AQA

General Certificate of Secondary Education
Foundation Tier
June 2015

Applications of Mathematics (Linked Pair) 93702F

Unit 2   Geometry and Measures

F

Thursday 11 June 2015   1.30 pm to 3.00 pm

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

Time allowed
- 1 hour 30 minutes

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. Cross through any work that you do not want to be marked.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80
- The quality of your written communication is specifically assessed in Questions 12 and 15
  These questions are indicated with an asterisk (*).
- You may ask for more answer paper, graph paper and tracing paper.
  These must be tagged securely to this answer book.
- You are expected to use a calculator where appropriate.

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

93702F

Formulae Sheet: Foundation Tier

Area of trapezium = $\frac{1}{2}(a+b)h$
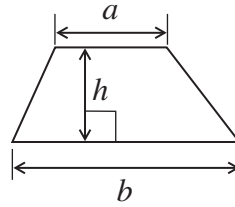
Volume of prism = area of cross section × length
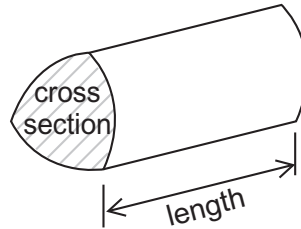
Answer **all** questions in the spaces provided.

1   Circle the most suitable unit to use for

1 (a)   the weight of a mobile phone.

[1 mark]

milligrams   grams   kilograms   tonnes

1 (b)   the distance between London and Manchester.

[1 mark]

millimetres   centimetres   metres   kilometres

1 (c)   the area of a school playground.

[1 mark]

centimetres   square centimetres   metres   square metres

Turn over for the next question

2   Logos are made using identical regular hexagons.

2 (a)   How many lines of symmetry does this logo have?

[1 mark]
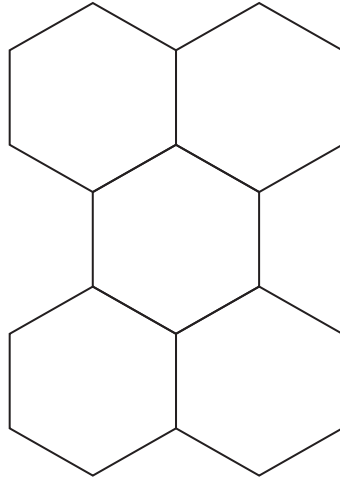
Answer ....

2 (b)   Add **one** hexagon so this logo has one line of symmetry.

[1 mark]
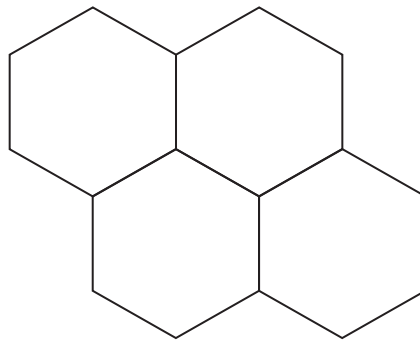
2 (c) This logo has edging around the perimeter as shown.

The length of each side of a hexagon is 1.4 metres.

The edging costs £1.15 per metre.

The exact amount of edging needed can be bought.
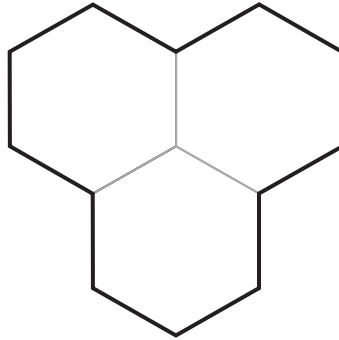
Work out the total cost of the edging.

[3 marks]

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Answer £ ....

Turn over for the next question

5

Turn over ▶

3 Tina buys 16 cakes.

Each cake costs 45 pence.

She pays with a £10 note.

What is the **smallest number** of coins she could get in her change?
You **must** show your working.

[4 marks]

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Answer ....

4 Here is Rob's homework.
His teacher has correctly marked the first two parts.

Complete the marking.

[3 marks]

