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F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

METHODS IN MATHEMATICS

B392/01

Methods in Mathematics 2 (Foundation Tier)

Candidates answer on the question paper.

OCR supplied materials:
None

Other materials required:
- Scientific or graphical calculator
- Geometrical instruments
- Tracing paper (optional)

Friday 24 June 2011
Morning

Duration: 1 hour 30 minutes

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

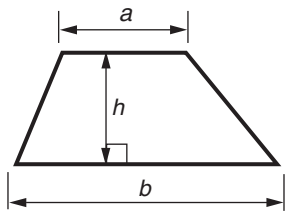
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **90**.
- This document consists of **20** pages. Any blank pages are indicated.

You are permitted to use a calculator for this paper

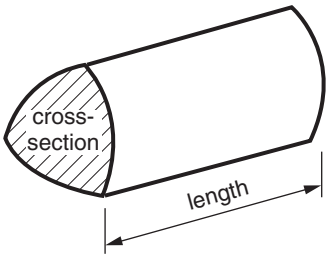
This paper has been pre modified for carrier language

Formulae Sheet: Foundation Tier

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



Volume of prism = (area of cross-section) × length



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1 This table shows the rules for three sequences and the first two terms of each sequence.

Write down the next three terms in each sequence.

Rule	Terms of sequence
Add 4 to the previous number	5, 9, _____, _____, _____
Double the previous number	5, 10, _____, _____, _____
Multiply the previous number by 3 and then subtract 2	5, 13, _____, _____, _____

[4]

2 Calculate.

(a) $\frac{13.8 + 7.7}{2.5}$

(a) _____ **[1]**

(b) $\sqrt{289}$

(b) _____ **[1]**

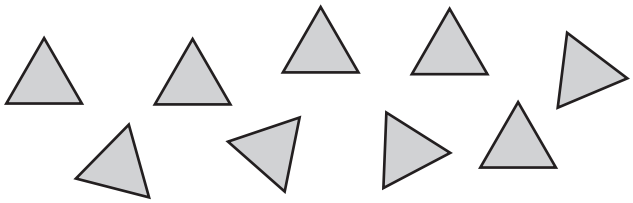
(c) 16^3

(c) _____ **[1]**

(d) $\frac{3}{4}$ of 860

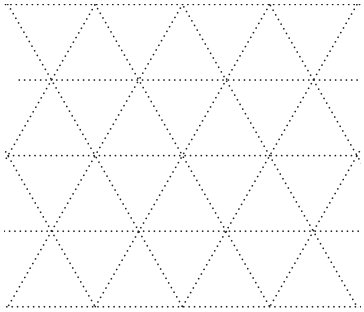
(d) _____ **[2]**

3 These nine tiles are equilateral triangles of side 1 cm.



Using nine tiles in **total** draw three different types of quadrilateral.

Give the mathematical name for each quadrilateral.



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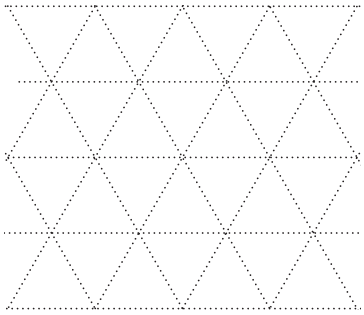

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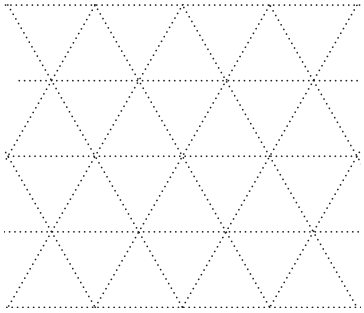
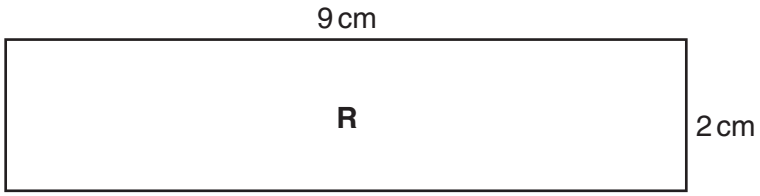


_____

[6]

4 **(a)** Work out the perimeter of rectangle **R**.



