AQA

General Certificate of Secondary Education
Foundation Tier
June 2011

Applications of Mathematics 93702F (Linked Pair Pilot)

F

Unit 2   Geometry and Measures

Tuesday 21 June 2011   9.00 am to 10.30 am

For this paper you must have:
● mathematical instruments.
You may use a calculator.

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 4 and 9.
  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 booklet.
● You are expected to use a calculator where appropriate.

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

Formulae Sheet: Foundation Tier

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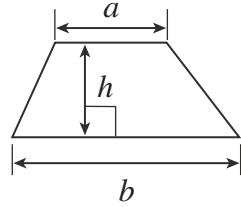
Volume of prism = area of cross-section × length
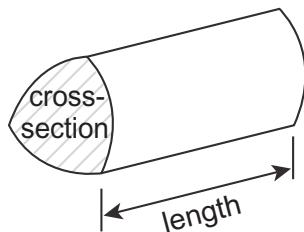
Answer **all** questions in the spaces provided.

1 The table shows the cost of 1st class and 2nd class stamps for large letters.

Weight	1st class	2nd class
1 g to 100 g	61p	47p
101 g to 250 g	90p	76p
251 g to 500 g	124p	104p
501 g to 750 g	177p	151p

1 (a) Tilly is going to post two large letters each weighing 240 g.
She buys two 1st class stamps.

How much does Tilly pay?

....

Answer £ .... *(2 marks)*

1 (b) Mark posts three large letters.
The weights of the letters are 75 g, 400 g and 650 g.

How much cheaper is it for him to use 2nd class stamps rather than 1st class stamps?

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....

Answer .... pence *(3 marks)*

5

Turn over ▶

2 The game of Battleships is played on a square grid.
In the game, players shade squares in rows or columns to represent ships.

The table shows the number of shaded squares for each type of ship.

Type of ship	Number of shaded squares
Aircraft Carrier	5
Battleship	4
Cruiser	3
Destroyer	2

2 (a) Here is a grid.

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6		■	■	■	■	■				
7										
8										
9				■						
10				■						
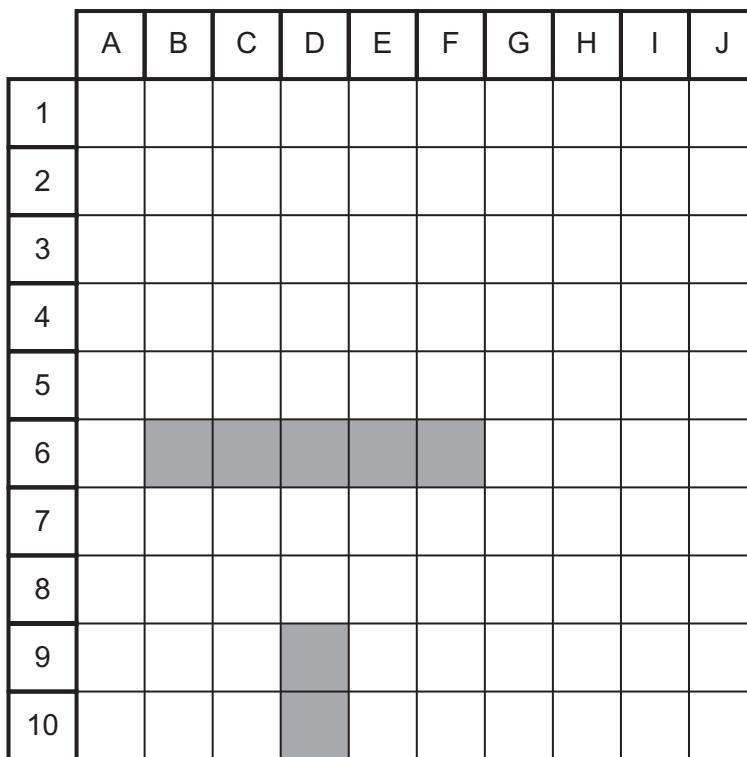
Tom has shaded squares B6, C6, D6, E6 and F6 to represent an aircraft carrier.

2 (a) (i) Tom has also shaded a destroyer.

Which **two** squares has he shaded?

Answer .... and .... *(1 mark)*

2 (a) (ii) Tom is going to shade a battleship on the grid.
He is going to use only column H.

