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F

Wednesday 13 June 2012 – Morning

GCSE APPLICATIONS OF MATHEMATICS

A382/01 Applications of Mathematics 2 (Foundation Tier)

A317050612

Candidates answer on the Question Paper.

OCR supplied materials:
None

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

Duration: 1 hour 30 minutes

A382 01

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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- 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 **24** pages. Any blank pages are indicated.

You are permitted to use a calculator for this paper

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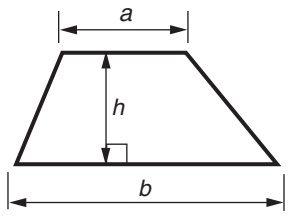
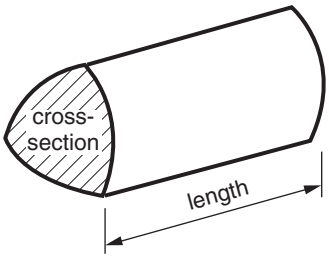
Formulae Sheet: Foundation Tier

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



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



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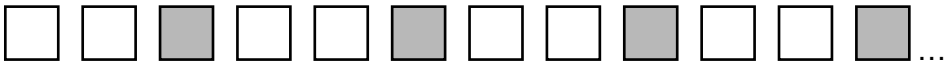
1 **(a)** Amy made a repeating pattern of grey and white squares.
Amy's pattern repeated after 3 squares.



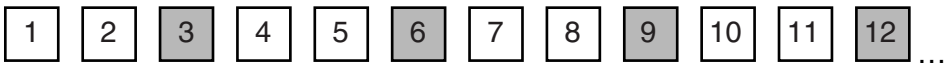
Amy used 2 white squares for every grey square in her pattern.
She went on adding sets of 3 squares to her pattern.

Fill in the table to show how many of each colour of square there were in Amy's pattern as she added more sets of 3 squares.
The first row is done for you.

number of □	number of ■	total number of tiles
8	4	12
10	5	
12		
	14	
		45

[4]

(b) Amy numbers the squares in her pattern.



(i) The first four grey squares have the numbers 3, 6, 9 and 12.

Write the numbers of the next three grey squares.

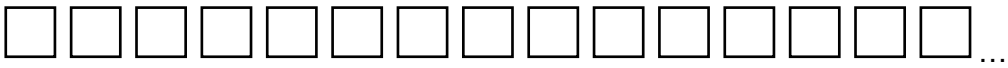
(b)(i) _____ , _____ , _____ **[1]**

(ii) Write the number of the first grey square after 100.

(ii) _____ **[1]**

(c) Shade in some squares below to make a different repeating pattern.

Your pattern must repeat after five squares.
It must have 2 grey squares for every 3 white squares.



[2]

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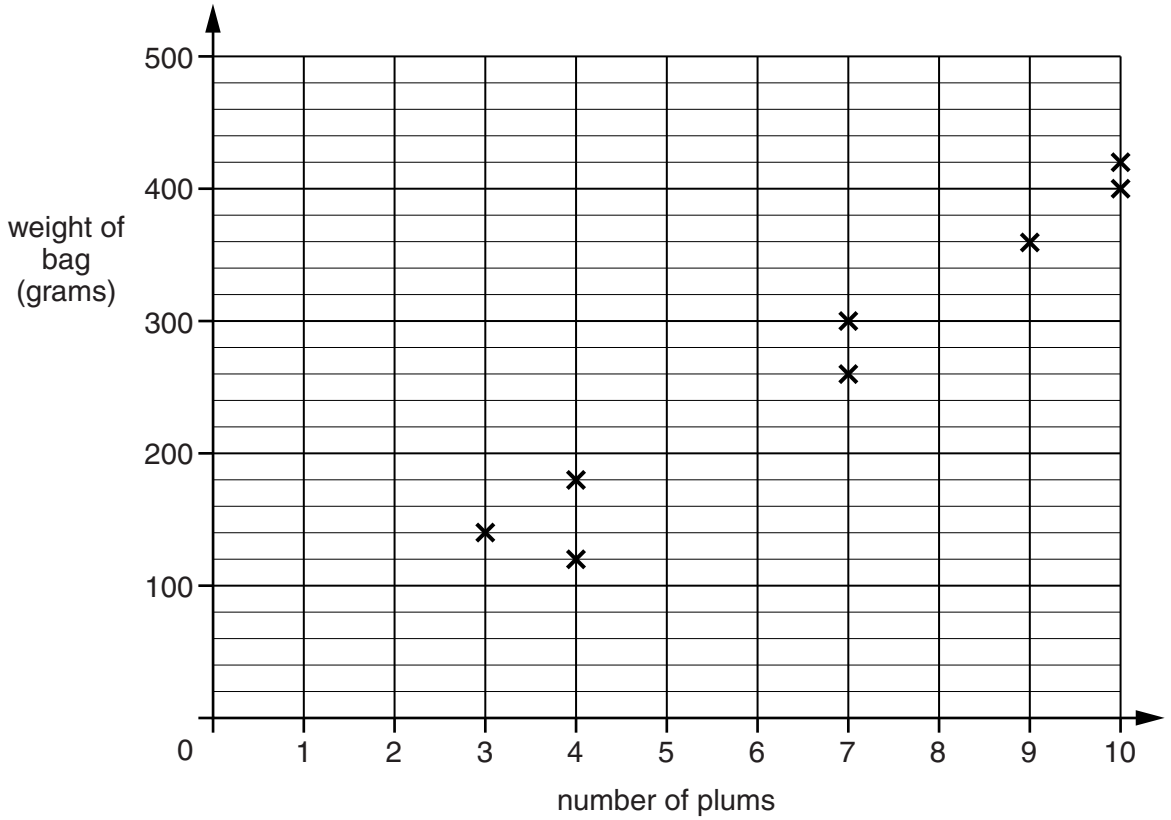
2 Lucy weighed eight bags of plums.
She counted the number of plums in each bag.
The scatter graph shows her results.



