

C67 D56 E46 F36 G26



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GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS SYLLABUS A

Paper 2 (Foundation Tier)

J512/02

Solutions

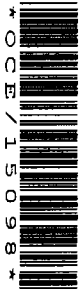
**Friday 15 January 2010
Morning**

Duration: 2 hours

Candidates answer on the Question Paper

OCR Supplied Materials:
None

- Other Materials Required:**
- Electronic calculator
 - Geometrical instruments
 - Tracing paper (optional)



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

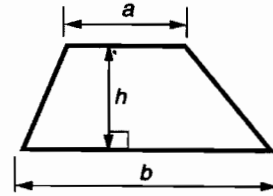
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show your working. Marks may be given for a correct method even if the answer is incorrect.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

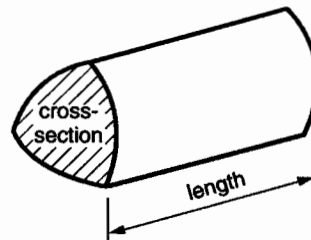
- The number of marks is given in brackets [] at the end of each question or part question.
- You are expected to use an electronic calculator for this paper.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- The total number of marks for this paper is **100**.
- This document consists of **20** pages. Any blank pages are indicated.

Formulae Sheet: Foundation Tier

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



Volume of prism = (area of cross-section) \times length



PLEASE DO NOT WRITE ON THIS PAGE

1

5	8	16	4
25	30	36	

From these numbers, select the correct one to fill each gap.

- (a) 30 is a multiple of 15. [1]
- (b) 4 is a factor of 12. [1]
- (c) 25 is the square of 5. [1]
- (d) The square root of 16 is 4. [1]
- (e) 4 multiplied by 25 gives the same answer as 10^2 . [2]
- (f) 5 is a prime number. [1]

- 2 (a) Write these decimals in order of size, smallest first.

0.32 0.201 0.124 0.2

.....

(a) 0.124 0.2 0.201 0.32 [2]
smallest

- (b) A box of cereal costs £2.42.

Work out the maximum number of these boxes that you can buy for £10.

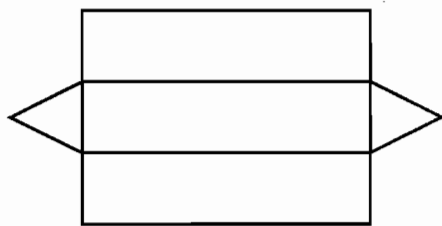
£10 ÷ £2.42 = 4.13 so 4 boxes

.....

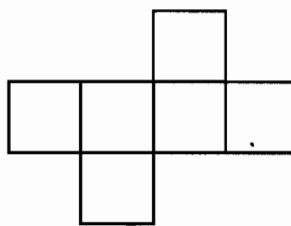
(b) 4 [2]

- 3 (a) Here are the nets of two 3-D shapes.

Write the name of each 3-D shape below its net.



Triangular Prism

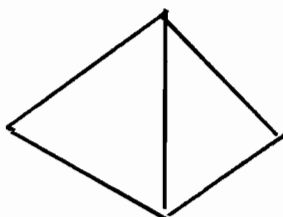


cube

[2]

- (b) Draw a sketch of a square-based pyramid.

[2]

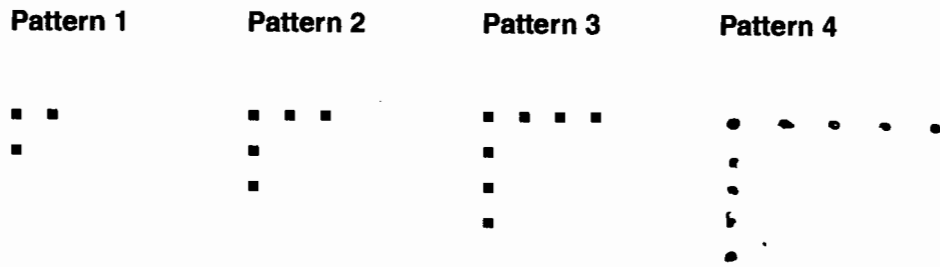


- (c) Without drawing any diagrams, describe a cylinder.

