

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
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TOTAL	



General Certificate of Secondary Education
Foundation Tier
November 2013

Applications of Mathematics (Linked Pair Pilot)

93702F

F

Unit 2 Geometry and Measures

Wednesday 13 November 2013 9.00 am to 10.30 am

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You may use a calculator.</p>	
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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 2, 10 and 12.
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.



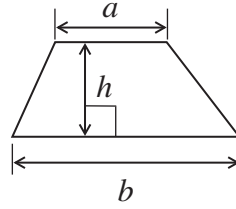
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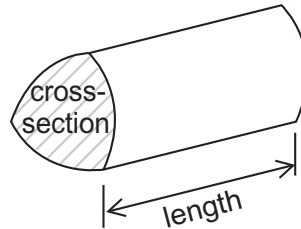
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Formulae Sheet: Foundation Tier

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



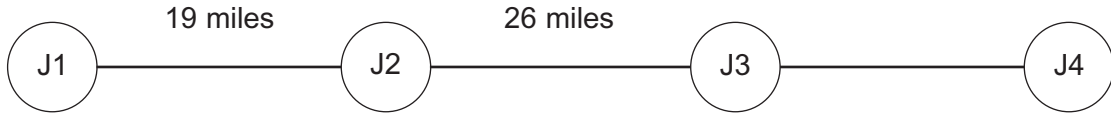
Volume of prism = area of cross-section \times length



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

1 A map shows some distances between motorway junctions.

One of the distances is missing.



Not drawn accurately

The total distance between J1 and J4 is 72 miles.

Work out the distance between J3 and J4.

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.....

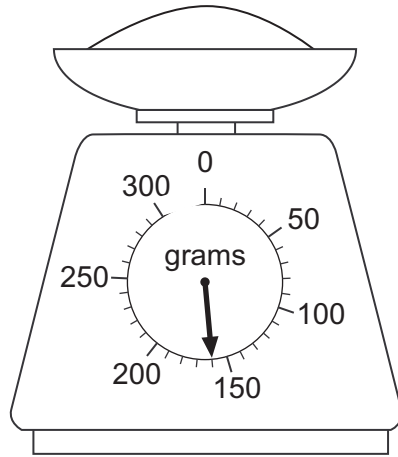
.....

Answer..... miles (2 marks)

Turn over for the next question



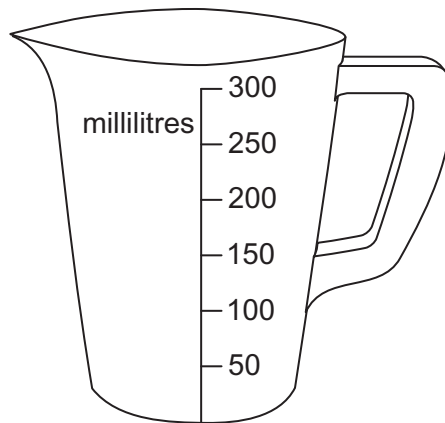
- 2 Neil is baking.
- 2 (a) He weighs some sugar.



How much does the sugar weigh?

Answer grams (1 mark)

- *2 (b) He has this jug.



He needs to put 500 millilitres of milk in a bowl.

How can he use the jug to do this?

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(2 marks)



3 Tick a box to show whether each statement is true or false.

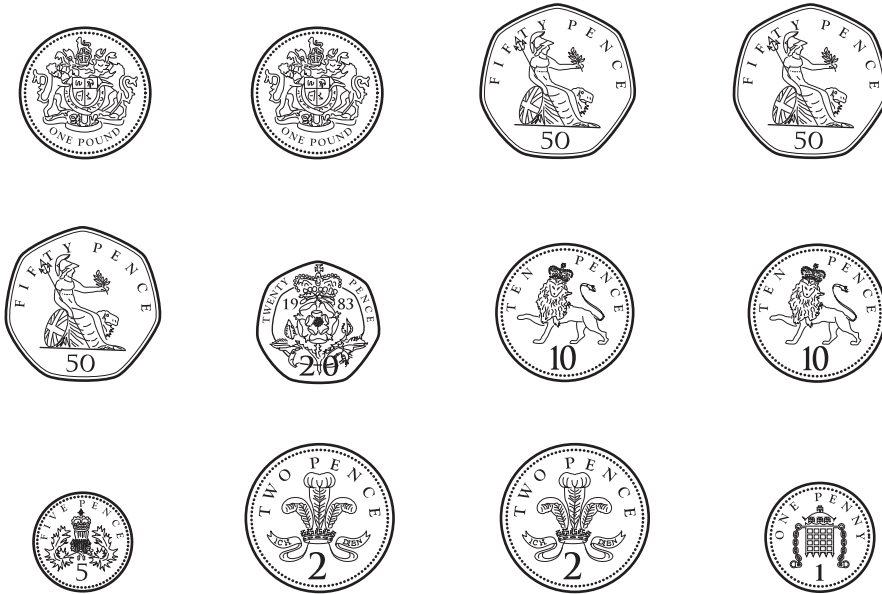
	TRUE	FALSE
The length of a pencil is about 15 kilometres.	<input type="checkbox"/>	<input type="checkbox"/>
A mobile phone weighs about 4 milligrams.	<input type="checkbox"/>	<input type="checkbox"/>
A carton of juice holds about 250 litres.	<input type="checkbox"/>	<input type="checkbox"/>
A diagonal of this page measures more than 30 cm.	<input type="checkbox"/>	<input type="checkbox"/>

(4 marks)

Turn over for the next question



4 (a) Fran has these coins in her pocket.



