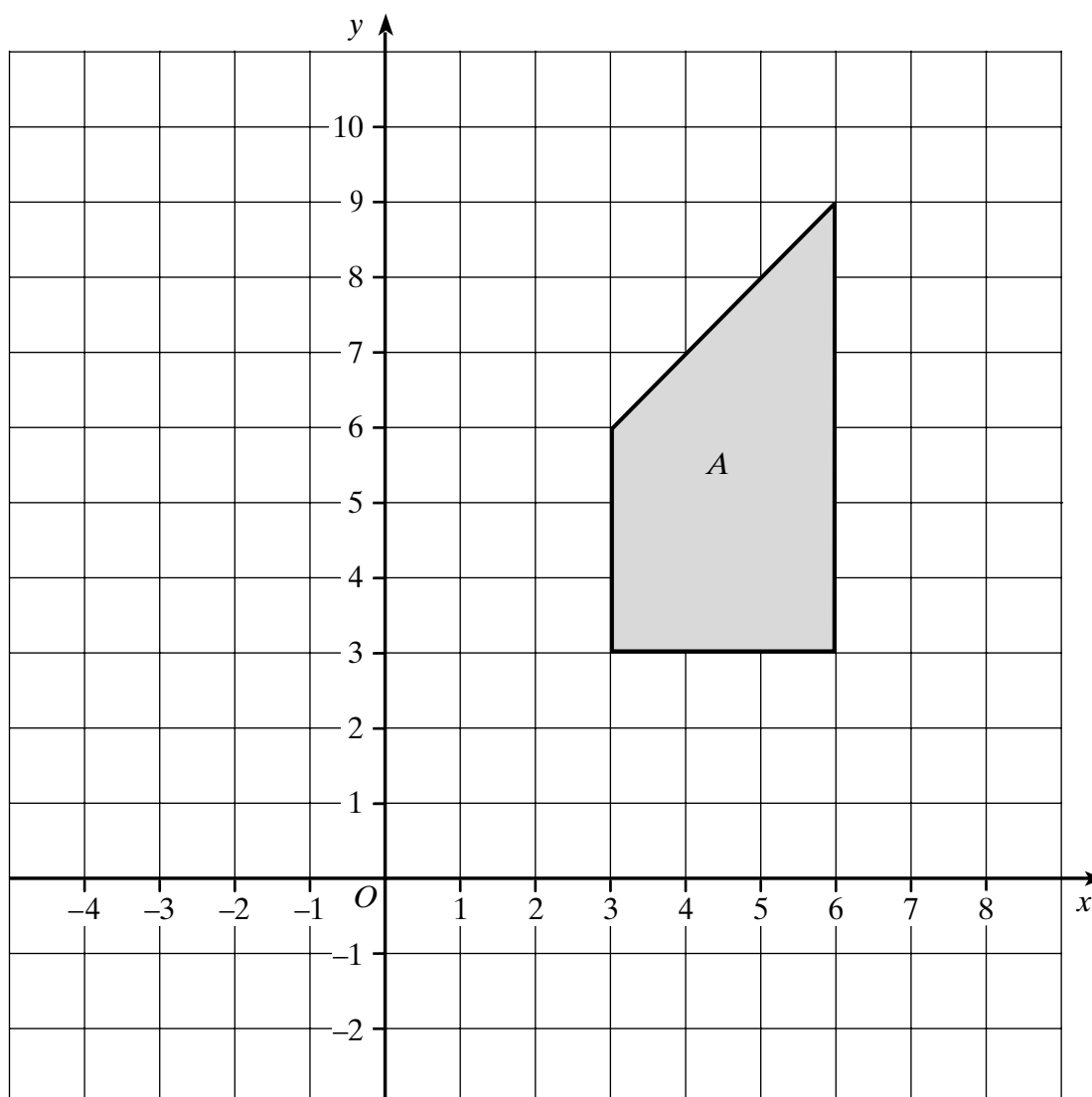
Number of spins	Relative frequency of a red
50	0.42
100	0.36
200	0.34
500	0.3
1000	0.32

How many times was a red obtained after 200 spins?

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Answer ..... (2 marks)

15 The diagram shows shape *A*.



Draw the enlargement of shape *A* with scale factor  $\frac{1}{3}$  and centre of enlargement (0, 0).