On the grid, shade squares to show a possible position of Tom's battleship.

(2 marks)

2 (a) (iii) Tom is going to shade a cruiser on the grid.
He starts by shading square B2.

Write down **two** different pairs of squares that he could shade to complete the cruiser.

First pair .... and ....

Second pair .... and ....   *(2 marks)*

2 (b) Here is a different grid.
This grid does **not** show the letters and numbers.
Leroy has shaded one cruiser and one destroyer on the grid.
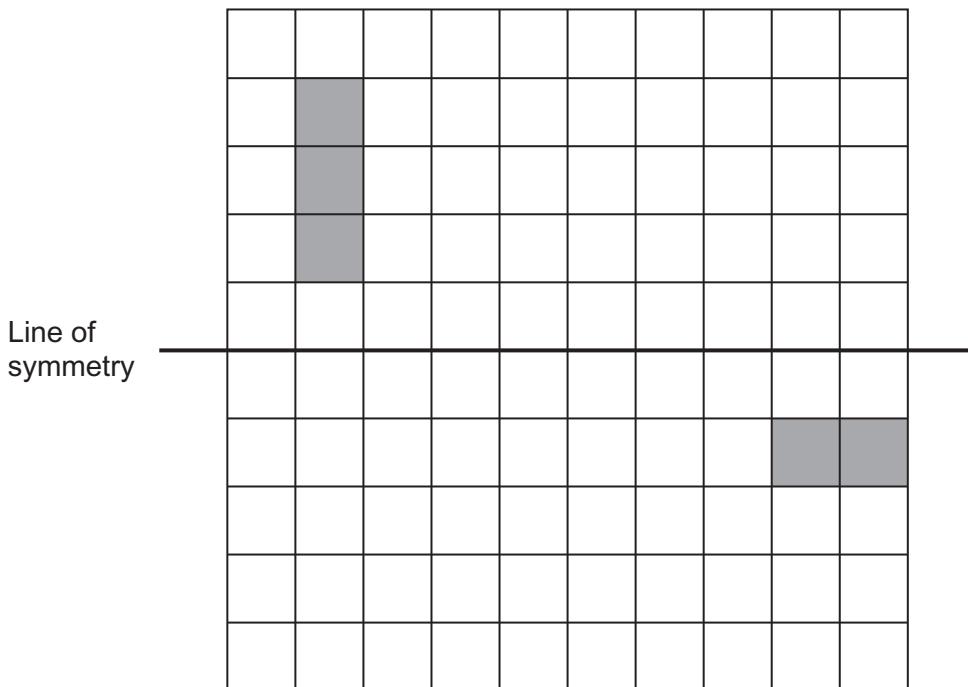
Line of
symmetry

Leroy needs to shade a total of **six** ships on the grid.
He wants his grid to have the line of symmetry shown.

Shade **four more** ships to complete Leroy's grid.

(3 marks)

8

Turn over ▶

3 Here is a conversion graph.
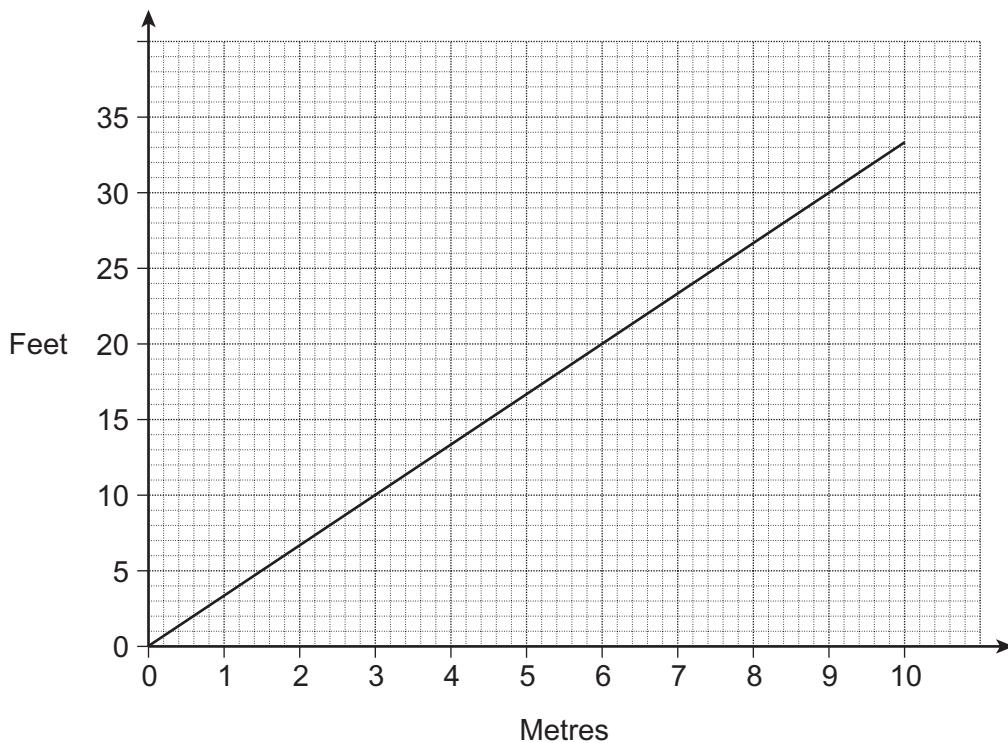
3 (a) Josh's garden is 8 metres long.
Bev's garden is 30 feet long.