She buys a sandwich that costs £2.75

She pays with as many coins as possible.

Which coins does she **have left**?

.....

.....

.....

.....

Answer

(2 marks)



4 (b) Joe has some £ 10 notes and some £ 5 notes.

The total value of his notes is £ 55

He has **exactly** 8 notes.

How many of each note does he have?

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..... £ 10 notes

..... £ 5 notes

(2 marks)

Turn over for the next question



5 A game for two players is played on a grid with 64 small squares.

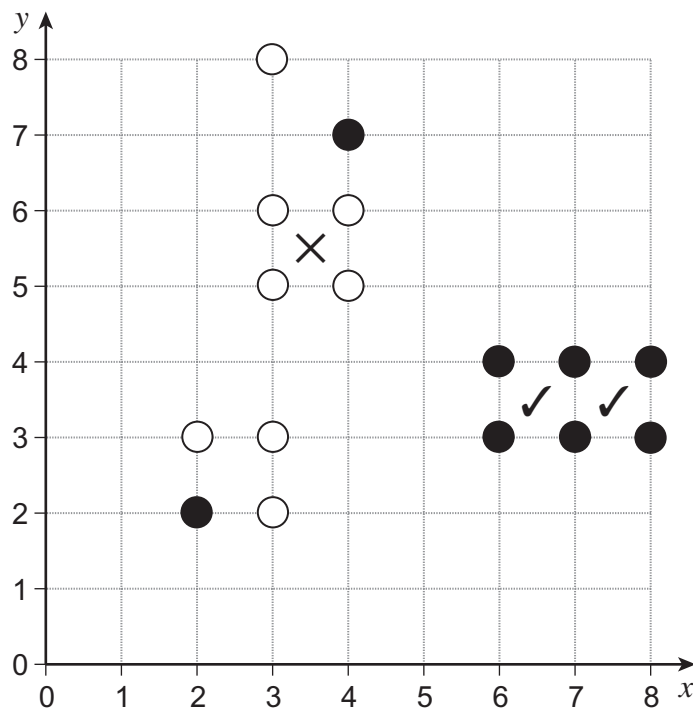
One player has black counters (●).

One player has white counters (○).

Players take turns putting one of their counters on a corner of one of the small squares.

A player scores one point if they put **their** counters on all four corners of one of the 64 small squares.

Here is a grid with 64 small squares.



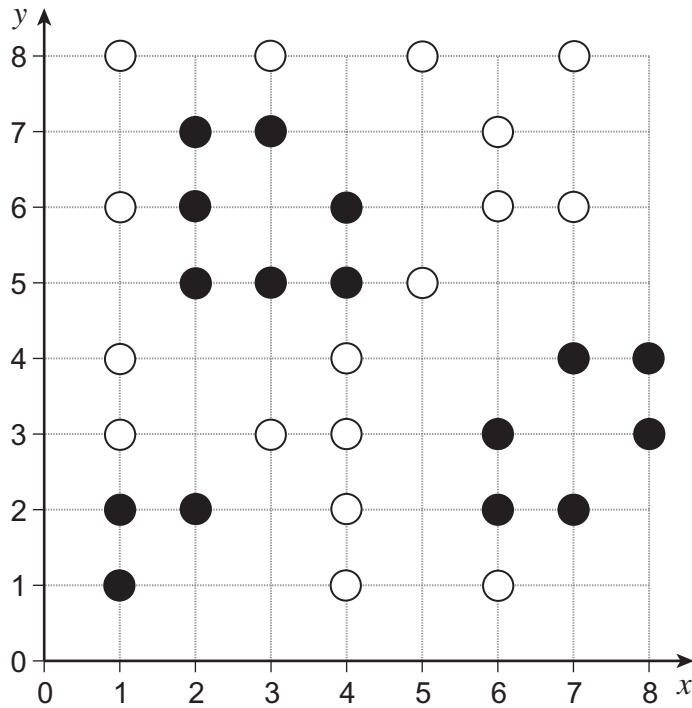
● has scored 2 points (✓ ✓)

○ has scored 1 point (X)



5 (a) Ryan (●) is playing this game.

It is his turn.



Complete each sentence.