(2 marks)

Turn over ►

- 16 Hannah, Gemma and Jo use their calculators to work out the value of

$$\frac{28.78}{4.31 \times 0.47}$$

Hannah gets 142.07, Gemma gets 14.207 and Jo gets 3.138

Use approximations to show which one of them is correct.  
You **must** show your working.

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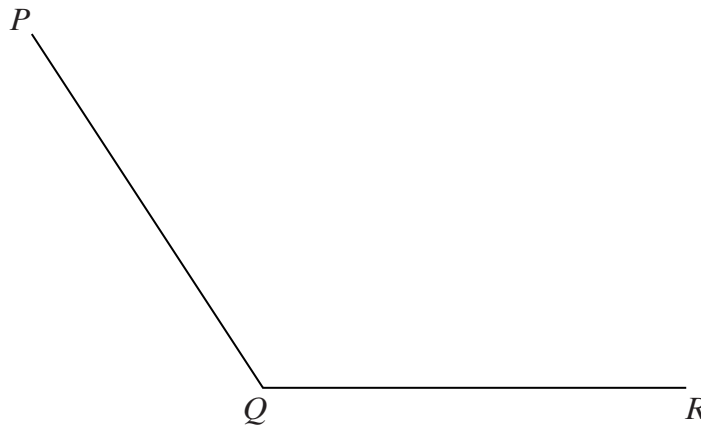
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Answer ..... (3 marks)

- 17 Using ruler and compasses only, construct the bisector of angle  $PQR$ .



(2 marks)

**18** There are 150 kangaroos at a wildlife park.

- (a) There are 66 female kangaroos.  
What percentage is female?

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Answer ..... % (2 marks)

- (b) The number of kangaroos increases by 20% each year.  
Calculate the number of kangaroos in the wildlife park after 2 years.

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Answer ..... (3 marks)

**19** In this question, the letters  $x$ ,  $y$  and  $z$  represent lengths.

State whether each expression could represent a length, an area or a volume.

- (a)  $xyz$

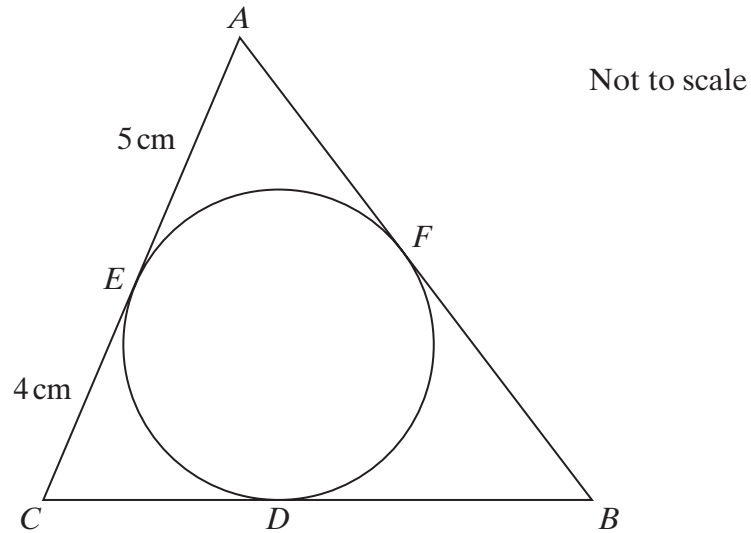
Answer ..... (1 mark)

- (b)  $\pi(x + y + z)$

Answer ..... (1 mark)

Turn over ►

- 20** In the diagram, the sides of triangle  $ABC$  are tangents to the circle.  
 $D$ ,  $E$  and  $F$  are the points of contact.  
 $AE = 5\text{ cm}$  and  $EC = 4\text{ cm}$



- (a) Write down the length of  $CD$ .

Answer ..... cm (1 mark)

- (b) The perimeter of the triangle is 32 cm.

Calculate the length of  $DB$ .

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Answer ..... cm (2 marks)



- 21** (a) Write 28 as the product of its prime factors.

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Answer ..... (2 marks)

- (b) Find the least common multiple (LCM) of 28 and 42.

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Answer ..... (2 marks)

- 22** Tom is investigating the equation  $y = x^2 - x + 5$   
He starts to complete a table of values of  $y$  for some integer values of  $x$ .