Who has the longer garden?

Tick a box.

Josh ☐   Bev ☐

Show how you decide.

....

....

....

(1 mark)

3 (b) (i) Use the graph to convert 10 metres to feet.

Answer .... feet   *(1 mark)*

3 (b) (ii) Nelson's Column in Trafalgar Square is 50 metres high.

Work out the height of Nelson's Column in feet.

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....

Answer .... feet   *(2 marks)*

3 (c) Here is a rule for converting feet to metres.

> Multiply by 3 then divide by 10

Use one example to show that this rule and the graph give the same conversion.

Using the rule ....

....

....

Using the graph ....

(2 marks)

Turn over for the next question

*4   *A, B, C* and *D* are corners of a field.

Angle *A* and angle *D* are both 90°.

There is a fence round the edge of the field.
Two gaps in the fence allow people to pass through.
There is a circular pond in the field.

This is a scale drawing of the field.

Scale: 1 centimetre represents 2 metres
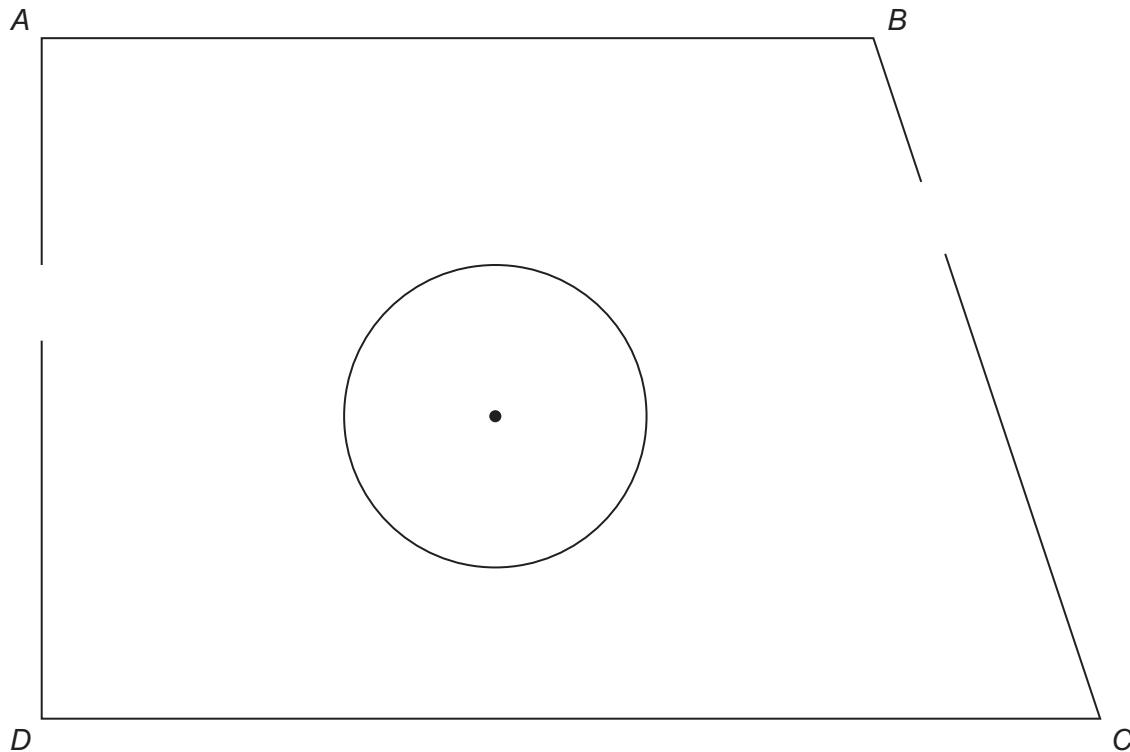
4 (a)   Measure the acute angle.