A circular prism. It has a uniform
circular cross-section all along its length

[2]

4 (a) Here is a sequence of patterns.



(i) Draw Pattern 4 in the space above. [1]

(ii) Complete this table.

Pattern number	1	2	3	4	5
Number of dots	3	5	7	9	11

[1]

(b) (i) Write down the next term in this sequence.

3 6 9 12 15 18

[1]

(ii) Explain in words how you worked out your answer.

Sequence goes up in 3s so I added
on 3 to 15

[1]

(c) (i) Write down the next two terms in this sequence.

72 36 18 9 4.5

..... [2]

(ii) Explain in words how you worked out your answer.

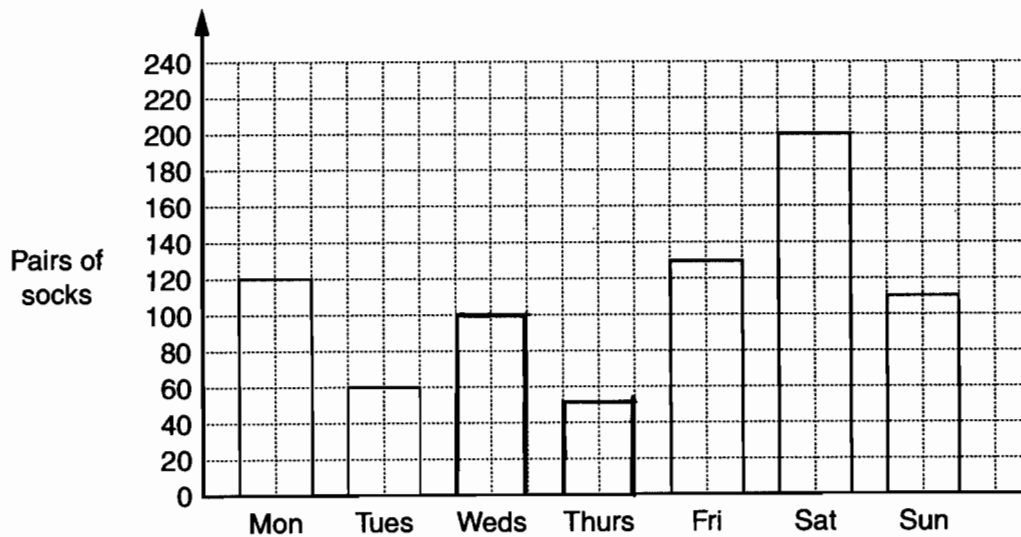
÷ 2 to get the next number in
the sequence

[1]

- 5 Jorgio sells socks.
The pictogram shows last week's sales.

Jorgio's Socks		■ represents 40 pairs of socks
Monday	■ ■ ■	120
Tuesday	■ ■	60
Wednesday	■ ■ ■	100
Thursday	■ ■	50
Friday	□ □ □ □	130
Saturday	□ □ □ □ □	200
Sunday	■ ■ ■	110

- (a) In the pictogram, enter the numbers of pairs of socks sold on Wednesday and on Thursday. [2]
- (b) Complete the pictogram to show the sales on Friday and on Saturday. [2]
- (c) Complete the bar chart to illustrate the information shown in the pictogram.



[2]

- 6 (a) Write in figures the number 'four million'.

(a) 4,000,000 [1]

- (b) Write 3538

(i) to the nearest 10,

(b)(i) 3540 [1]

(ii) to the nearest 100.

(ii) 3500 [1]

- (c) Maria buys a bag of sweets costing £1.15 and a sandwich costing £1.08.

Work out how much change she receives from £5.

$$\begin{aligned} & \text{.....} \quad \text{£}1.15 + \text{£}1.08 = \text{£}2.23 \\ & \text{.....} \quad \text{£}5 - \text{£}2.23 = \text{£}2.77 \\ & \text{.....} \end{aligned}$$

(c) £ 2.77 [2]

- 7 Use your calculator to work these out.