$x$			-2	-1	0	1	2	3			
$y$			11	7	5	5	7	11			

Tom says, “When  $x$  is an integer,  $y$  is **always** a prime number”.  
Find a counter-example to show that Tom is wrong.  
Explain your answer.

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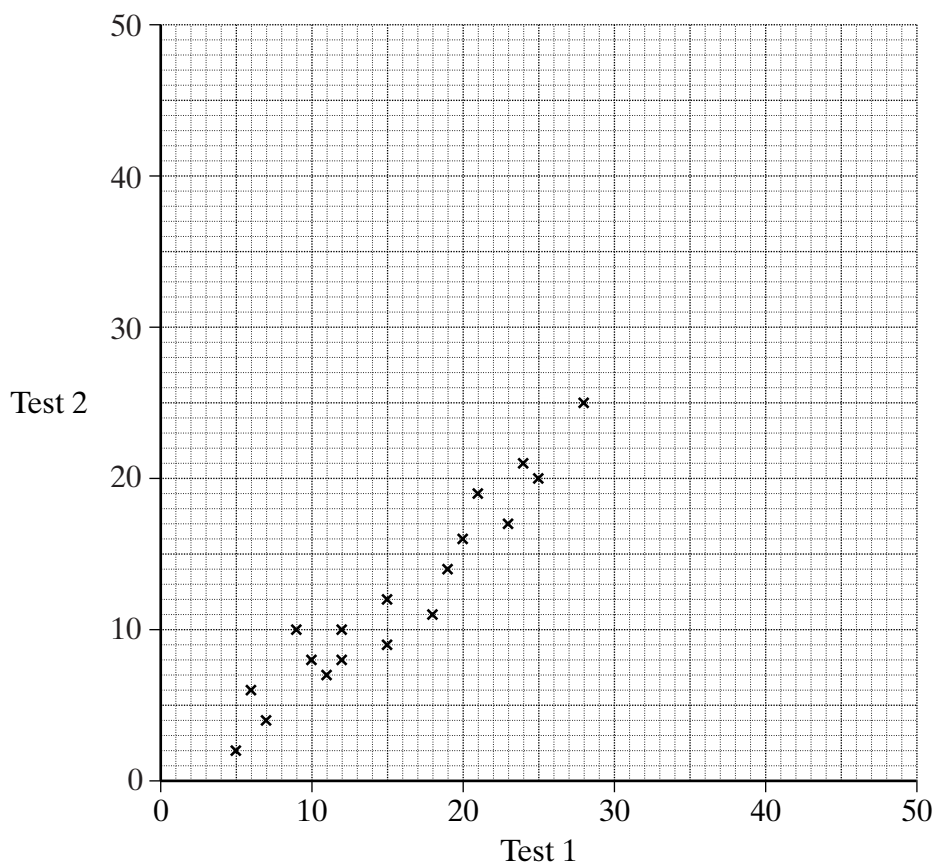
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(2 marks)

Turn over ►

- 23** (a) In a school, students in year 7 take two English tests.  
Each test is marked out of 50.  
The scatter graph compares the scores in Test 1 and Test 2 in Mr Pym's class.



- (i) Draw a line of best fit.

(1 mark)

- (ii) Ben scores 16 in Test 1 and misses Test 2.  
Lilin misses Test 1 and scores 37 in Test 2.  
Mr Pym uses the scatter graph to estimate the missing scores.

Which of his estimates is likely to be more reliable?  
Explain your answer.