(a) _____ cm **[1]**

(b) **(i)** Draw a rectangle with the **same perimeter** as rectangle **R** but with a **larger area** than **R**.
Write the length and width on your rectangle. **[2]**

(ii) Work out the area of your rectangle.
Give the units of your answer.

(b)(ii) _____ **[2]**

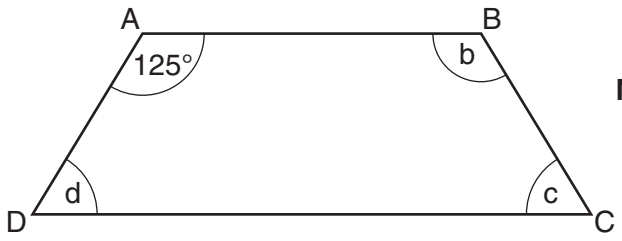
5 **(a)*** Explain why the sum of the angles of a quadrilateral is 360°.
You may wish to use a diagram to help you.

_____

_____

_____ **[2]**

(b) This trapezium has one line of symmetry.
Angle DAB = 125°.



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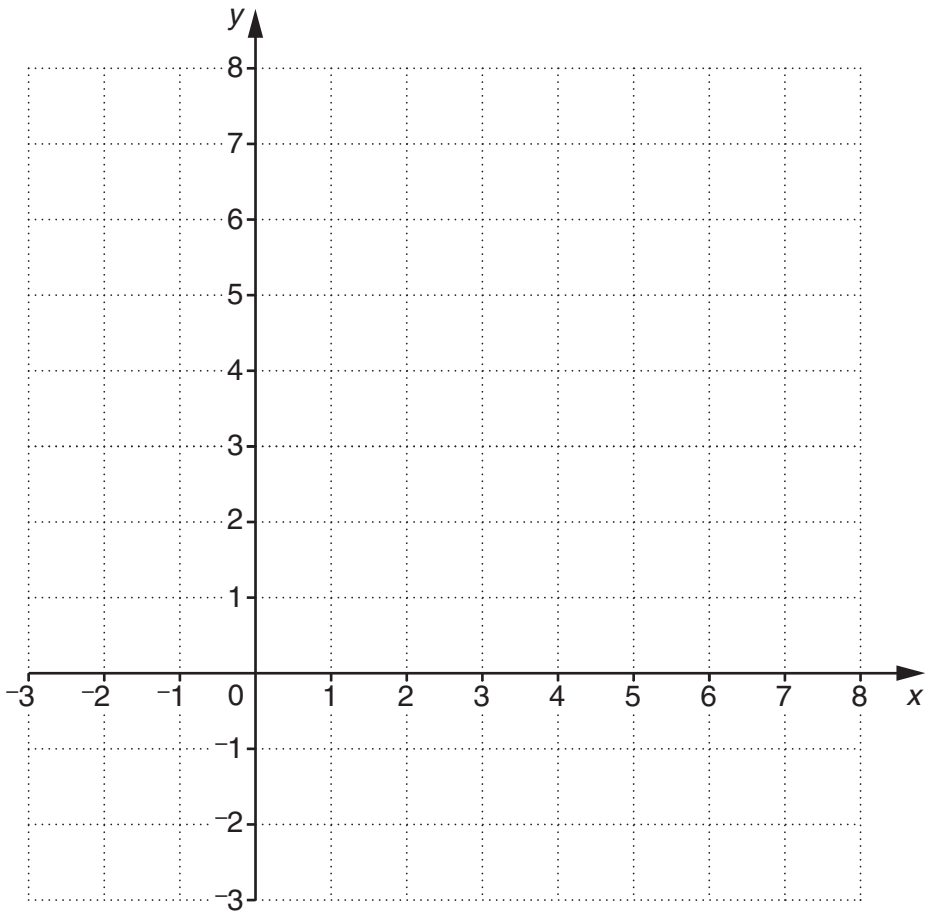
Work out the sizes of angles b, c and d.

(b) b = _____ °

c = _____ °

d = _____ ° **[3]**

6



(a) Plot the points A (−1, 4) and B (5, 7). **[2]**

(b) Find the coordinates of the midpoint of the line segment AB.