Ryan will score **1 point** if he puts his counter at (..... ,)

Ryan will score **2 points** if he puts his counter at (..... ,)

Ryan will score **3 points** if he puts his counter at (..... ,) (3 marks)

Question 5 continues on the next page



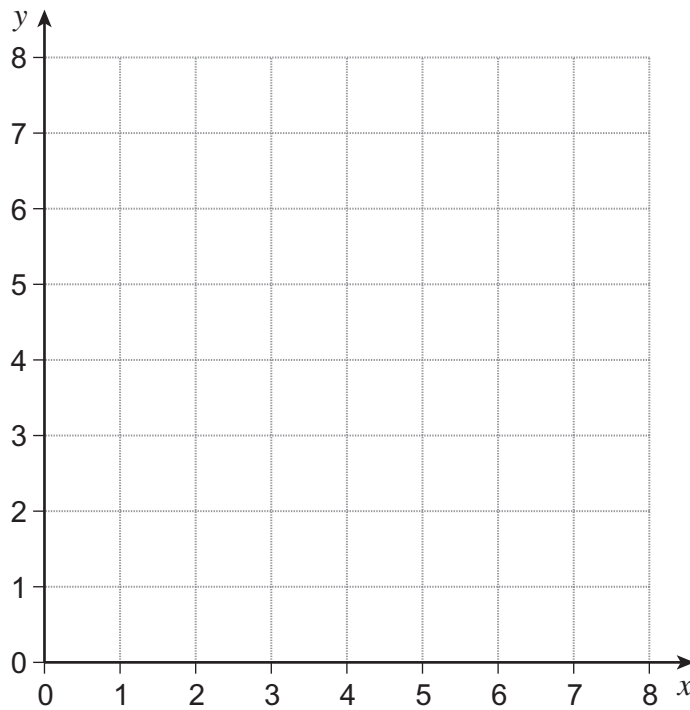
5 (b) Salim (○) starts a different game.



Salim

I will put my counter in a place where the x -coordinate is double the y -coordinate.

On the grid, show **all** the places where Salim could put his counter.



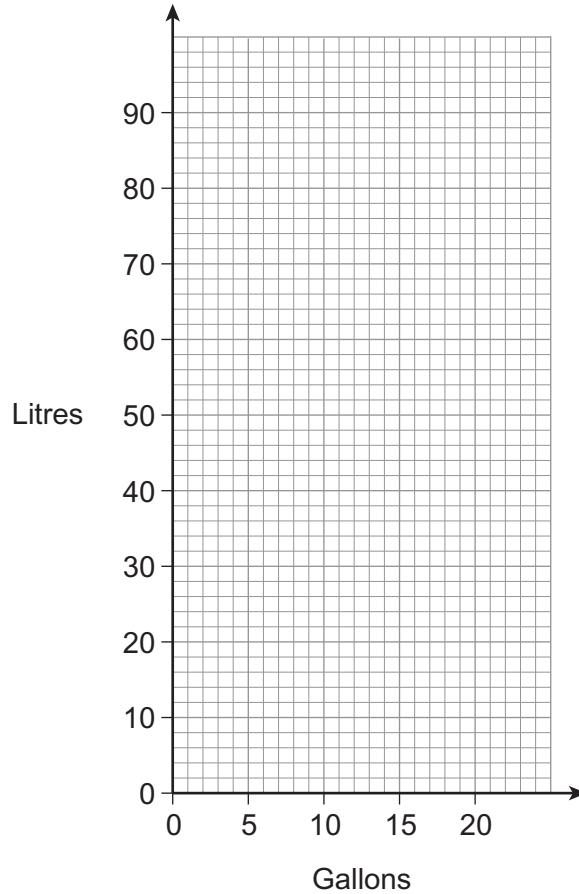
(2 marks)



6 (a)

Gallons	0	10	20
Litres	0	45	90

Draw the conversion graph for gallons and litres.



(2 marks)

6 (b) Convert 54 litres to gallons.

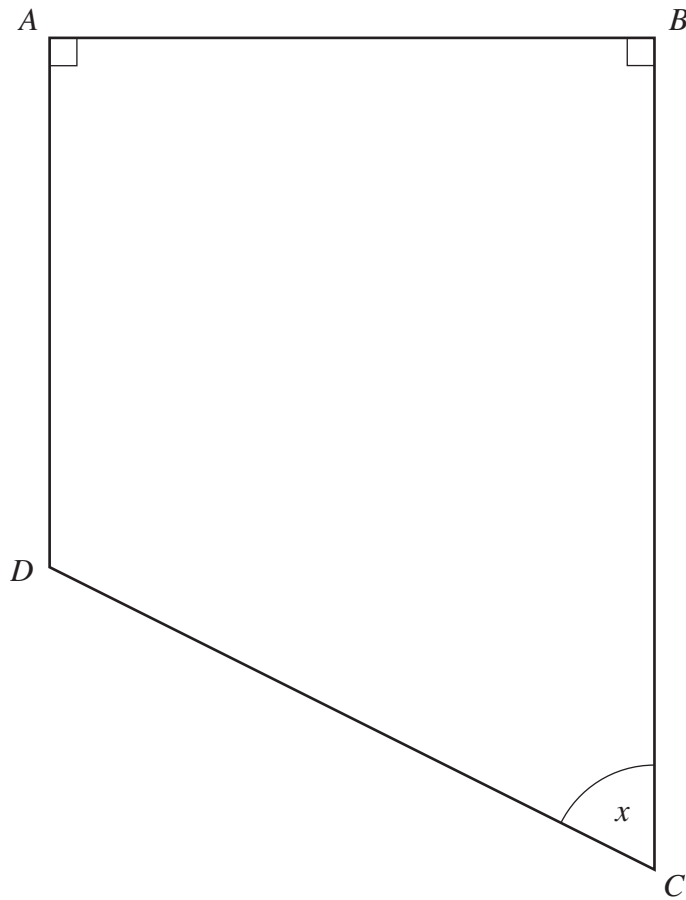
Answer..... gallons (1 mark)