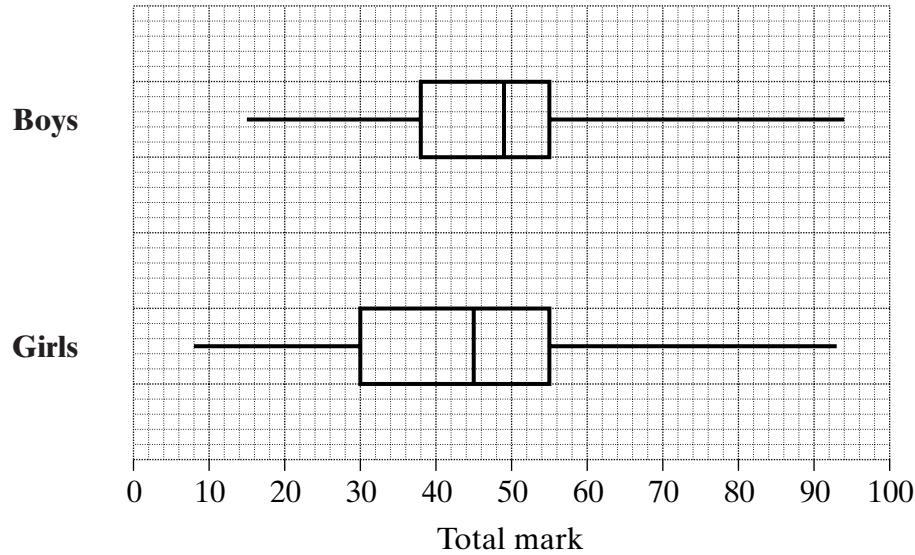
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(2 marks)

- (b) Altogether 56 boys and 52 girls take the two English tests.  
The box plots show the distributions of their total marks.



- (i) Give **two** differences between the boys' marks and the girls' marks.

Difference 1 .....

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Difference 2 .....

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(2 marks)

- (ii) A certificate is given to each student who scores a total of more than 55 marks.  
How many students are given a certificate?

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Answer ..... (2 marks)

Turn over ►

- 24** Work out  $(3 \times 10^2) \times (4 \times 10^5)$   
Give your answer in standard form.

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Answer ..... (2 marks)

- 25** Simplify

(a)  $c \times c \times c \times c$

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Answer ..... (1 mark)

(b)  $d^3 \times d^2$

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Answer ..... (1 mark)

(c)  $\frac{e}{e^8}$

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Answer ..... (1 mark)

(d)  $(2g^2h^4) \times (3g^3h)$

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Answer ..... (2 marks)

- 26 (a) Expand and simplify  $(x + y)(x - y)$

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Answer ..... (2 marks)

- (b) (i) Factorise  $x^2 - 13x + 36$

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Answer ..... (2 marks)

- (ii) Hence, or otherwise, solve the equation  $x^2 - 13x + 36 = 0$

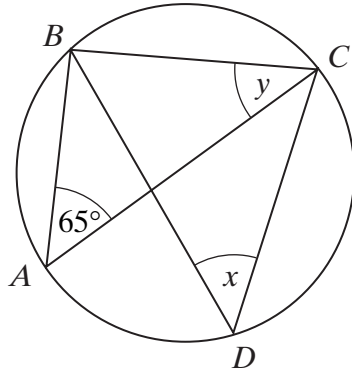
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Answer ..... (1 mark)

**TURN OVER FOR THE NEXT QUESTION**

Turn over ►

- 27**  $A, B, C$  and  $D$  are points on the circumference of a circle.  
 $AC$  is a diameter of the circle.  
 Angle  $BAC = 65^\circ$



Not drawn accurately

- (a) Write down the value of  $x$ .

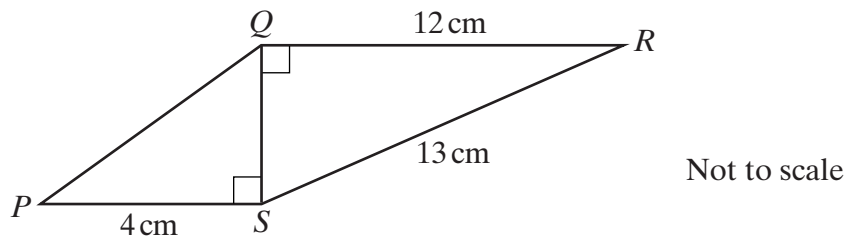
Answer ..... degrees (1 mark)

- (b) Calculate the value of  $y$ .

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Answer ..... degrees (1 mark)

- 28**  $PQRS$  is a quadrilateral.  
Angles  $RQS$  and  $QSP$  are right angles.  
 $PS = 4$  cm,  $QR = 12$  cm and  $RS = 13$  cm.



Show that the length of  $PQ$  is  $\sqrt{41}$

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(4 marks)

**END OF QUESTIONS**

**THERE ARE NO QUESTIONS PRINTED ON THIS PAGE**