Answer ....degrees   *(2 marks)*

4 (b)   A sign is to be put on the fence at the midpoint of *AB.*

Mark this point with a cross.

....
(1 mark)

4 (c) The scale of the drawing is

<div style="border:1px solid">

1 centimetre represents 2 metres

</div>

4 (c) (i) Measure the diameter of the pond on the drawing.
Give your answer in centimetres.

Answer .... cm   *(1 mark)*

4 (c) (ii) Work out the actual diameter of the pond.
Give your answer in metres.

....

Answer .... m   *(1 mark)*

4 (c) (iii) A square flower bed is put in the field.
The sides of the flower bed are 4 metres long.
A corner of the flower bed is at *D.*

Draw the flower bed on the scale drawing.

(2 marks)

4 (d) The fence around the field is painted.
Mr Jones takes 20 minutes to paint a 1-metre length of fence.
To hire Mr Jones costs £15.50 per hour.

Work out the cost of hiring Mr Jones to paint the fence.
Give your answer to the nearest pound.

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Answer £ ....   *(6 marks)*

Turn over ▶

5   Suki makes some dice.
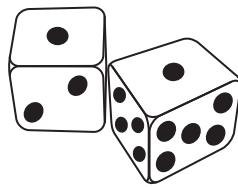
5 (a)   The numbers on the opposite faces of her dice always add up to 7.

Circle the diagrams that Suki can fold up to make her dice.

(2 marks)

Do not write outside the box
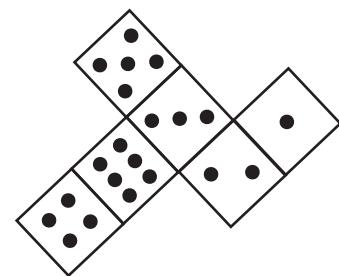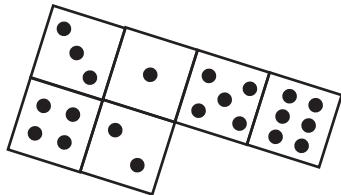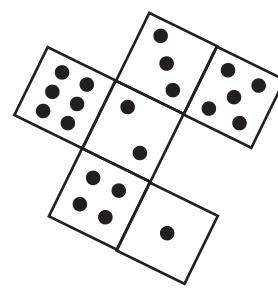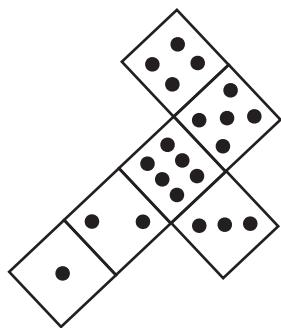
5 (b) Each dice is a cube of length 1 centimetre.

The diagram shows how some dice fit in a box.
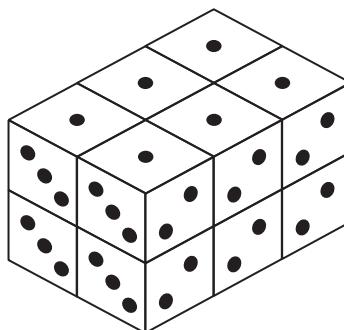
5 (b) (i) What is the mathematical name for the box?
Circle your answer.

cylinder   rectangle   cuboid   cube

(1 mark)

5 (b) (ii) How many dice are in the box?

Answer ....   *(1 mark)*

5 (c) Suki makes a box that holds exactly 24 dice.

5 (c) (i) Complete the statement by writing the correct units.