(a) Jack has a bag that contains 6 plums and weighs 240 grams.

Put a cross on the graph to show Jack's bag of plums. **[1]**

(b) What is the mean weight of the plums in Jack's bag?

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

(c) Branka has a bag that contains 8 plums.

Use the graph to estimate the weight of Branka's bag of plums.

(c) _____ g **[2]**

(d) Luke has a bag of plums that weighs 220 grams.

Use the graph to estimate the number of plums in Luke's bag.

(d) _____ **[1]**

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3 A patient in a hospital must have 4 doses of medicine at evenly spaced intervals.
She must have the first dose at **3pm** on Thursday.
She must have the last dose 24 hours later.

Look at the 24-hour time chart.

	Time for dose					
Thursday	01:00	02:00	03:00	04:00	05:00	06:00
	07:00	08:00	09:00	10:00	11:00	12:00
	13:00	14:00	15:00	16:00	17:00	18:00
	19:00	20:00	21:00	22:00	23:00	24:00
Friday	01:00	02:00	03:00	04:00	05:00	06:00
	07:00	08:00	09:00	10:00	11:00	12:00
	13:00	14:00	15:00	16:00	17:00	18:00
	19:00	20:00	21:00	22:00	23:00	24:00

At what time must the patient have each dose of medicine?

Put rings around each of the 4 times. **[3]**

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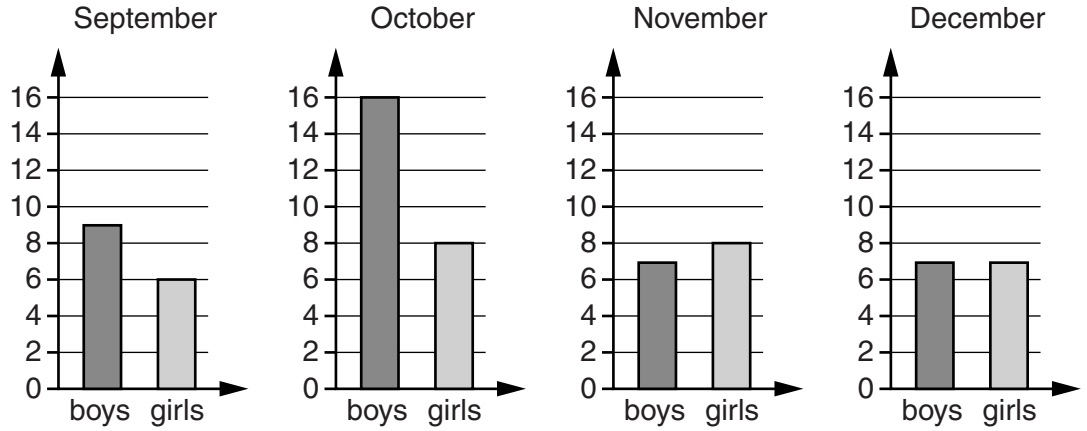
4 A school chess club meets once a month during the Autumn term.

The bar charts show the number of boys and the number of girls who attended the four meetings.



(a) (i) In one of these months, all the members of the chess club attended the meeting.

Which month was this?

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

(ii) How many students were members of the chess club?

(ii) _____ **[1]**

(iii) How many more boys than girls were members of the chess club?

(iii) _____ **[1]**

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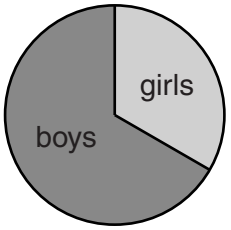
(b) These pie charts show the proportions of boys and girls who attended the four meetings.

Each pie chart shows one meeting.

Write the month of the meeting it shows next to each pie chart.