Line *AC* touches the circle at *B*.
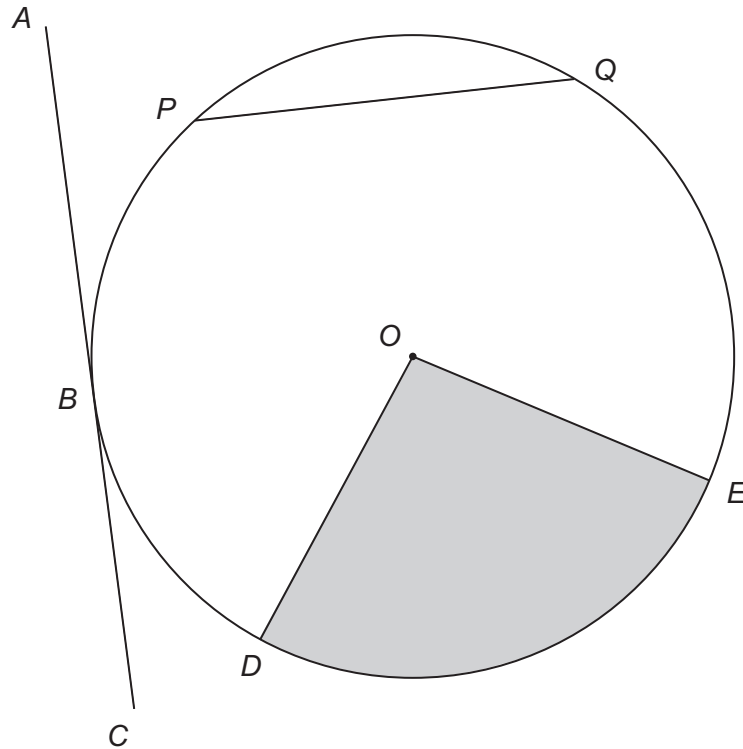
O is the   *centre*   of the circle   ✓

OD is a   *diameter*   of the circle   ✗

AC is a   *tangent*   of the circle   ....

PQ is a   *radius*   of the circle   ....

The shaded section is a   *segment*   of the circle   ....

The perimeter of the circle is the   *circumference*   ....

5   A plan for a new playground, *ABCD*, is shown on the centimetre grid.
The position of a sandpit is shown.
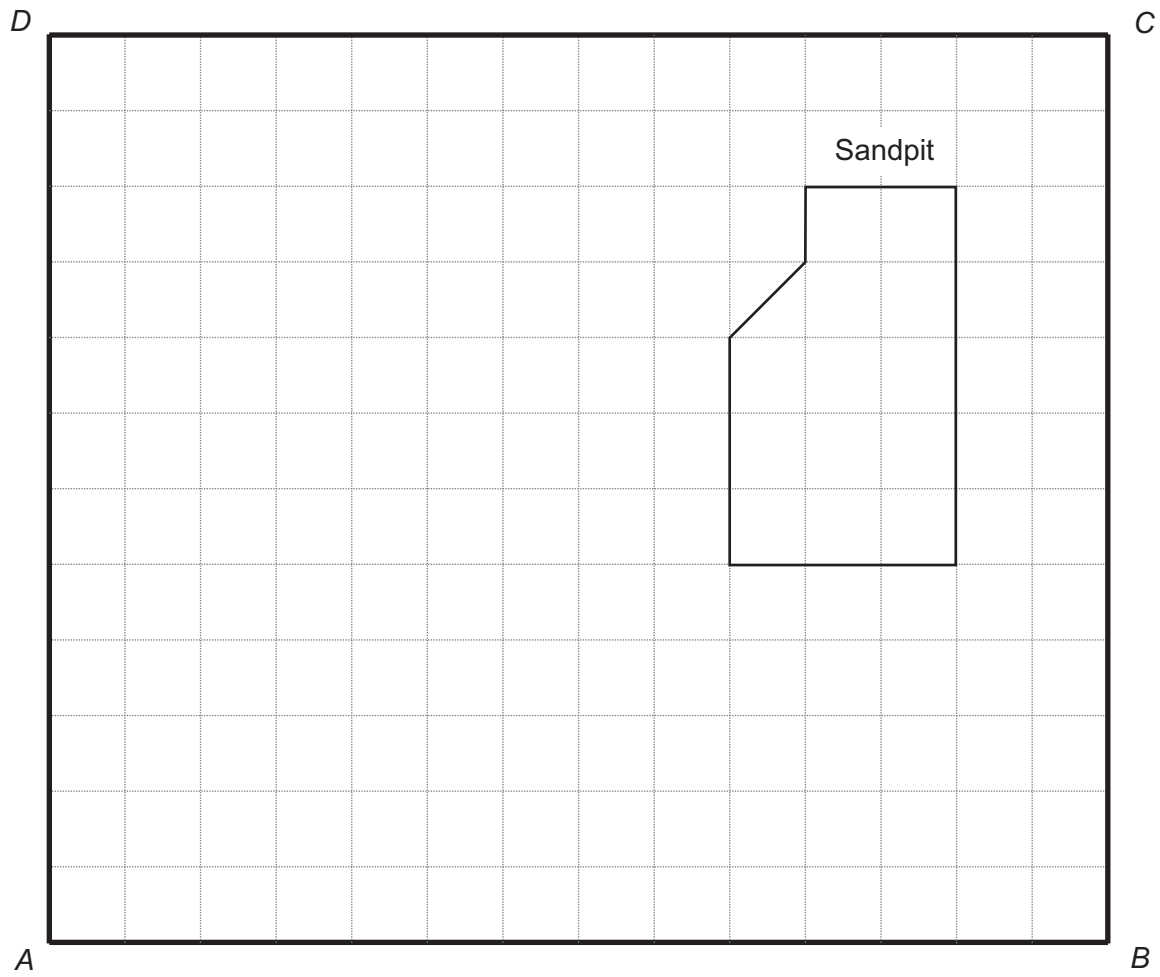
5 (a) Each square centimetre on the grid represents an actual area of 5 square metres.