The volume of Suki's box is 24……………………………

(1 mark)

5 (c) (ii) Work out **two** possible dimensions for Suki's box.

....

....

....

First Answer   Second Answer

Length……………………………cm   Length ……………………………cm

Width ……………………………cm   Width ……………………………cm

Height ……………………………cm   Height ……………………………cm

(2 marks)

7

Turn over ▶

6   Sally has these coins.

She spends £1.98 in a shop.
She pays using some of her coins.
She is given the correct change and has exactly **four** coins left.

Work out what these four coins are.

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Answer ....   *(3 marks)*

7 (a) A farmer keeps chickens in this rectangular yard.

Not drawn accurately
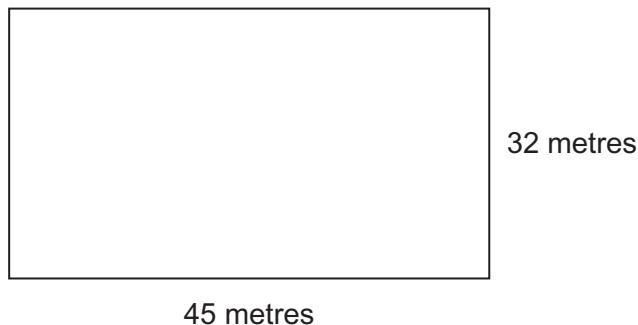
32 metres

45 metres

7 (a) (i) Work out the area of the yard.

....

Answer.. m² *(2 marks)*

7 (a) (ii) Each chicken needs an area of 10 square metres.

How many chickens can the farmer keep in the yard?

....

Answer .... *(2 marks)*

7 (b) The farmer also has this field.

60 m

Not drawn accurately

20 m

20 m

50 m

30 m
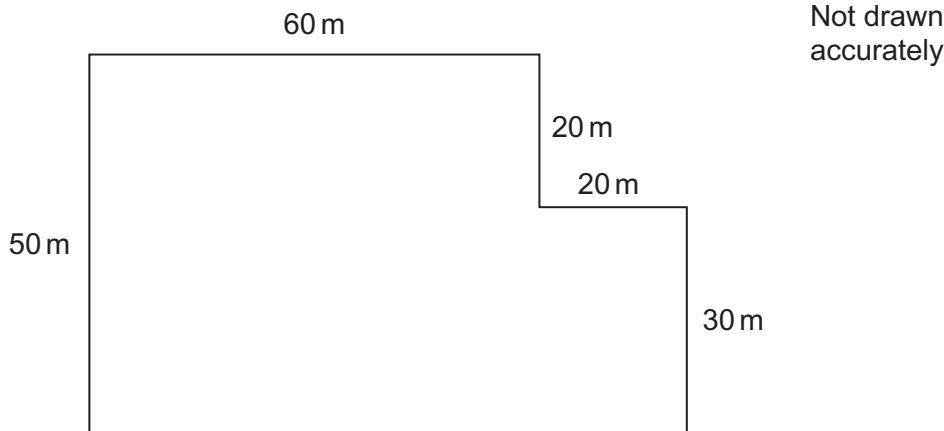
He wants to place a fence all the way round the field.
He has 200 metres of fencing.

How much **more** fencing does he need?

....

....

....

Answer ....m *(3 marks)*

10

Turn over ▶

8 Kitchen units can be bought in different sizes.
The width of the units are shown.

Width of unit (millimetres)	300	400	600	900	1000	1200

8 (a) These units fit along a wall.

Not drawn accurately

600 mm   600 mm   900 mm   400 mm
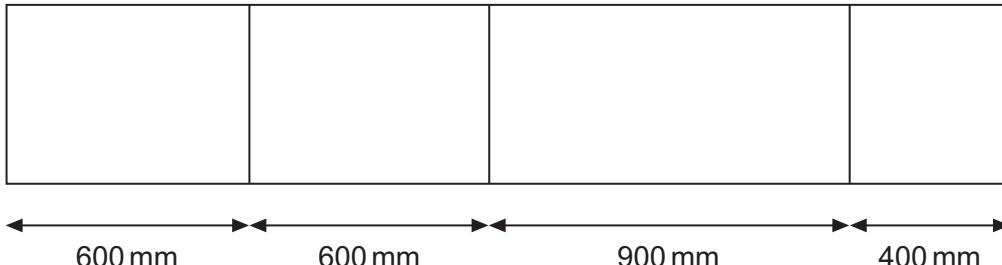
Work out the total length of these units.
Give your answer in metres.