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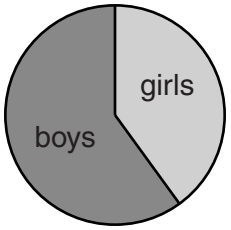

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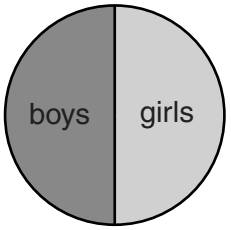

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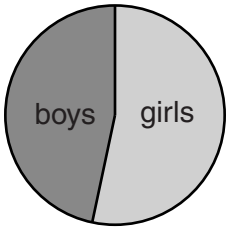

_____

[2]

(c) No members joined or left the chess club during the Autumn term.
In January, no members left the club but some new ones joined it.
Then there were an equal number of boys and girls.

How many boys and how many girls could have joined the club?

Give two different possible answers.

_____ boys and _____ girls

_____ boys and _____ girls

[2]

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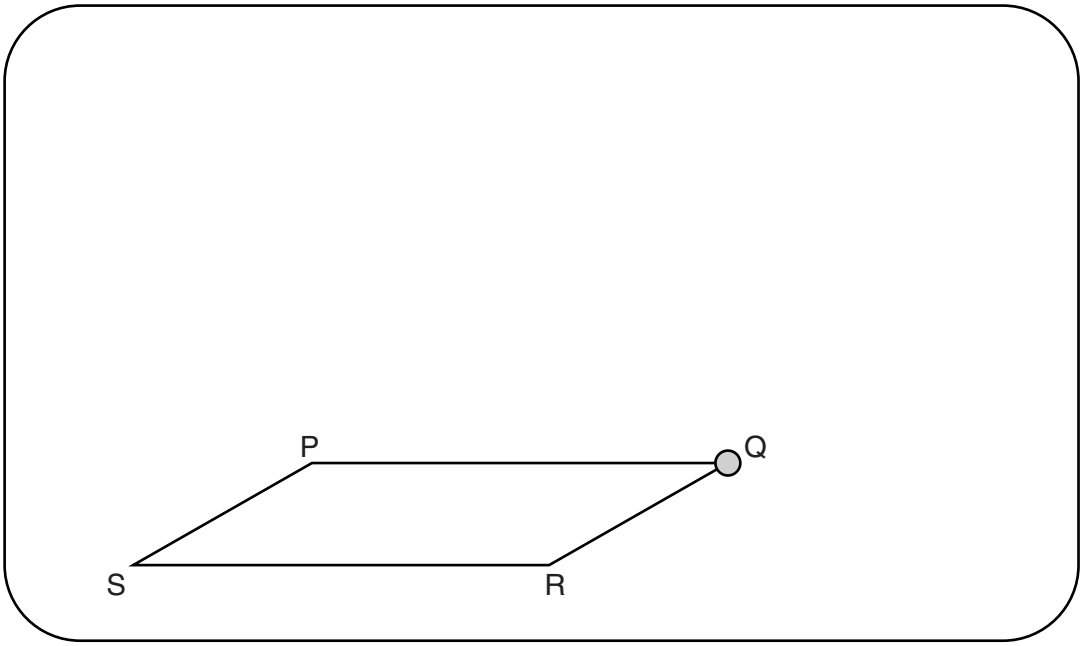
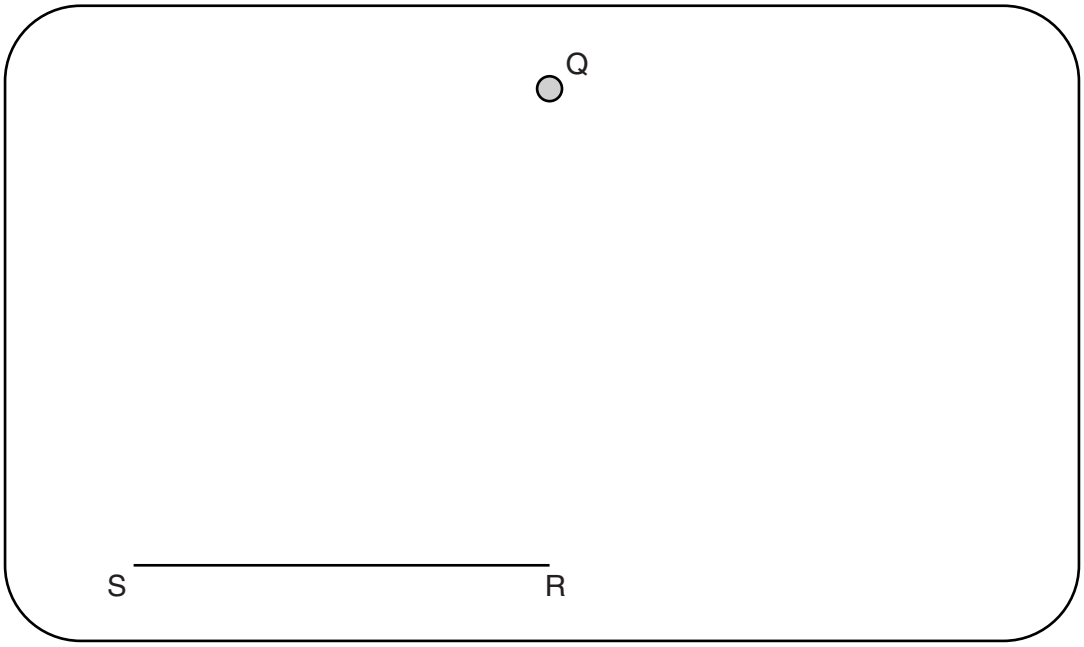
5 Maria used a dynamic geometry package to construct a parallelogram PQRS.