6 (c) Convert 30 gallons to litres.

Answer..... litres (1 mark)



- 7 A scale diagram of a flower bed is shown.



- 7 (a) Measure the length AB on the diagram.

Give your answer in centimetres.

Answer cm (1 mark)



7 (b) The scale of the diagram is

1 centimetre represents 1.5 metres.

Work out the actual length AB on the flower bed.

.....
.....

Answer m (2 marks)

7 (c) Measure the size of angle x on the diagram.

Answer degrees (1 mark)

7 (d) What is the actual size of angle x on the flower bed?

Answer degrees (1 mark)

7 (e) Circle the **two** correct words for the shape of the flower bed.

rectangle

rhombus

trapezium

quadrilateral

kite

square

(2 marks)

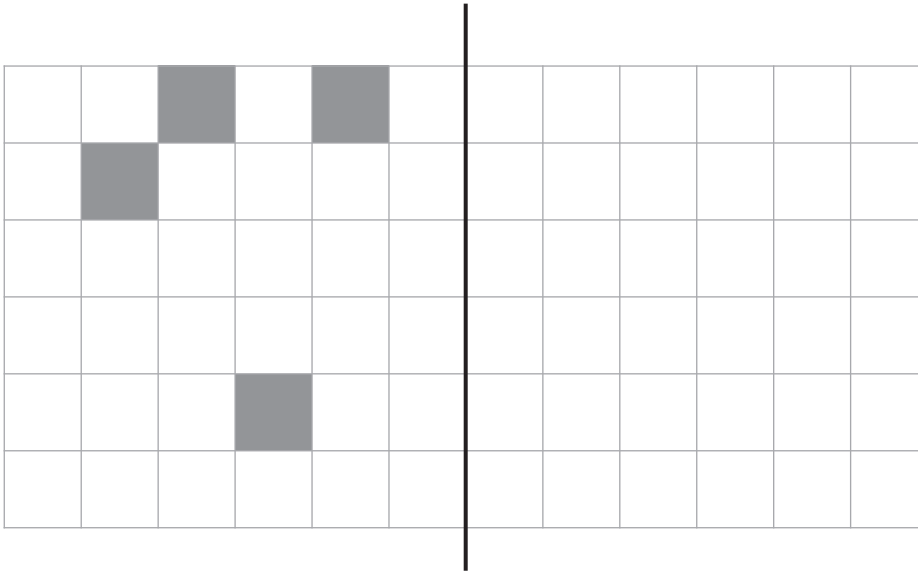
7

Turn over ►



- 8 A puzzle book has square grids.
Some squares are shaded.
You have to shade in more squares to make the grid have symmetry.

- 8 (a) Shade 4 more squares so that this grid has **exactly** one line of symmetry.
The line of symmetry is shown.