Work out the actual area of the sandpit.

[3 marks]

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Answer .... square metres

5 (b) A play area is triangular.
One of the vertices is at *A*.

Join the midpoint of *AB* to the midpoint of *AD* to show the position of this play area.

[2 marks]

5 (c) There is a lamp-post on side *BC*.
The lamp-post is twice the distance from *C* as it is from *B*.

Mark the position of the lamp-post with a cross.

[2 marks]

Turn over for the next question

7

Turn over ▶

6 The weight of a person can be measured in kilograms or pounds.
This graph converts between kilograms and pounds.

Pounds (y-axis)

Kilograms (x-axis)
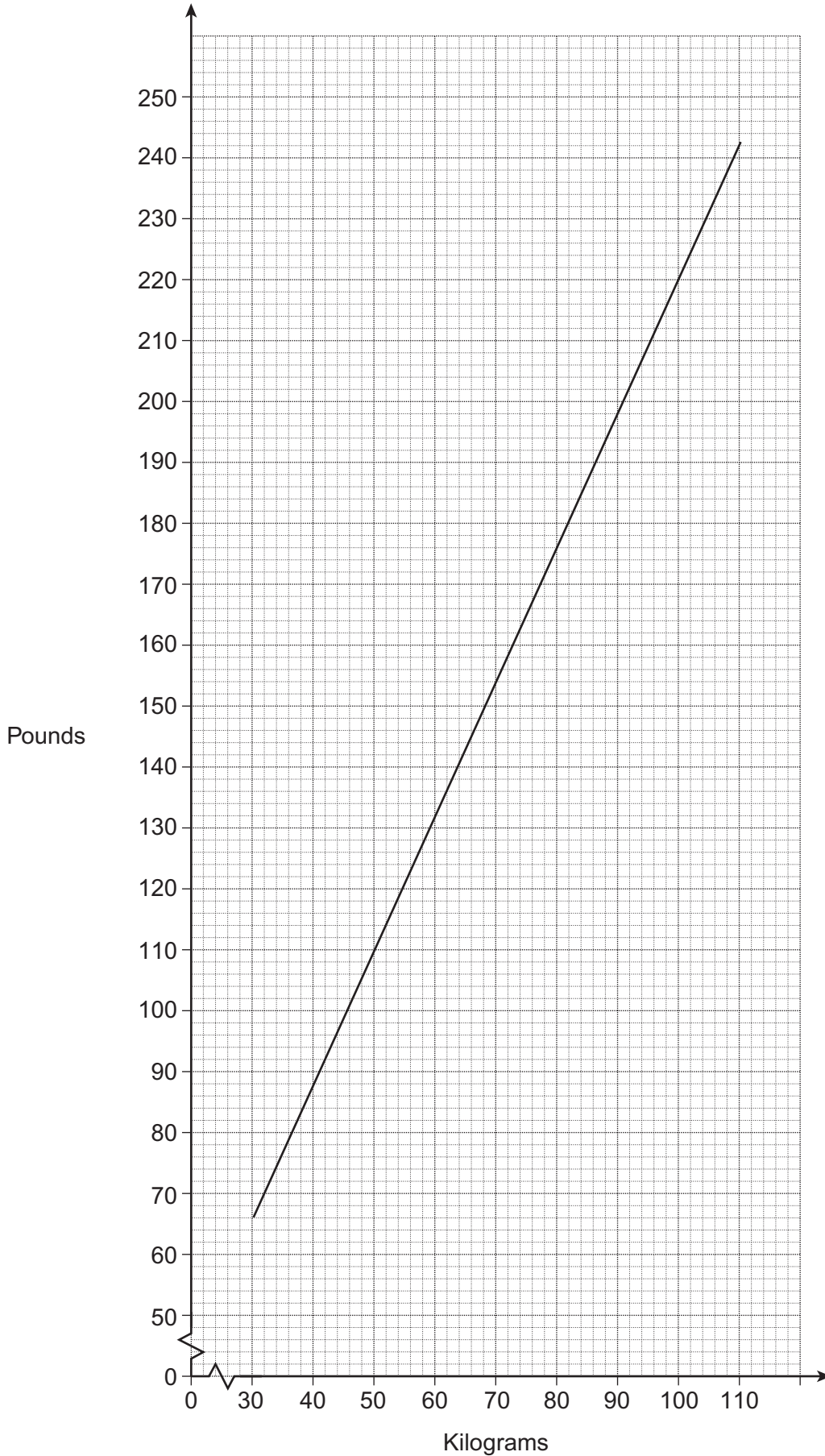
6 (a) Sally weighs 48 kilograms.