Then she dragged the point Q to a new position.



Draw the rest of the parallelogram with the points P and Q in their new positions. **[3]**

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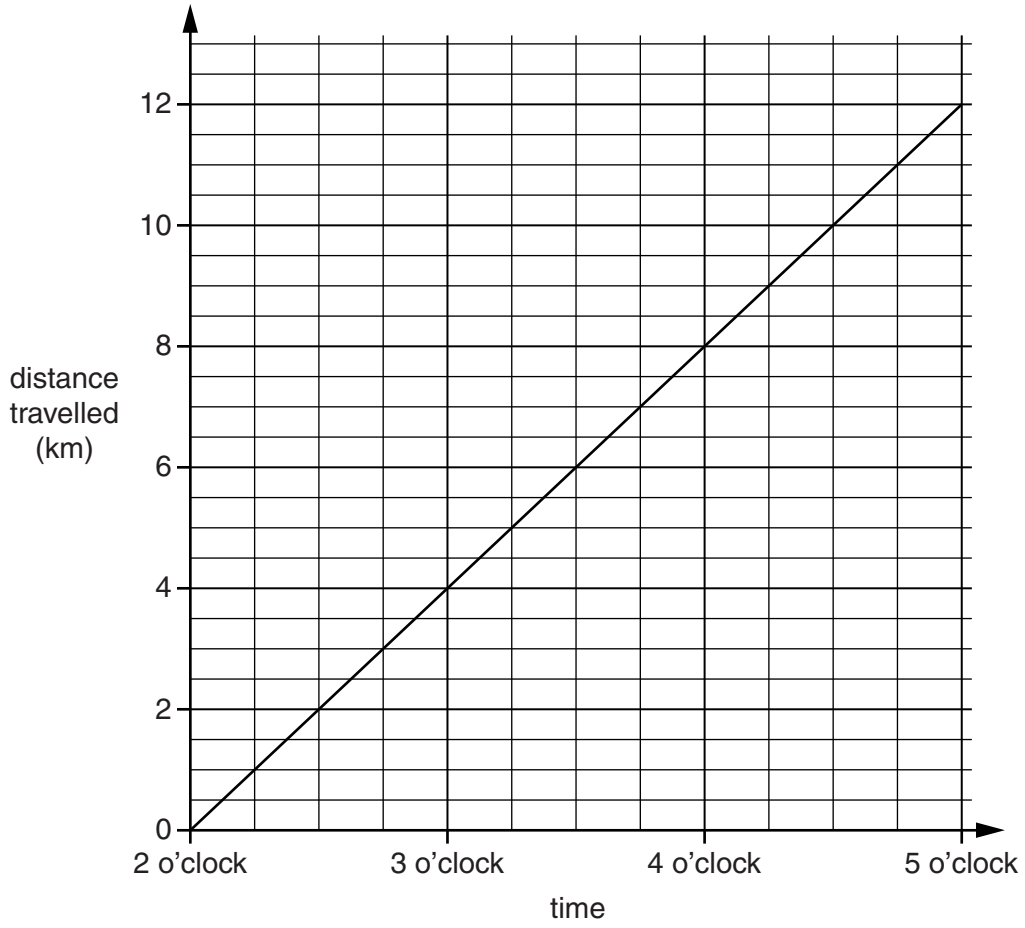
6 At 2 o'clock Leo starts walking at a steady speed along a path from a railway station.
He walks for 3 hours, then he stops at a village.
The graph shows his journey.



(a) What is the distance from the railway station to the village?

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

(b) What is Leo's speed in kilometres per hour?

(b) _____ km per hour **[2]**

(c) **(i)** At half past three Karen starts cycling along the same path from the station.
She cycles to the village at a steady speed of 16 kilometres per hour.

Draw a line on the graph to show Karen's journey. **[2]**

(ii) At what time does Karen overtake Leo?