(b) (_____ , _____) **[2]**

7 This is part of a number grid.

1	2	3	4	5	6	7
11	12	13	14	15	16	17
21	22	23	24	25	26	27
31	32	33	34	35	36	37
41	42	43	44	45	46	47

(a) (i) This 3 by 3 square is taken from the grid.

4	5	6
14	15	16
24	25	26

Find the sum of the corner numbers.

4 + 6 + 24 + 26 = _____ **[1]**

(ii) Choose another 3 by 3 square from the grid.

Find the sum of the corner numbers.

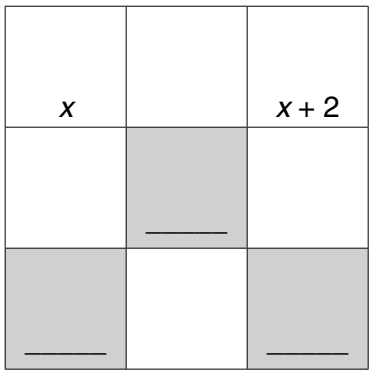
_____ = _____ **[1]**

(iii) What connection do you notice between the sum of the corner numbers and the middle number in each square?

_____

_____ **[2]**

(b) This square represents any 3 by 3 square from the grid.
The numbers in two of the small squares are written in terms of x.



(i) Write expressions, in terms of x, for the numbers in the three shaded squares. **[2]**

(ii) Find an expression for the sum of the corner numbers in terms of x.
Write your answer in its simplest form.

(b)(ii) _____ **[2]**

(iii) Use your expressions to show that the connection you found in part **(a)** will be true for any 3 by 3 square from the grid.

_____

_____

_____ **[2]**

8 The rows in the table show equivalent fractions, decimals and percentages.

Fill in the missing numbers.

Fraction (in its simplest form)	Decimal	Percentage
$\frac{1}{10}$	0.1	10%
		25%
	0.05	
$\frac{2}{5}$		

[4]

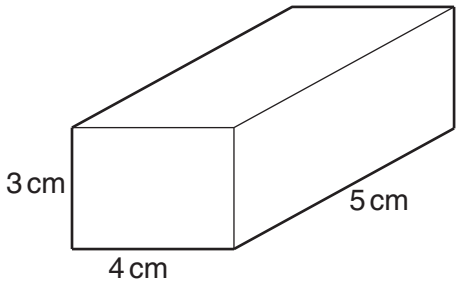
9 **(a)** Solve $x + 18 = 16$.

(a) _____ **[1]**

(b)* Solve $5(3x + 2) = 50$.
Show each step of your working.

(b) _____ **[3]**

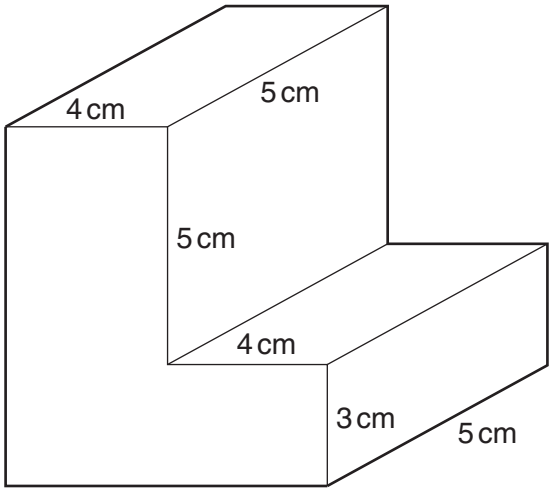
10 (a)



Work out the volume of this cuboid.

(a) _____ cm^3 **[2]**

(b) Two cuboids are joined together to make an 'L-shaped' prism.