What is her weight in pounds?

[1 mark]

Answer .... pounds

6 (b) Ben weighs 11 stone and 6 pounds.
1 stone = 14 pounds

Work out his weight in kilograms.

[2 marks]

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Answer .... kg

Turn over for the next question

3

Turn over ▶

7   A cinema has 18 rows of 12 seats.

Tickets for seats cost £6.25

15 of the tickets are **not** sold.

How much money is made from selling the tickets?

[3 marks]

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Answer £ ....

8 A plumber works on two jobs.

Between 9.35 am and 11.35 am she works on job A.

Between 12.15 pm and 1.30 pm she works on job B.

8 (a) How many **more** minutes does she work on job A than on job B?

[3 marks]

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Answer .... minutes

8 (b) She charges

- for the **exact** amount of time she works
- at a rate of £36 per hour.

How much **more** does she charge for job A than job B?

[2 marks]

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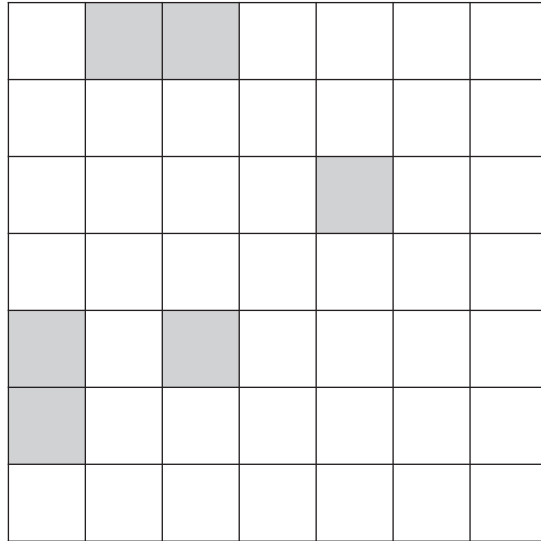Answer £ ....

9 A grid for a crossword puzzle needs to have rotational symmetry of order 4

Shade **six** more squares to make this grid have rotational symmetry of order 4

[2 marks]

Practise on this grid.

Put your answer on this grid.
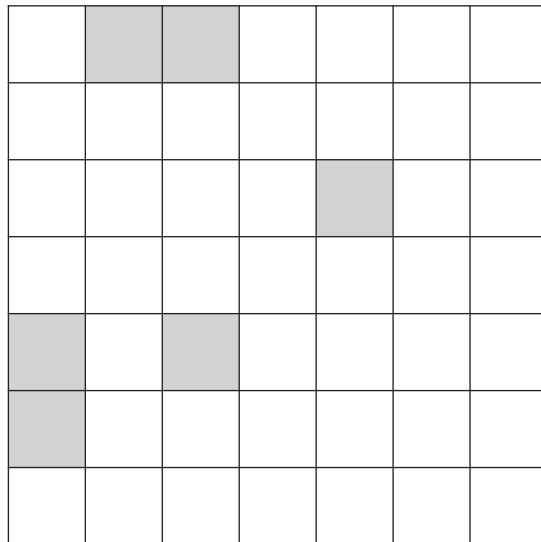
10 Heidi is making a model of a church.
Here is a sketch of one of the doors in the model.
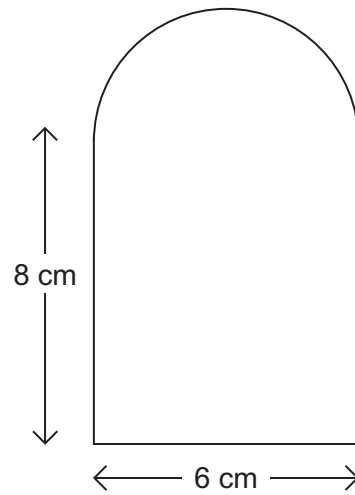
Not drawn
accurately

8 cm

6 cm

The door is an 8 cm by 6 cm rectangle with a semicircular top of diameter 6 cm

Make an accurate drawing of the door.
One line has been drawn for you.

[3 marks]

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1 5

11   Leo drives a car while on holiday in Spain.

On Monday, Leo

   drives to Madrid and parks his car

   goes sightseeing

   continues his car journey.

The graph shows this information.

Distance travelled by his car (km)

Time of day

11 (a)   For how long does he go sightseeing?
Give your answer in hours.

[1 mark]

Answer .... hours

11 (b)   Write down his speed when driving **to** Madrid.

[1 mark]

Answer .... km/h

11 (c)   Tick a box to show when he is travelling at a faster speed.

On the way to Madrid   ☐   After leaving Madrid   ☐

Give a reason for your answer.