(c)(ii) _____ **[1]**

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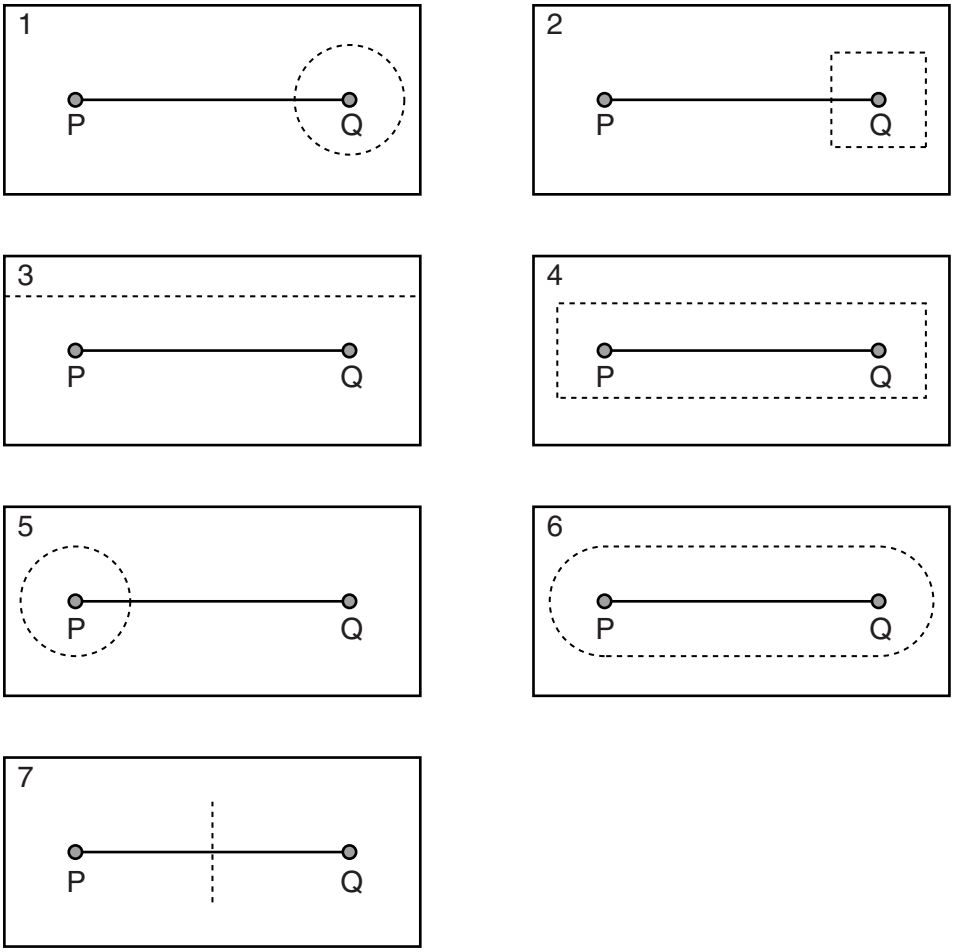
7 Five robots each move according to a different rule.

Write the correct Robot path number next to each rule.

The first is done for you.

Rule	Robot path number
Always keep a constant distance away from point P	5
Always keep a constant distance away from point Q	
Always keep the distance from point P and from point Q equal	
Always move parallel to the line PQ	
Always keep a constant distance away from the line PQ	

Robot paths



[4]

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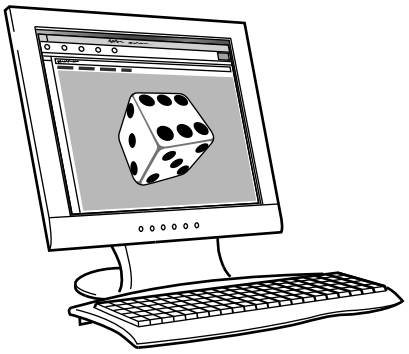
8 Jess, Laura and Molly are developing a computer simulation of a rolling dice.



They each test the simulation to see if it is fair. The table shows how many times they got each number.

	number on the dice					
	1	**2**	**3**	**4**	**5**	**6**
Jess	2	0	8	5	3	2
Laura	6	4	3	2	2	3
Molly	35	32	33	36	33	31

(a) How many times did each girl test the simulation?

Jess: _____ Laura: _____ Molly: _____ **[2]**

(b)* Tom says:

The results show that the simulated dice is **not** fair.

Is Tom correct? Put a ring around 'Yes' or 'No'.

Yes **No**

Give a reason for your answer.

_____

_____ **[2]**

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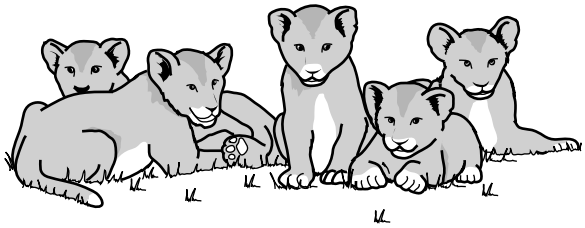
9 An American vet weighs five lion cubs in ounces.
She records her results.



name of lion cub	Kosey	Tocho	Amra	Sab	Jato
weight in ounces	34	36	40	46	49

An English vet weighs the same lion cubs in kilograms.
He records his results.