- (a) $\sqrt{1.44}$

(a) 1.2 [1]

- (b) 17% of 400

$$400 \times 0.17 = 68$$

(b) 68 [2]

- (c) 71% of 3.2

$$3.2 \times 0.71 = 2.272$$

(c) 2.272 [2]

- 8 (a) Tania's class did a French test.
Here are the marks.

Mark	Tally	Frequency
0		0
1		0
2	I	1
3		0
4	I	1
5		5
6	I	6
7		3
8		10
9		3
10		2

- (i) Write down the mode of these marks.

Occurs Most often

(a)(i) 8 [1]

- (ii) How many pupils in Tania's class did the test?

.....
(ii) 31 [1]

- (b) Some of the class did a maths challenge.
Here are their scores.

$$12 + 15 + 17 + 21 + 21 + 23 + 23 + 26 + 29 + 35 = 222$$

Work out the mean of these scores.

$$222 \div 10 = 22.2$$

.....
.....
.....
(b) 22.2 [3]

- 9 (a) n represents an even number.

What kind of number is represented by

(i) $n + 1$,

(a)(i) odd [1]

(ii) $3n$?

(ii) even [1]

- (b) Work out the value of $3x + 2y$ when $x = 4.2$ and $y = -5$.

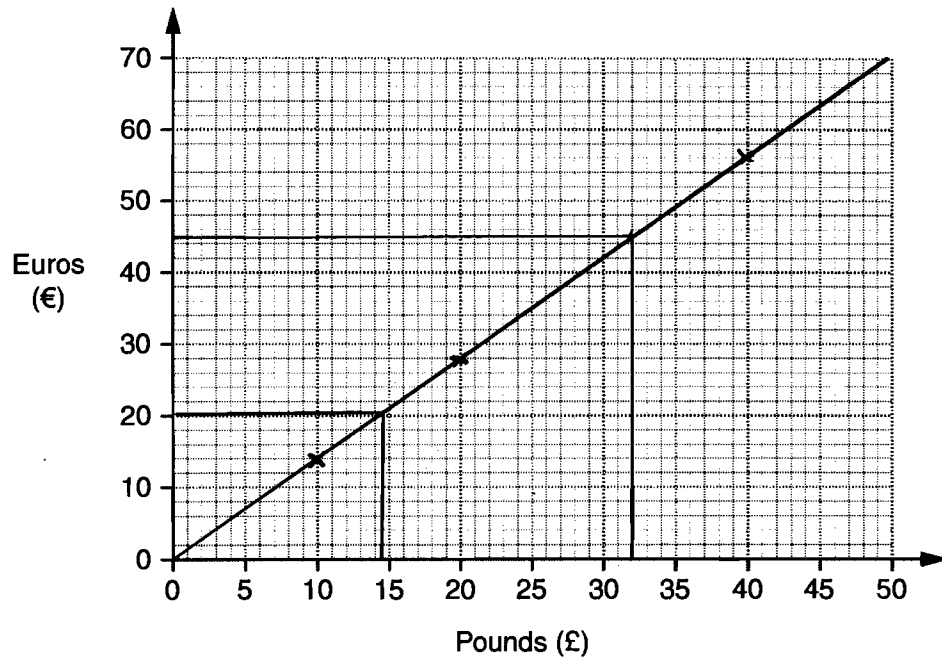
$$\begin{array}{l} \text{.....} \\ 3(4.2) + 2(-5) \\ \text{.....} \\ 12.6 - 10 = 2.6 \\ \text{.....} \end{array}$$

(b) 2.6 [2]

10 Iqbal wants to change some pounds (£) into euros (€).

He could change £10 for €14
or £20 for €28
or £40 for €56.

- (a) Use this information to plot three points on the grid.
Join the points with a straight line to form a conversion graph.



[3]

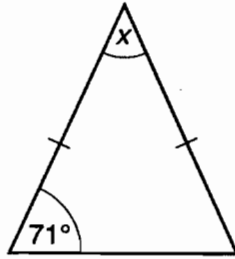
- (b) Use your graph to find how many euros Iqbal would get for £32.