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Answer .... metres   *(2 marks)*

8 (b)   Here is a wall of Mohammed's kitchen.

Not drawn
accurately

4340 mm
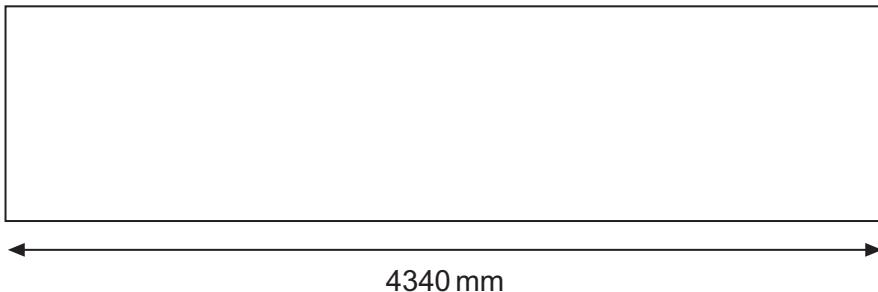
He wants to put units along this wall.
He wants to fill as much of the space as possible.

Work out **two** possible ways Mohammed can do this.

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First way ....

Second way ....

(4 marks)

6

Turn over ▶

*9 A designer is making shapes with right-angled triangles and parallelograms.

Not drawn accurately
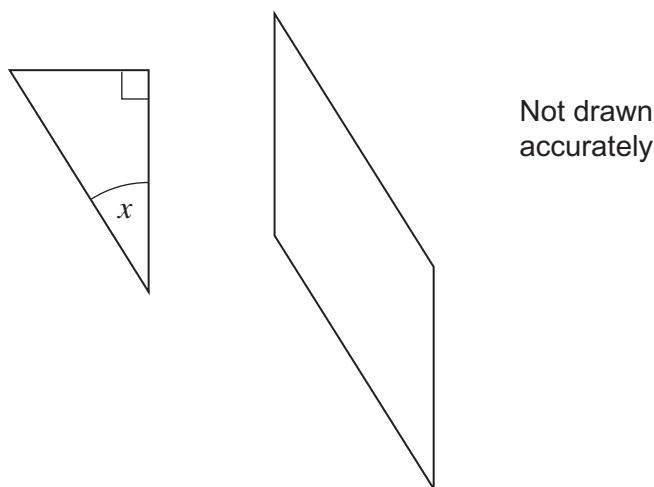
The obtuse angle in the parallelogram is four times the size of the smallest angle, x, in the triangle.

The designer uses the parallelogram and triangle to make a symmetrical logo.

Not drawn accurately
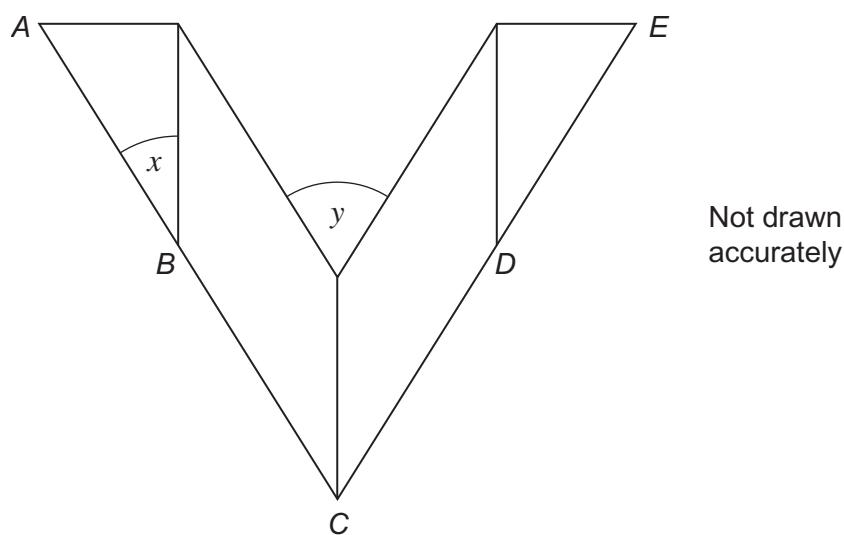
9 (a) *ABC* and *CDE* are straight lines.