Write the names of the lion cubs on the English vet's list.

name of lion cub	**weight in kilograms**
	1.39
	0.964
	1.134
	1.02
	1.3

[3]

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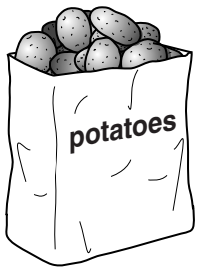
10 Alex has a bag of potatoes all of different sizes.
Each day he takes out two potatoes to cook.
He always takes the largest potato and the smallest potato left in the bag.

After a number of days there is one potato left in the bag.



(a) Look at these words:

maximum minimum mean median modal

Use one of the words to complete the sentence below:

The weight of the last potato left in the bag is equal to the

_____ weight of all the potatoes. **[1]**

(b)* There were 23 potatoes in the full bag.
The weight of the last potato is 90 grams.

Alex says:

The total weight of all the potatoes in the bag must have been 23 × 90 grams.

Explain why Alex is **wrong**.

_____

_____

_____

_____ **[1]**

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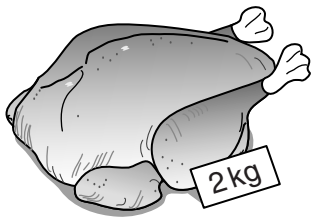
11 A cookery book gives these instructions to cook a chicken.

Roast Chicken
cooking time: 45 minutes for each 1 kg, plus 20 minutes

(a) Mohammed wants to cook a chicken that weighs 2 kilograms.

Use the instructions to work out how many minutes it will take to cook Mohammed's chicken.



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

(b)* Ellen has two chickens. One weighs twice as much as the other.

Ellen says:

> The bigger chicken will take twice as long as the smaller one to cook.

Is Ellen correct? Put a ring around 'Yes' or 'No'.

Yes **No**

Give a reason for your answer.

_____

_____

_____

_____ **[2]**

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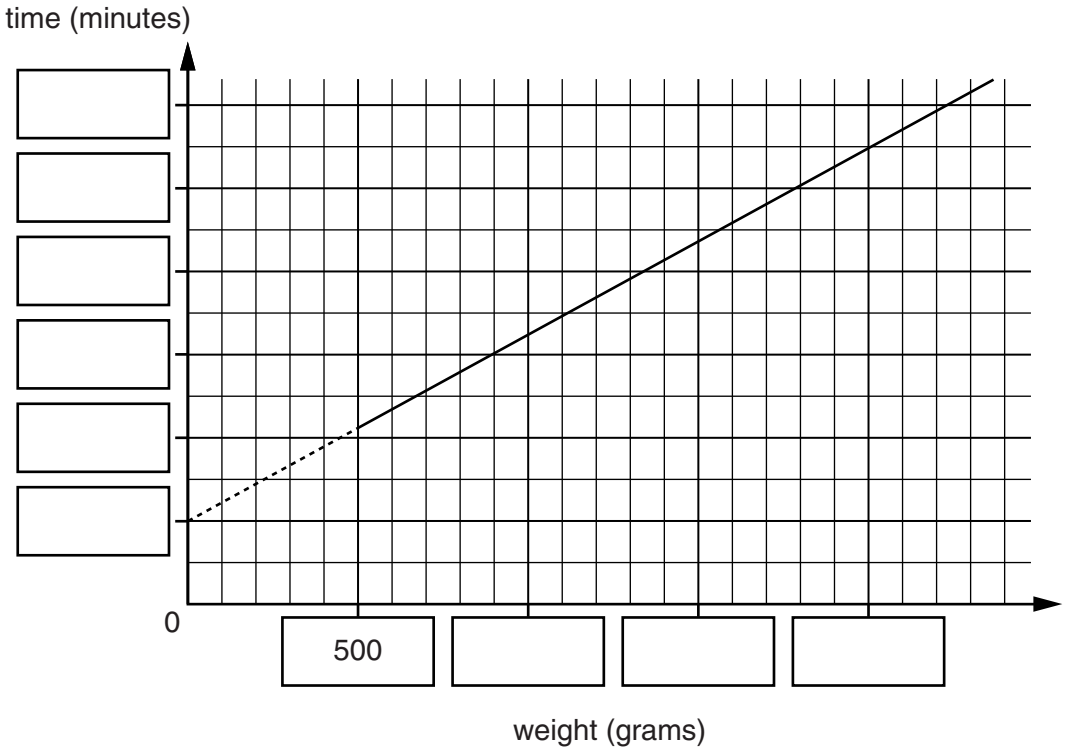
(c) The graph shows how long it takes to cook chickens of different weights using the instructions in the cookery book.

Fill in the missing numbers on the horizontal and vertical axes of the graph.



[4]

(d)* Anna bought a chicken from a supermarket.
The instructions on the package say:

Roast Chicken

cooking time:
20 minutes for each 450 g,
plus 20 minutes

Anna could use the instructions in the cookery book or the instructions on the package.

Show that it makes very little difference to the cooking time which instructions she uses.