[1 mark]

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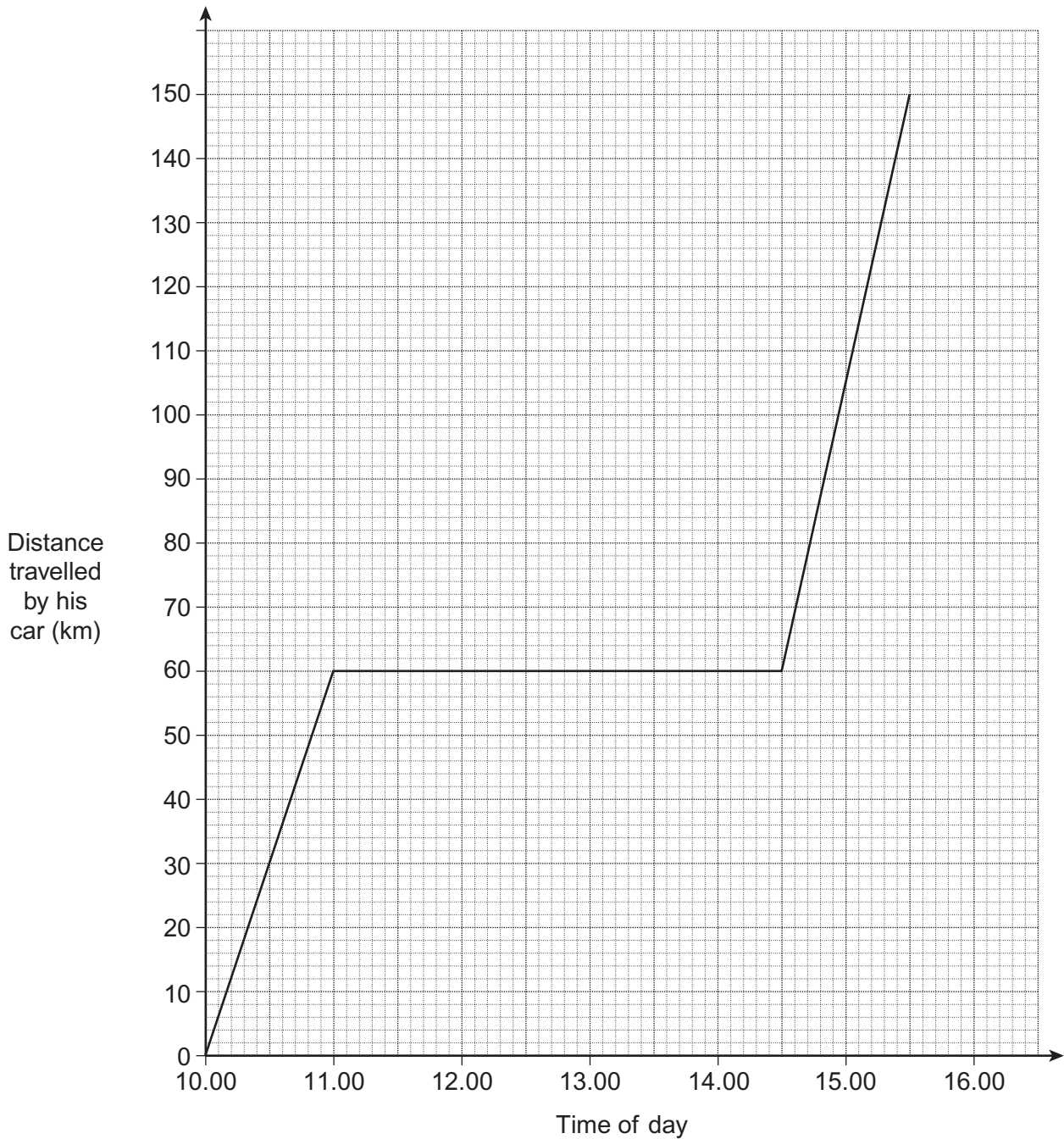
....

11 (d)   On Tuesday, Leo travels at an average speed of 104 kilometres per hour.

Show that 104 kilometres per hour is more than 60 miles per hour.

[3 marks]

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Turn over ▶

12   Chris packs ornaments.

Each ornament is put in a box.

Each box is a cube with edges of length 20 cm

The boxes are then put in a crate.

Chris wants to put 64 of the boxes in a crate.

*12 (a)   Show that the crate must have a volume of at least 512 000 cm^3

[2 marks]

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12 (b)   This crate is a cuboid.
The volume of the crate is 512 000 cm^3

h cm

100 cm

128 cm
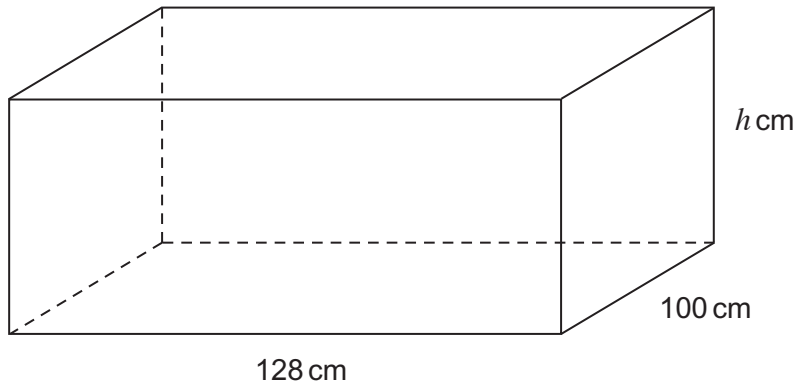
Work out the value of h.