Write down and solve an equation to work out the size of angle x.

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Answer .... degrees   *(4 marks)*

9 (b) Work out the size of angle y.

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....

....

Answer .... degrees   *(3 marks)*

10 The table shows the stopping distances for cars travelling at different speeds on dry roads.

Speed (miles per hour)	20	30	40	50	60
Stopping distance (feet)	44	84	136	200	276

The stopping distances on wet roads are **double** the stopping distances on dry roads.

A car is travelling on a wet road where the speed limit is 30 mph.
The car's stopping distance is 250 feet.

Is the car travelling above or below the speed limit?
Show how you decide.

....

....

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(3 marks)

10

Turn over ▶

11 A cheese and tomato pizza costs £6 at Mama's restaurant.
Extra toppings on pizzas increase the cost.
The graph shows the cost, in pounds, of a cheese and tomato pizza with up to five
extra toppings.
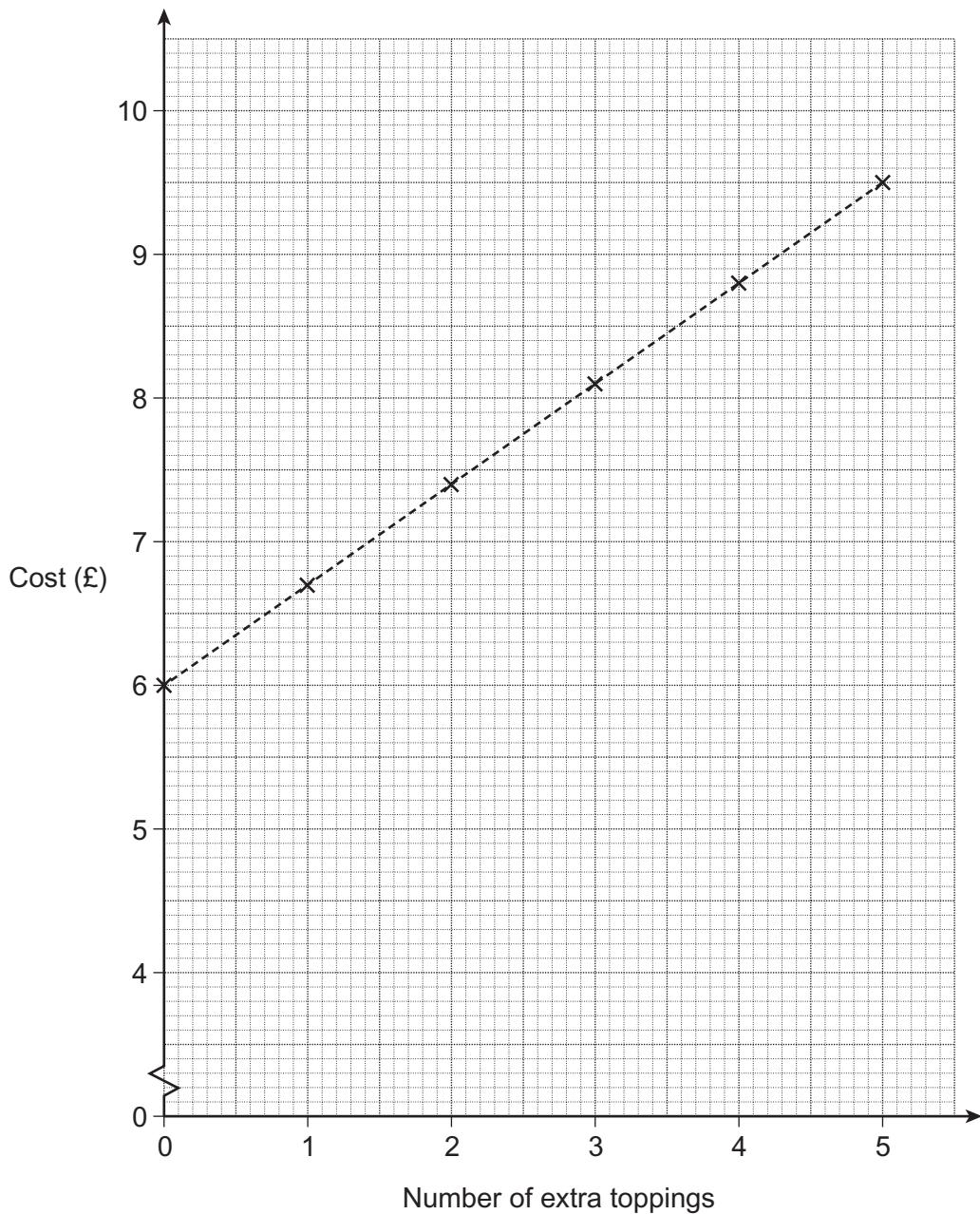
11 (a) Work out how much more one extra topping costs.