_____

_____

_____

_____ **[3]**

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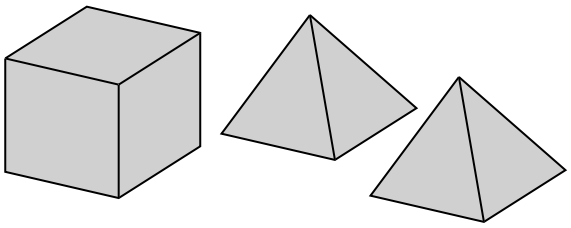
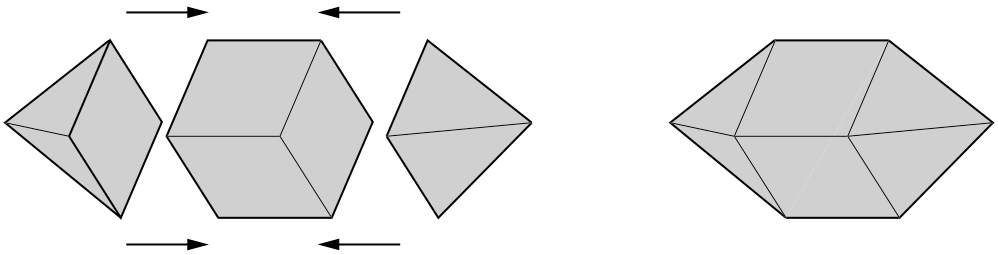
12 Rita has a cube and two square-based pyramids.

All the edges of the cube and the pyramids are the same length.

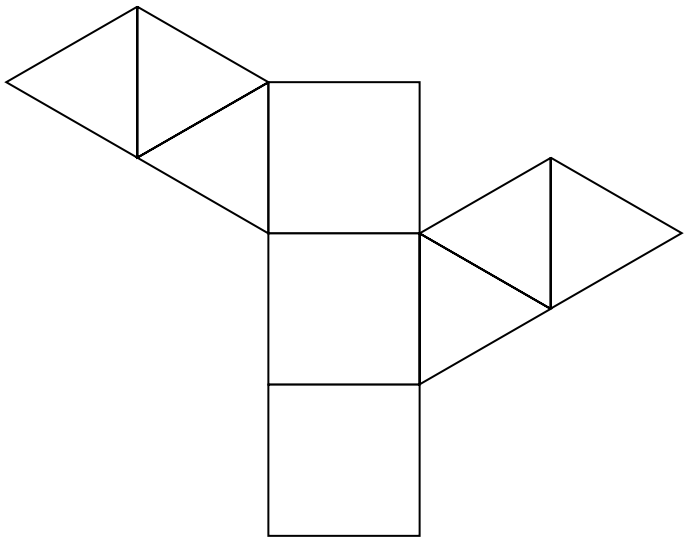


(a) Rita joins the square-based pyramids to the cube to make a new solid.



Tandi wants to make a solid that looks like Rita's new solid.
She starts to draw the net of her solid.

Complete the sketch of the net of Tandi's solid.
You will need to draw one more square and two more triangles.



[3]

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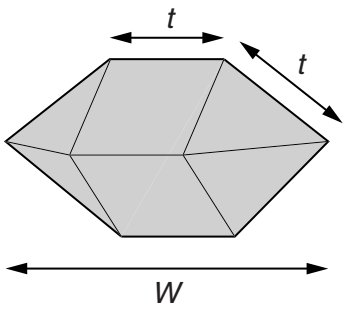
(b) All the edges of Tandi's new solid are t centimetres long.



The width in centimetres, W, of the solid is given by the formula:

$$W = t + \sqrt{2}\,t$$

The width of Tandi's solid is 15 centimetres.

What is the length of one of the edges of the solid, correct to the nearest millimetre?

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

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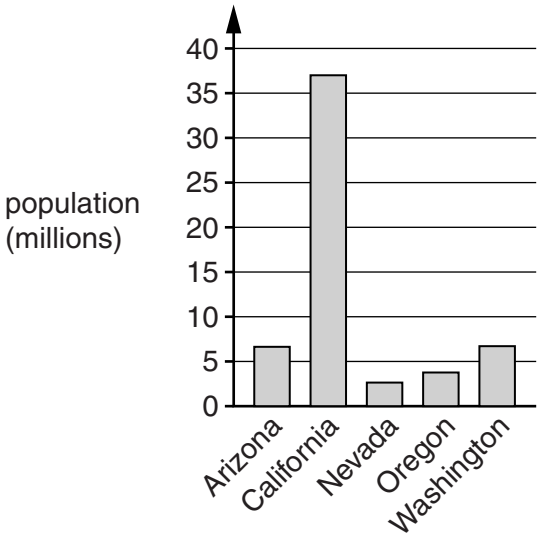
13 The diagram shows a sketch map of five states in the USA.
It is drawn approximately to scale.

The bar chart shows the population of each of the five states.



(a) Look at the statements about the five states.
Use the information from the sketch map and the bar chart to decide whether each statement is true or false.