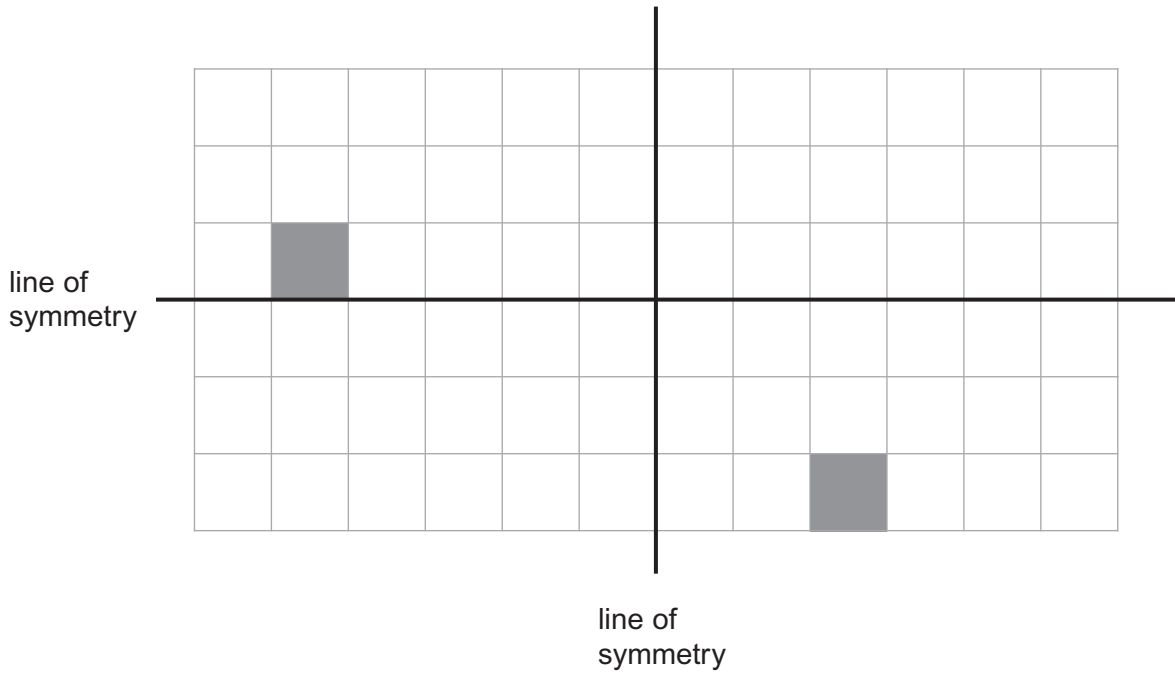


line of
symmetry

(2 marks)

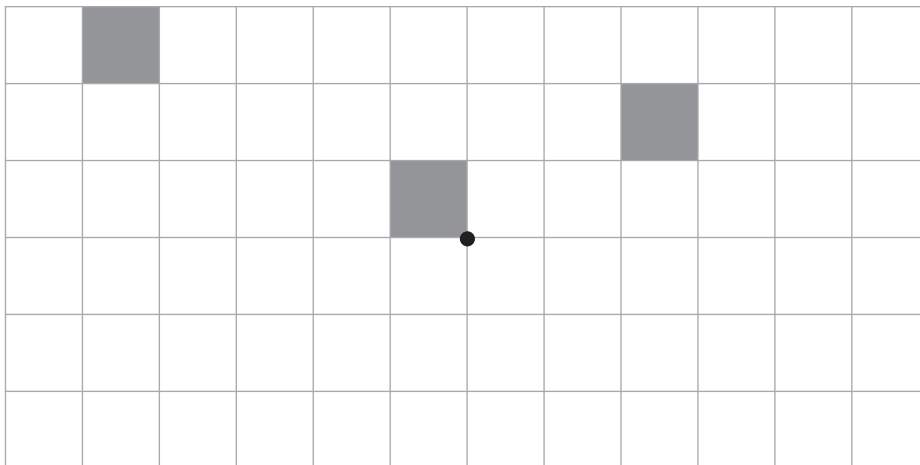


8 (b) Shade 6 more squares so that this grid has **exactly** two lines of symmetry. The two lines of symmetry are shown.



(2 marks)

8 (c) Shade 3 more squares so that this grid has rotational symmetry of order 2. The centre of rotational symmetry is marked with a dot.



(2 marks)

6

Turn over ►



- 9** Ranvir uses this formula in a science lesson.

$$t = \frac{v - u}{a}$$

Her correct working is shown.

$$t = \frac{19.2 - 7.85}{2.6}$$

- 9 (a)** Use your calculator to work out the value of t .
Give your answer as a decimal.
Write down your full calculator display.

Answer (1 mark)

- 9 (b)** Give your answer to (a) to 1 decimal place.

Answer (1 mark)



10 48 rugby players need to stay at a hotel for one night.

Comfy Hotel
All rooms are for 2 people
£ 95 per room per night

10 (a) Work out the **cheapest** total cost for 48 people to stay at the hotel for one night.

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.....
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£ (2 marks)

*10 (b)

Breakfast at Comfy Hotel
£ 8 per person
Groups of between 20 and 30 pay 10% less
Groups of more than 30 pay 15% less

All of the rugby players have breakfast.

Work out the total cost of breakfast.

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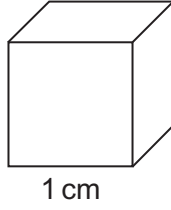
£ (4 marks)

8

Turn over ►



11 Building blocks are cubes of side 1 centimetre.



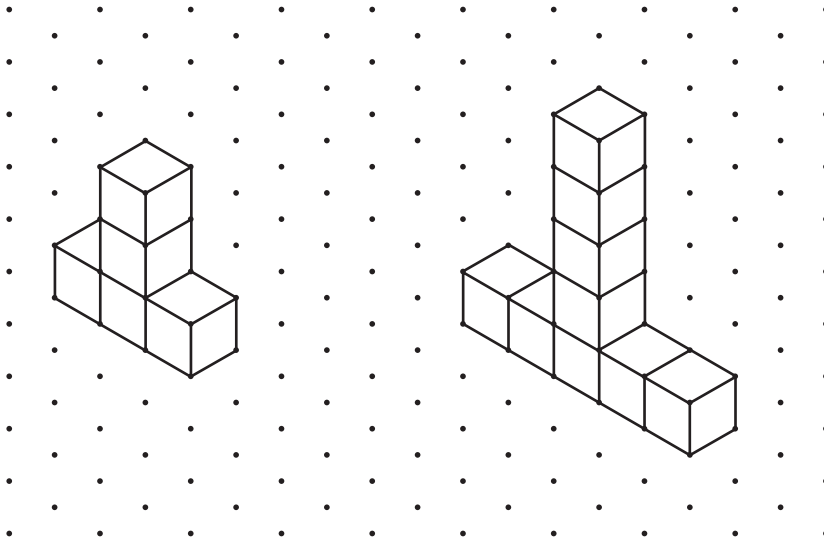
Eli uses blocks to make T-shapes.