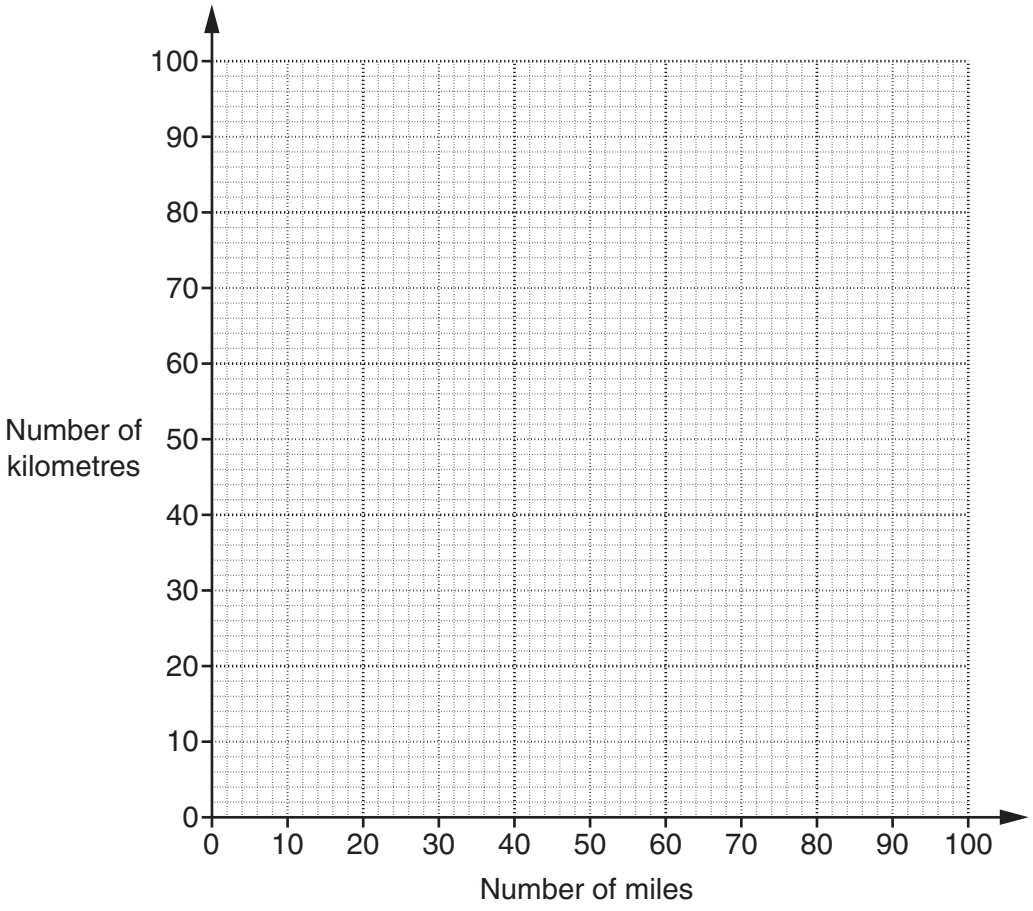
Work out the volume of this prism.

(b) _____ cm^3 **[3]**

11 This is a conversion table between miles and kilometres.

Number of miles	Number of kilometres
10	16
20	32
50	80

(a) Draw a graph for converting between miles and kilometres.



[2]

(b) Anna drove 840 kilometres on holiday in France.
Leo drove 550 miles on holiday in Scotland.

Who drove further and by how much?

(b) _____ drove further by _____ **[4]**

12 Decide whether each of these statements is true or false.
Justify each answer.

Statement	True or false	Justification
$\frac{1}{3} < 0.3$		
$\left(\frac{1}{5}\right)^2 < \frac{1}{5}$		

[4]

13 **(a)** Janet went on holiday to Namibia.
She flew from London at 7:15 pm on Wednesday evening and arrived in Windhoek, the capital city of Namibia, at 11:05 am on Thursday morning.

How long did the journey take?
Write your answer in hours and minutes.

(a) _____ hours _____ minutes **[2]**

(b) The area of Namibia is 825 400 km^2.
The area of England is 130 400 km^2.

(i) Write 130 400 in words.

_____ **[1]**

(ii) Complete the sentence below.

The area of Namibia is about _____ times the area of England. **[2]**

(c) This table gives information about the populations of Namibia and England and their capital cities.

Country	Capital city
Namibia 2 130 000	Windhoek 270 000
England 51 000 000	London 7 600 000

'Living in the capital city is more likely in England than in Namibia.'