Statement	True	False
The state with the smallest area has the smallest population.		
The two states with the closest populations are about the same size.		
The population of California is about 15 times the population of Nevada.		
The area of California is about 15 times the area of Nevada.		
The number of people per square kilometre in California and in Nevada is about the same.		

[3]

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(b) Nevada has the smallest number of people per square kilometre of the five states.

Use the information from the sketch map **and** the bar chart to write the names of the five states in the order of their number of people per square kilometre.

Number of people per square kilometre	**State**
smallest:	Nevada
largest:	

[4]

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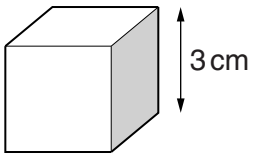
14 **(a)** Megan has a cube with an edge length of 3 cm.



(i) What is the volume of Megan's cube?

(a)(i) _____ cm^3 **[1]**

(ii) What is the total surface area of Megan's cube?

(ii) _____ cm^2 **[2]**

(b) Harry has a cube with a volume of $n^3 cm^3$.

(i) What is the edge length of Harry's cube?

(b)(i) _____ cm **[1]**

(ii) Write an expression for the total surface area of Harry's cube.

(ii) _____ cm^2 **[1]**

(iii) Harry's cube has a total surface area of 150 cm^2.

What is the volume of Harry's cube?

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

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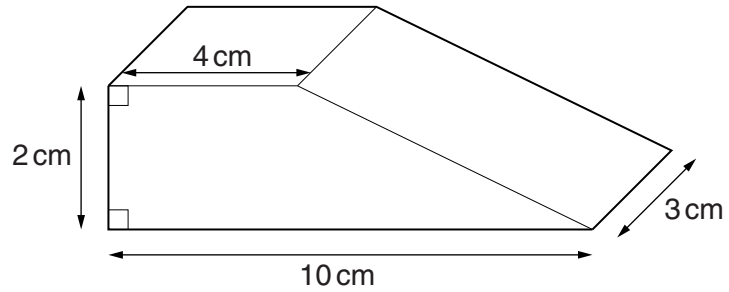
15 Anil designs this door wedge.
The top and the base are rectangles.

This is a 3-D drawing of the door wedge.



Draw full size the plan view, a front view and a side view of the door wedge.

[6]

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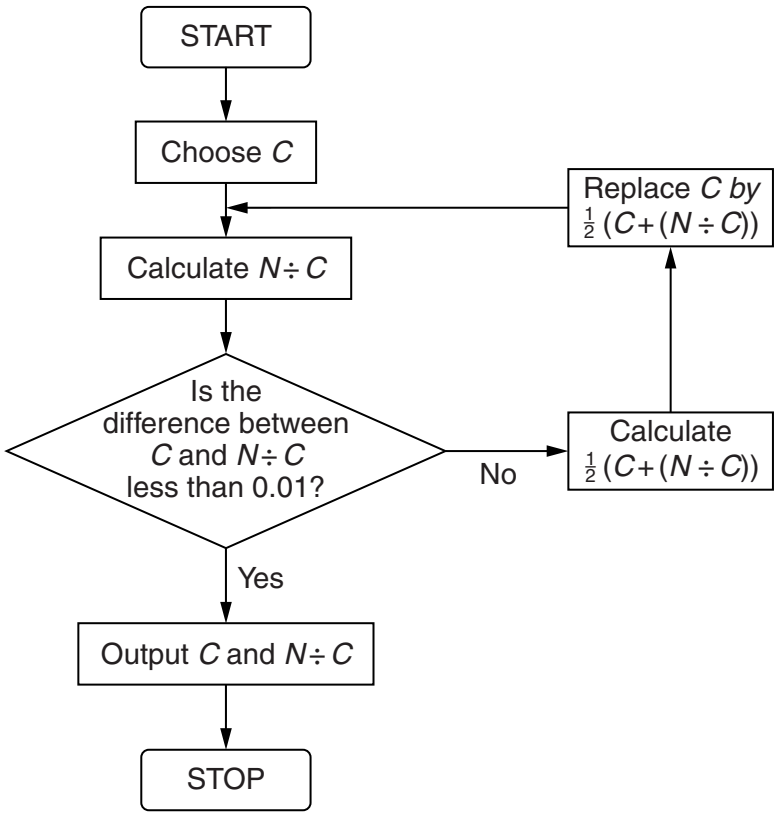
16 Hero was a mathematician who lived in Ancient Greece.
He used the method shown in this flow diagram to find an approximate square root, C, of a number, N.



(a) Use the flow diagram to find the approximate square root of 29.
Start with $C = 5$ and $N = 29$.
Complete the table to show each step of your working.

C	$N \div C$	Difference between C and $N \div C$	$\frac{1}{2}(C + (N \div C))$
5			

[5]

(b) Use the values in the bottom row of your table to write down $\sqrt{29}$ correct to 4 significant figures.

(b) $\sqrt{29}$ = _____ **[1]**

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