Eli

I will make T-shapes that have equal length and height.

The first two T-shapes are shown.



length 3 cm
height 3 cm

length 5 cm
height 5 cm



11 (a) How many blocks are in the T-shape that has length 5 cm and height 5 cm?

Answer (1 mark)

11 (b) What is the volume of the T-shape that has length 7 cm and height 7 cm?
Write the units of your answer.

Answer (2 marks)

11 (c) Is it possible to make a T-shape using **exactly** 29 blocks?
Tick the correct box.

Yes No

Give a reason for your answer.

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(2 marks)



*12

Joe wants to record some TV programmes when he goes on holiday.



Joe

I want to record
8 episodes of Brookdale,
each lasting half an hour
and
3 episodes of Prelude,
each lasting 1 hour 45 minutes.

Joe's digital recorder always records 7 minutes more than the length of the programme.

There are 10 hours of recording space left.

Is there enough space left?
You **must** show your working.

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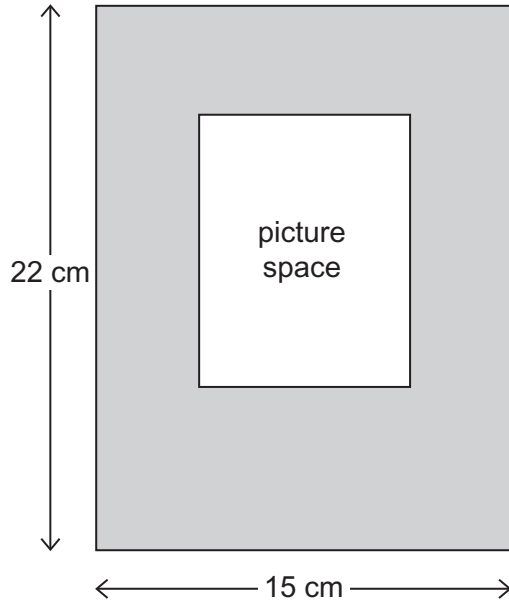
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(4 marks)



- 13** A picture holder is a rectangle measuring 22 cm by 15 cm
A smaller rectangle is cut out to make a space for a picture.



Not drawn accurately

The picture space is 40% of the area of the large rectangle.

- 13 (a)** Work out the area of the picture space.

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Answer cm² (3 marks)

- 13 (b)** Work out a suitable length and width for the picture space.

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Length = cm

Width = cm (2 marks)

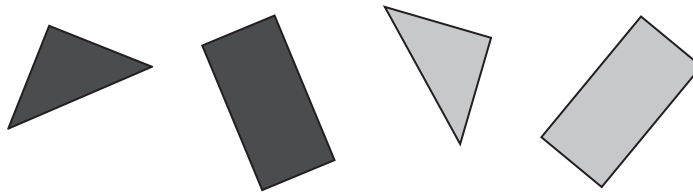


14

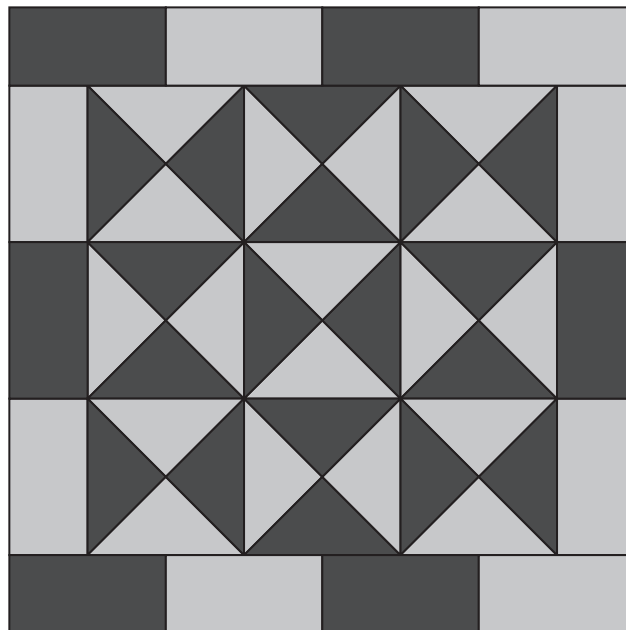
Tim buys some square floor tiles.
The tiles are either black or grey.
He cuts the square tiles into quarters and halves as shown.