[2 marks]

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Answer ....

12 (c) Chris **cannot** put 64 of the boxes in the crate shown in part (b).

Work out the **largest** number of boxes he can put in the crate.

[3 marks]

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Answer ....

Turn over for the next question

13 To make pancakes for 6 people you need 210 millilitres of milk.

How much milk do you need to make pancakes for 4 people?

[2 marks]

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Answer .... ml

14 Numbers that are the product of two different prime numbers are used in internet security.

6497 is the product of two prime numbers.

14 (a) Explain why

one of the prime numbers could have **unit** digit 3

and

the other prime number could have **unit** digit 9

[1 mark]

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14 (b) Work out the two prime numbers which have a product of 6497
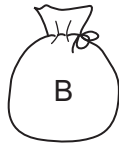
[2 marks]

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Answer .... and ....

5

Turn over ▶

15   Saj has four bags of apples.

A	B	C	D
x apples	$(x + 6)$ apples	$5x$ apples	$2(x + 6)$ apples

Bag C and Bag D have the same number of apples.

15 (a)   Circle the correct equation.

[1 mark]

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$5x = 2x + 6$ $5x = 2x + 12$ $2x = 5x - 6$ $5x = x + 12$

15 (b)   Work out the number of apples in bag A.

[2 marks]

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Answer ....

*15 (c) Saj needs 5 apples to make an apple pie.

Are there enough apples in all four bags to make 10 apple pies?
You **must** show your working.

[2 marks]

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Turn over for the next question

5

Turn over ▶

16   The scale drawing shows the positions of towns *A*, *B*, *C* and *D*.

Scale   1 cm represents 5 km

North

B •   • *A*

C •   • *D*
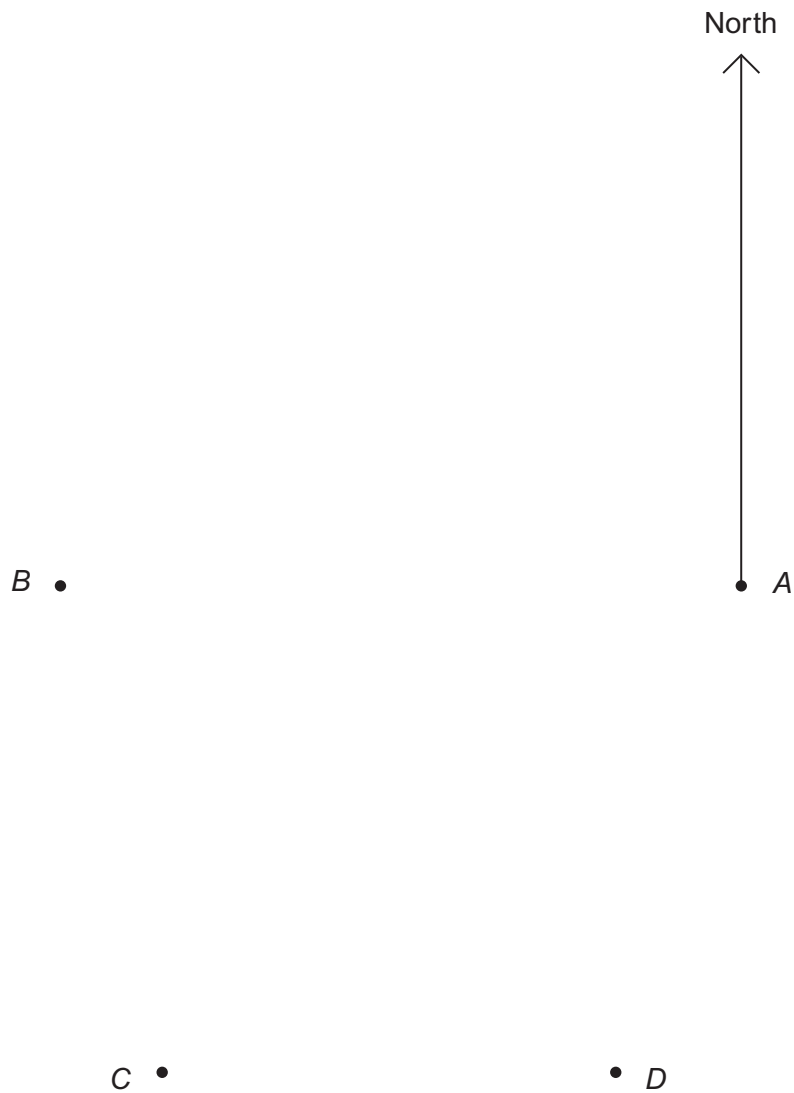
16 (a)   A helicopter flies directly from *A* to *C*.