(b) € 45 [1]
(44 - 46)

- (c) Use your graph to find how many pounds you would get for €20.

(c) £ 14.50 [1]
(£14 to £15)

- 11 (a) Here is an isosceles triangle.



NOT TO
SCALE

- (i) Work out angle x .

$$71 + 71 = 142$$

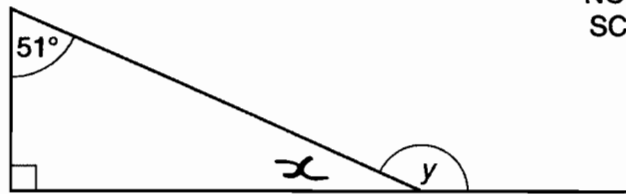
$$180 - 142 = 38^\circ$$

(a)(i) 38° [2]

- (ii) Write down an angle fact that you used to work out your answer.

Base angles of isosceles triangle are equal
OR angles of a triangle add up to 180° [1]

- (b) Here is a right-angled triangle.



NOT TO
SCALE

- (i) Work out angle y .

$$90 + 51 = 141^\circ$$

$$x = 180 - 141 = 39^\circ$$

$$y = 180 - x = 180 - 39^\circ = 141^\circ$$

(b)(i) 141° [2]

- (ii) Write down any angle facts you used to work out your answer.

Angles of triangle add up to 180°
Angles on a straight line add up to 180°

[2]

- 12 (a) A bag contains red, green and blue discs.
Eleven of the discs are red, five are green and three are blue.
A disc is taken from the bag at random.

$$11 + 5 + 3 = 19$$

Work out the probability that the disc is

- (i) red,

$$\frac{11}{19}$$

(a)(i) $\frac{11}{19}$ [2]

- (ii) green or blue,

$$\frac{5+3}{19} = \frac{8}{19}$$

(ii) $\frac{8}{19}$ [1]

- (iii) white.

impossible so 0

(iii) 0 [1]

- (b) A dice was rolled 200 times.
Here are the results.

Score	1	2	3	4	5	6
Frequency	23	18	26	95	22	16

Explain why these results might make you suspect that the dice is biased.

Would expect the frequencies to be more evenly spread on a fair dice. Too many 4s occurred. [1]

13 Calculate.

$$(a) \frac{(7.8 - 3.1)}{(1.2 + 6.9)}$$

Put brackets round top and bottom!!

.....

.....

$$(a) \frac{0.580}{\quad\quad\quad} \quad [2]$$

to 3 d.p

$$(b) \sqrt{2.56^2 - 1.4^2}$$

$$= \sqrt{(2.56^2 - 1.4^2)}$$

Brackets again!!

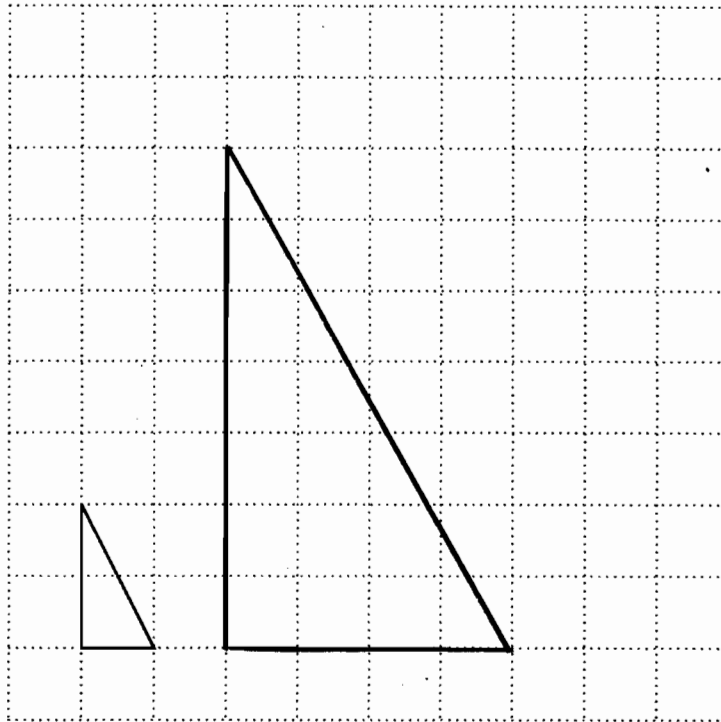
.....