He makes these shapes.



He wants to make this pattern.



How many of each colour tile does he need to buy?

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Number of black tiles

Number of grey tiles

(5 marks)

Turn over for the next question

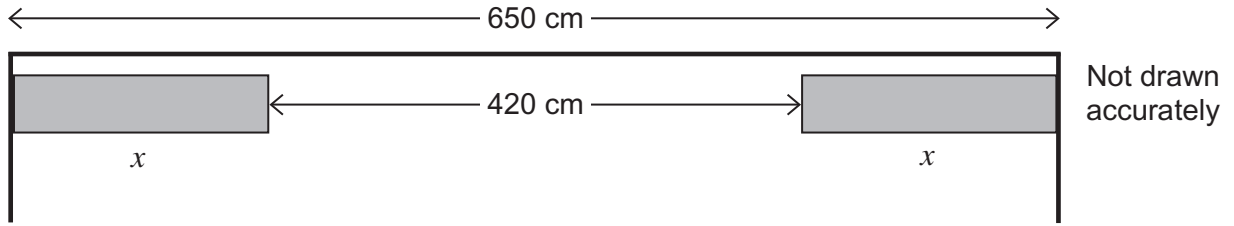
5

Turn over ►



15 A wall is 650 centimetres long.

Two bookcases, each of width x , are at opposite ends of the wall as shown.



15 (a) Circle the correct equation for the information above.

$2x - 420 = 650$

$2x + 650 = 420$

$2x + 420 = 650$

$2x - 650 = 420$

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(1 mark)

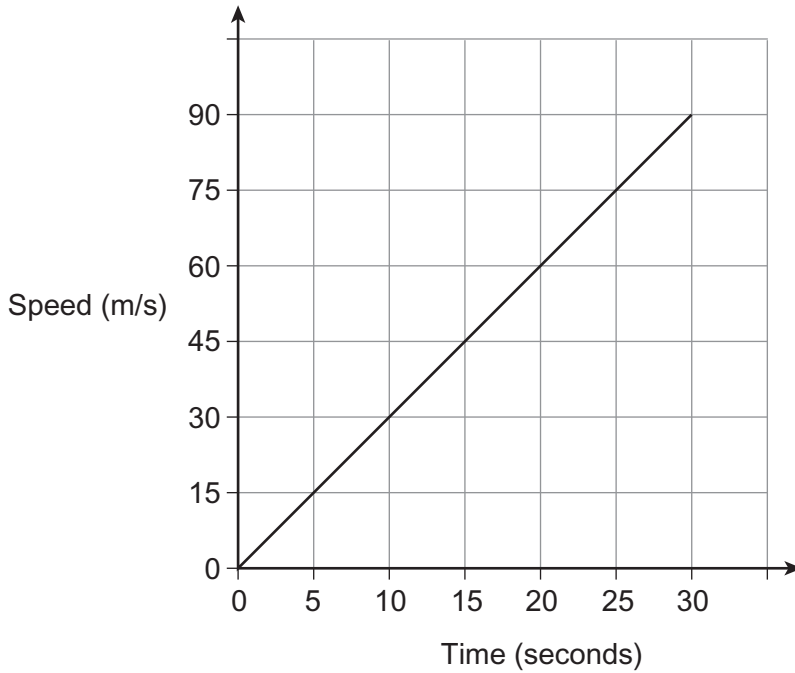
15 (b) Work out the width of each bookcase.

.....

Answer cm (3 marks)



16 A plane accelerates along a runway for 30 seconds.
The graph shows the speed-time graph for the plane.



16 (a) The plane takes off after 30 seconds.
What is the speed of the plane when it takes off?

Answer m/s (1 mark)

16 (b) Work out the distance the plane travels on the runway.
Give your answer in kilometres.