....

....

Answer .... pence *(1 mark)*

11 (b) A cheese and tomato pizza costs £4.80 at Alfredo's restaurant.
Each extra topping costs £1.

Draw a graph to show the cost, in pounds, of a cheese and tomato pizza with up to five extra toppings at Alfredo's restaurant.
Use the grid on the opposite page.

(2 marks)

11 (c) Alfredo says

For the same number of extra toppings my pizzas are always cheaper than Mama's
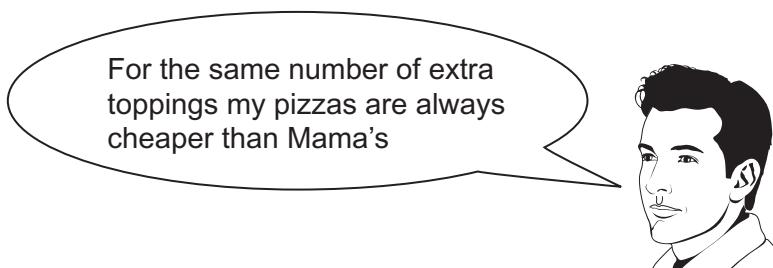
Alfredo

Give an example to show that Alfredo is **not** correct.

....

....

(1 mark)

12   Sammy makes bracelets and necklaces.
She threads small and large beads onto a chain.
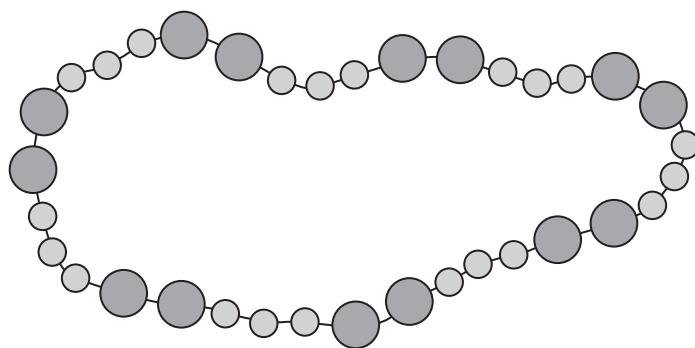
12 (a)   The table shows some information about the number of beads she uses.

	Small beads	Large beads	Total number of beads
Bracelet	21	14	35
Necklace			125

Sammy uses the same ratio of small and large beads for a bracelet and a necklace.

Complete the table.

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(3 marks)

12 (b) The table shows the cost of the materials.

Item	Cost
Small bead	5p
Large bead	9p
Bracelet chain	87p
Necklace chain	£2.84

A shop buys 200 bracelets.
Sammy makes 85% profit on the cost of the materials.

Work out the amount that the shop pays for the bracelets.

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Answer £ .... *(5 marks)*

8

Turn over ▶

13   The map shows distances between some junctions on a motorway.
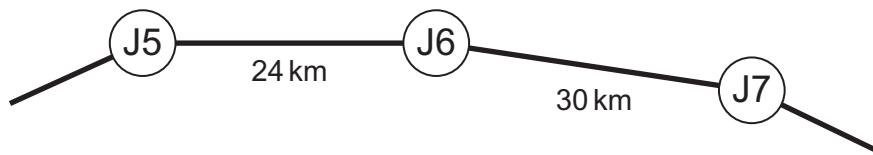
A car is travelling at a constant speed on the motorway.
The car travels between J5 and J6 in 20 minutes.

How many minutes does it take to travel between J6 and J7?

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Answer .... minutes   *(3 marks)*

END OF QUESTIONS

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