.....

$$(b) \frac{2.143}{\quad\quad\quad} \quad [2]$$

to 3 d.p

- 14 (a) Draw an enlargement of the triangle.
Use a scale factor of 4.

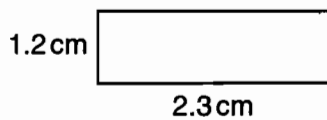


[2]

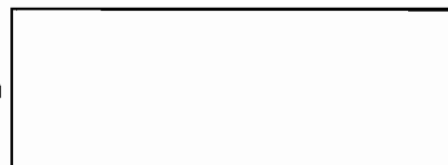
- (b) The smaller rectangle has been enlarged by a scale factor of 1.8 to give the larger rectangle.
Work out the length and width of the larger rectangle.

.....

NOT TO SCALE



2.16 cm



4.14 cm

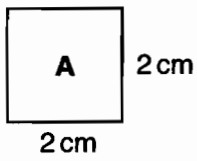
$$1.2 \times 1.8 = 2.16$$

$$2.3 \times 1.8 = 4.14$$

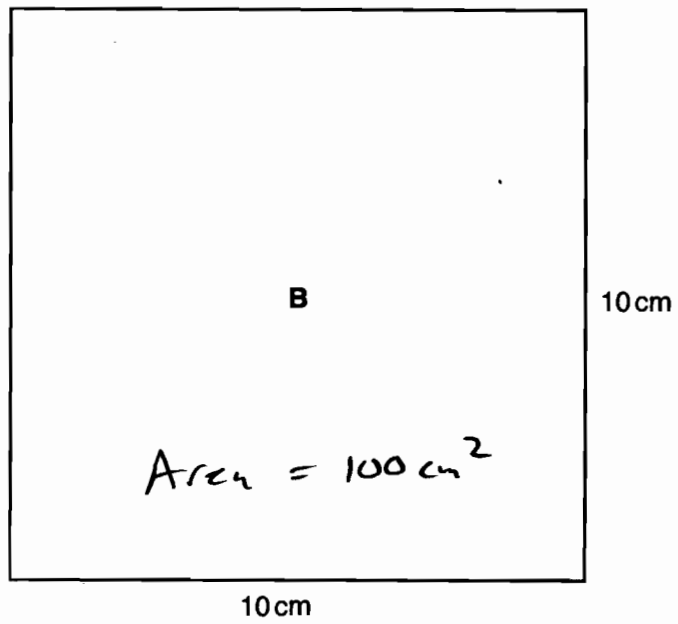
[2]

- (c) Square **A** has been enlarged by a scale factor of 5 to give square **B**.

NOT TO SCALE



$$\text{Area} = 4 \text{ cm}^2$$



$$\text{Area} = 100 \text{ cm}^2$$

$$100 \div 4 = 25$$

Complete this sentence.

The area of square **B** is 25 times the area of square **A**.

[2]

- 15 Jayne uses these ingredients to make play dough.

Play dough for 2 children	
Plain flour	225 g
Oil	2 tablespoons
Water	$\frac{3}{4}$ pint
Salt	140 g

For 1 child

112.5

70g

- (a) Jayne wants to make enough play dough for 10 children.

$$10 = 2 \times 5$$

Work out the amount of water Jayne will need.

$$\text{Water } \frac{3}{4} \times 5 \text{ pints}$$

$$= \frac{15}{4}$$

(a) $3\frac{3}{4}$ pints [2]

- (b) Jayne has lots of oil and water, but only a 1.5 kg bag of plain flour and a 1 kg bag of salt.

What is the maximum number of children Jayne can make play dough for?