On what bearing does the helicopter fly?

[1 mark]

Answer .... °

16 (b)   The distances along roads between the towns are shown in this table, in kilometres.

	A	*B*	*C*	*D*
A		52	59	36
B	52		38	54
C	59	38		39
D	36	54	39	

A car travels by road

from *A* to *D*

and then from *D* to *C*.

How many **more** kilometres does the car travel than the helicopter?
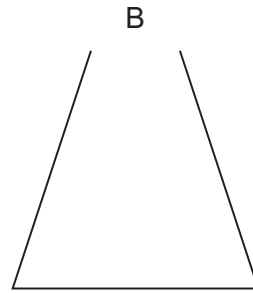
[3 marks]

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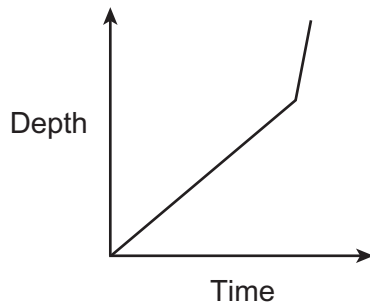Answer .... km

17   Four containers are of equal height.
These diagrams show the cross section of each container.
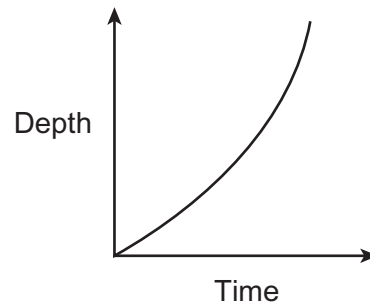
A

B

C

D
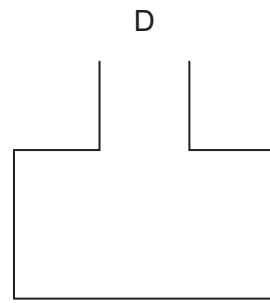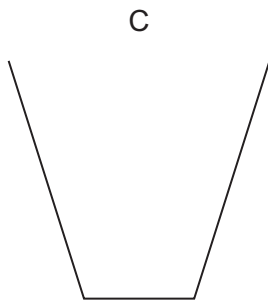
Water flows into each container at a constant rate until the container is full.
These sketch graphs show how the depth of the water changes with time, for each container.
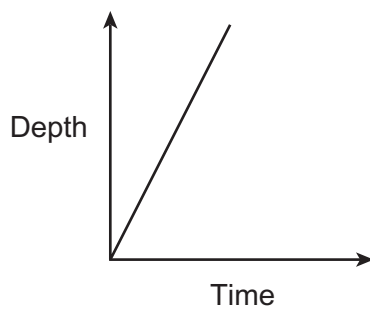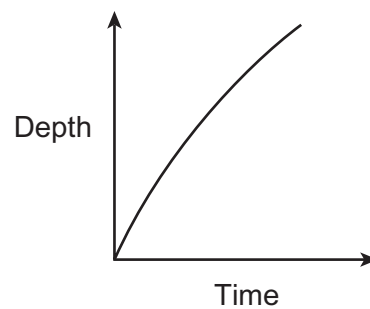
Graph 1

Depth

Time

Graph 2

Depth

Time

Graph 3

Depth

Time

Graph 4

Depth

Time

17 (a) Complete this table to match each container to a graph.

[2 marks]

Container A	Graph ....
Container B	Graph ....
Container C	Graph ....
Container D	Graph ....