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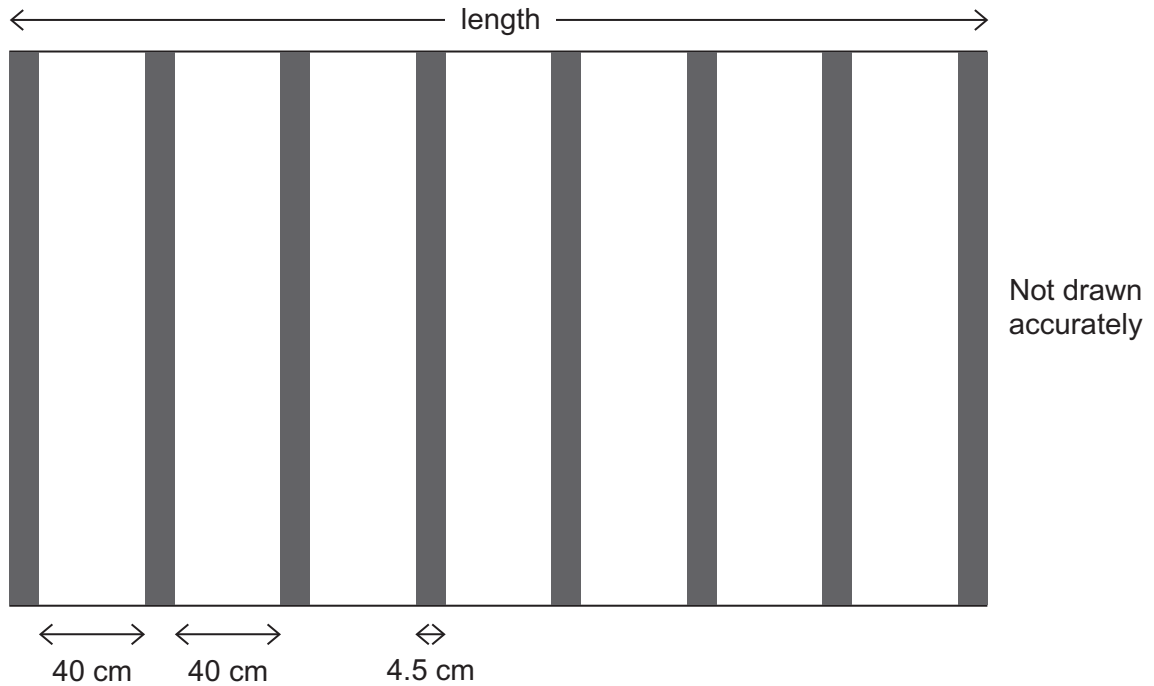
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Answer km (3 marks)



- 17 Floor joists are wooden boards that support a floor in an upstairs room of a house. The diagram shows 8 joists laid parallel to the shorter side of a rectangular room.

- Gaps between joists are 40 cm
- Each joist is 4.5 cm wide.



- 17 (a) Show that the length of the room is 316 cm

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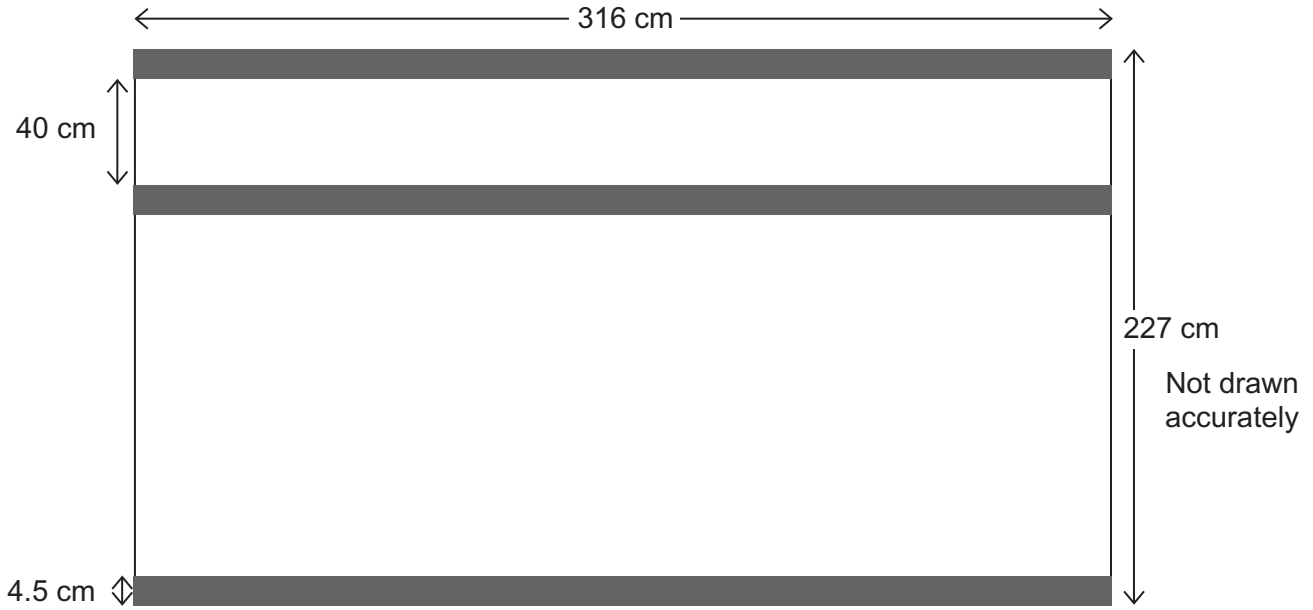
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(2 marks)



Joists can also be laid parallel to the longer side of the room.
Three of the joists are shown on the diagram.



17 (b) Which way should the joists be laid so that the least amount of wood is used?
You **must** show your working.

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(5 marks)

7

Turn over ►



18 A subject has two examination papers.
There is a non-calculator paper and a calculator paper.

The ratio of the number of marks on the papers is

$$\text{non-calculator : calculator} = 9 : 11$$

The total number of marks for the two papers is 120

Work out the number of marks on the calculator paper.

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Answer (3 marks)

END OF QUESTIONS