Use information from the table to work out whether this statement is true.

_____

_____

_____ **[2]**

14 A fizzy orange drink can be made from orange juice and lemonade.
The strength of the drink depends on the ratio of orange juice to lemonade.
The greater the proportion of orange juice, the stronger the drink is.

The table gives the ratios for 5 drinks.

Drink	Ratio of orange juice to lemonade
A	1 : 4
B	2 : 10
C	1 : 6
D	1 : 3
E	3 : 12

Arrange the drinks in order of strength, weakest to strongest.

_____ **[3]**

weakest

15 **(a)** Calculate the size of an interior angle of a regular pentagon.

(a) _____ ° **[2]**

(b) Explain why regular pentagons will not tessellate.
You may wish to use diagrams to help you.

_____

_____

_____ **[2]**

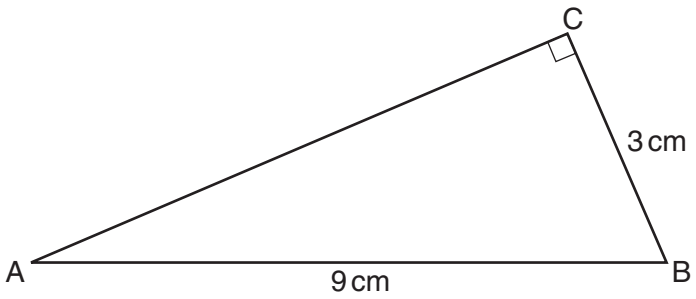
16 Rearrange this formula to make x the subject.

$y = 5x - 9$

_____ **[2]**

17 ABC is a right-angled triangle.
AB = 9 cm. CB = 3 cm.

Work out the length of AC.



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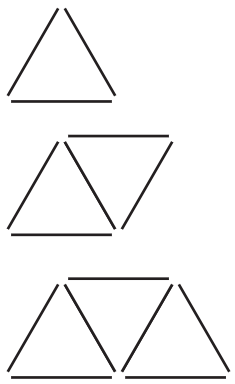
_____ cm **[3]**

18 The diagrams show a sequence of patterns using sticks.
The first three patterns are shown.



How many sticks will be needed for the 50th pattern?

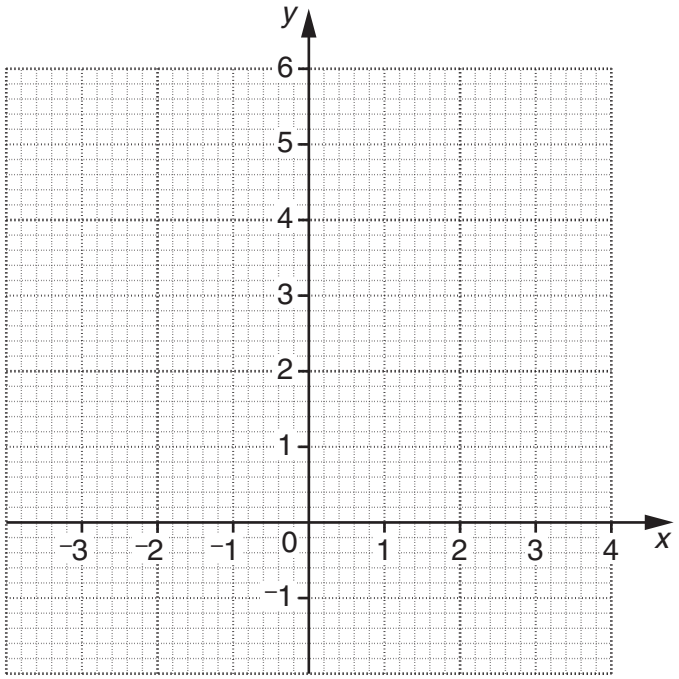
_____ **[3]**

19 **(a)** Complete the table for $y = x^2 + x$.

x	−3	−2	−1	0	1	2
y	6			0		

[2]

(b) Draw the graph of $y = x^2 + x$.



[2]

(c) Use your graph to solve $x^2 + x = 5$.
Write your answers correct to 1 decimal place.

(c) _____ **[2]**

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