You must show your working.

$$\text{Flour } 1.5 \text{ kg} = 1500\text{g} \quad 1500 \div 112.5 = 13.3$$

$$\text{Salt } 1000 \div 70 = 14.28$$

Max of 13 with flour and max of 14 with salt

so limited to 13

(b) 13 [3]

- 16 Gary's dogs eat 6 tins of dog food between them each day.
The tins are sold in boxes of 44.
Gary normally buys one box of 44 tins for each week.

Explain, showing your calculations, why Gary does not have to buy a box for the 22nd week.

7 days in week

$$7 \times 6 = 42 \text{ so } 2 \text{ left each week}$$

After 21 weeks there will be $21 \times 2 = 42$

left over which is enough for a week without buying any more.

17 One question on the 2001 Census form was;

'How many cars are available for use by one or more members of your household?'

There was space on the form to write down who lived at that household.

Jenna collects information about the number of people and the number of cars at each household from a sample of 100 Census forms.

In this sample there were no households where more than 5 people lived and none had more than 3 cars.

(a) Design a two-way table for Jenna to use.

[3]

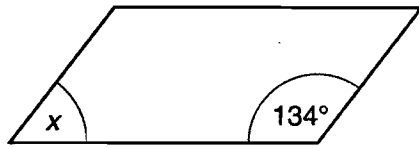
		People in Household					TOTALS
		1	2	3	4	5	
No of Cars	0						
	1						
	2			14			
	3						
TOTALS							

(b) In Jenna's sample there are 14 households with 3 people and 2 cars.

Show this data in your table in part (a).

[1]

- 18 (a) A parallelogram has angles as shown.



NOT TO
SCALE

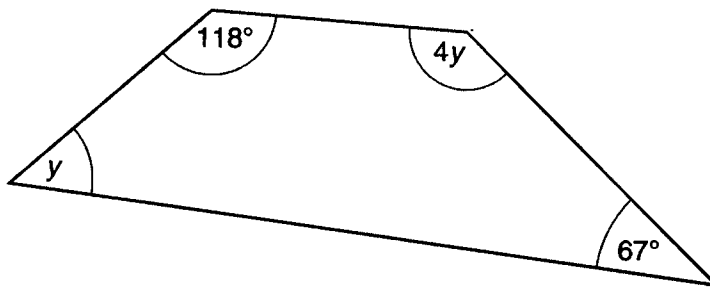
Work out angle x .

Give a reason for your answer.

$$180 - 134 = 46$$

$x = 46$ ° because Allied or interior angles
add up to 180° [2]

- (b) A quadrilateral has angles as shown.



NOT TO
SCALE

Work out angle y .

$$y + 118 + 4y + 67 = 360$$

$$5y + 185 = 360$$

$$5y = 360 - 185$$

$$5y = 175$$

$$y = \frac{175}{5}$$

$$y = 35^\circ$$

(b) $y = 35$ ° [4]

19 Simplify.

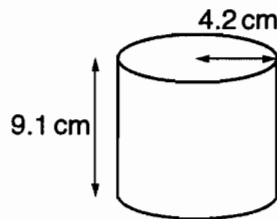
$$(a) d^7 \times d^4 = d^{7+4} = d^{11}$$

$$(a) \underline{d^{11}} \quad [1]$$

$$(b) \frac{d^9}{d^3} = d^{9-3} = d^6$$

$$(b) \underline{d^6} \quad [1]$$

20 A cylindrical tin has radius 4.2 cm and height 9.1 cm.



$$\begin{aligned} \text{Circumference} &= 2\pi r \\ &= 2 \times \pi \times 4.2 \\ &= 26.39 \text{ cm} \end{aligned}$$

Work out the curved surface area of the tin.

Give your answer to an appropriate degree of accuracy.

$$\begin{aligned} \text{Curved surface area} &= \text{circumference} \times \text{height} \\ &= 26.39 \times 9.1 \\ &= 240.149 \end{aligned}$$

$$\underline{240.1} \text{ cm}^2 \quad [4]$$

$$\text{or } 240 \text{ cm}^2$$