17 (b) Which graph shows that the depth of water increases at a constant rate until the container is full?
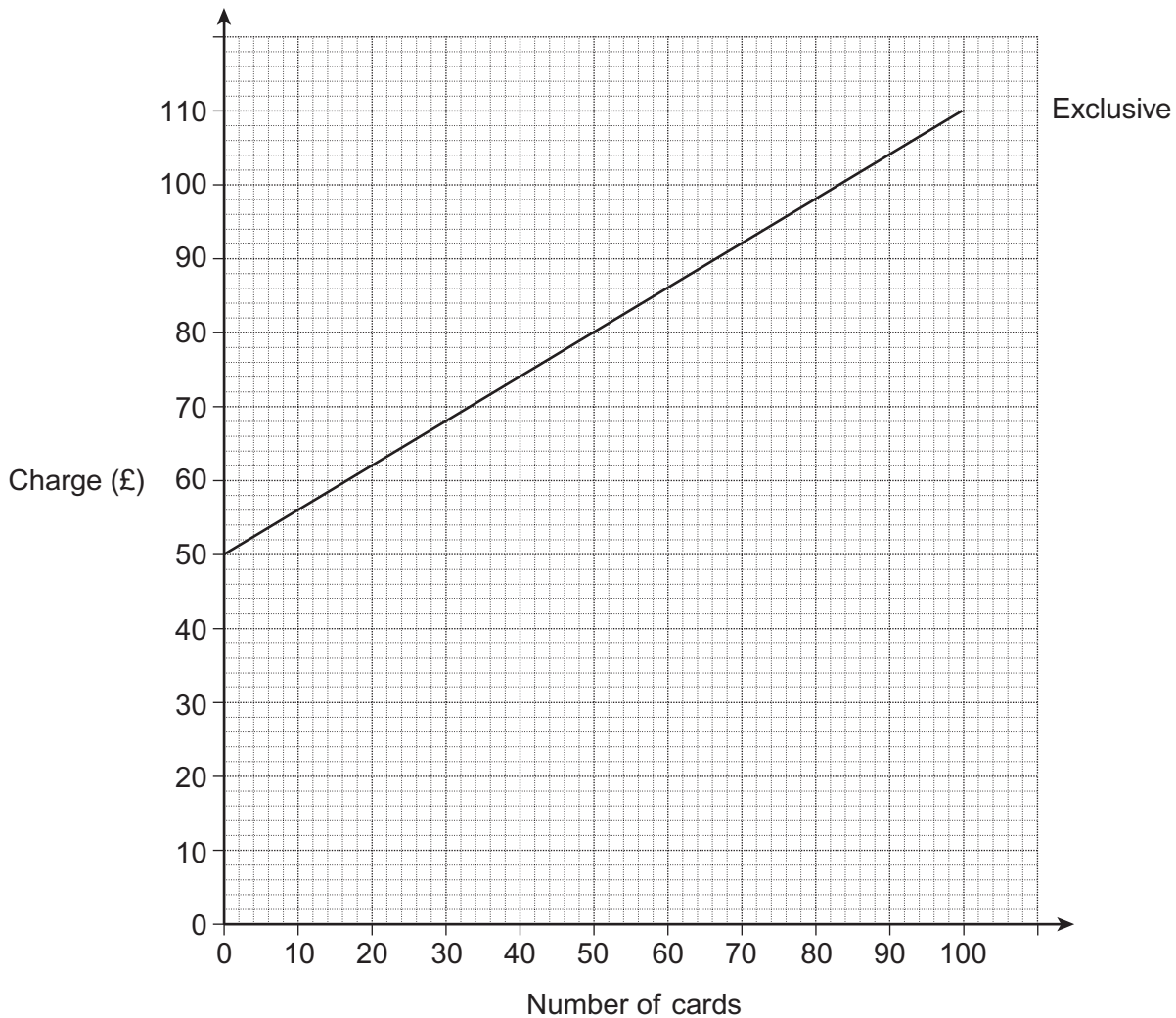
[1 mark]

Answer ....

Turn over for the next question

3

Turn over ▶

18 A company designs and prints **standard** and **exclusive** wedding invitation cards.
This graph shows how much the company charges for up to 100 **exclusive** cards.

This table shows the design and printing charges for the **standard** card.

Design charge	Printing charge
£40	30p per card

18 (a) On the grid above, draw a graph to show how much the company charges for up to 100 **standard** cards.

[2 marks]

18 (b) Work out the **total** charge for 10 exclusive cards and 50 standard cards.

[2 marks]

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Answer £ ....

18 (c) Ann and Mike want to spend £130 on wedding invitation cards.
They would like 150 **exclusive** cards.

Is £130 enough?
You **must** show your working.

[2 marks]

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Turn over for the next question

6

Turn over ▶

19   A ship travels directly from port *A* to port *B* and then directly to port *C*.

19 (a)   From *A* to *B* the ship travels a distance of 30 km at a speed of 24 km/h
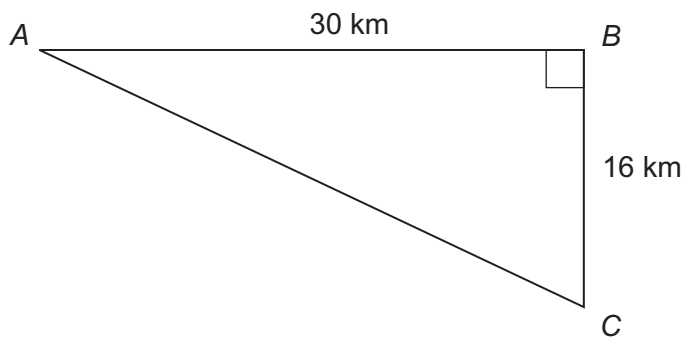
Work out the time taken to travel from *A* to *B*.
Give your answer in hours and minutes.

[3 marks]

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Answer .... hours .... minutes

19 (b)   The positions of *A*, *B* and *C* are shown.

Work out the direct distance from *A* to *C*.

[3 marks]

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Answer .... km

END OF QUESTIONS

6

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