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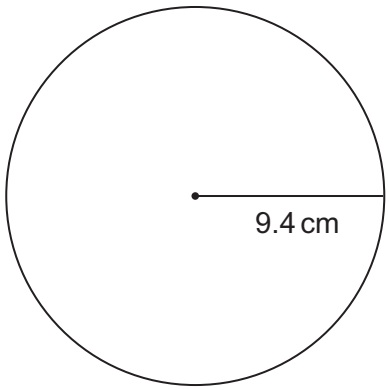
Answer **all** questions in the spaces provided.

1 A circle has radius 9.4 cm.



Not drawn accurately

1 (a) Work out the circumference of the circle.

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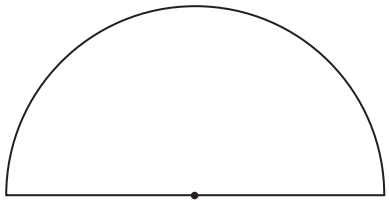
Answer ..... cm *(2 marks)*

1 (b) A semicircle has radius 9.4 cm.



Not drawn accurately

Use your answer to part (a) to work out the perimeter of the semicircle.

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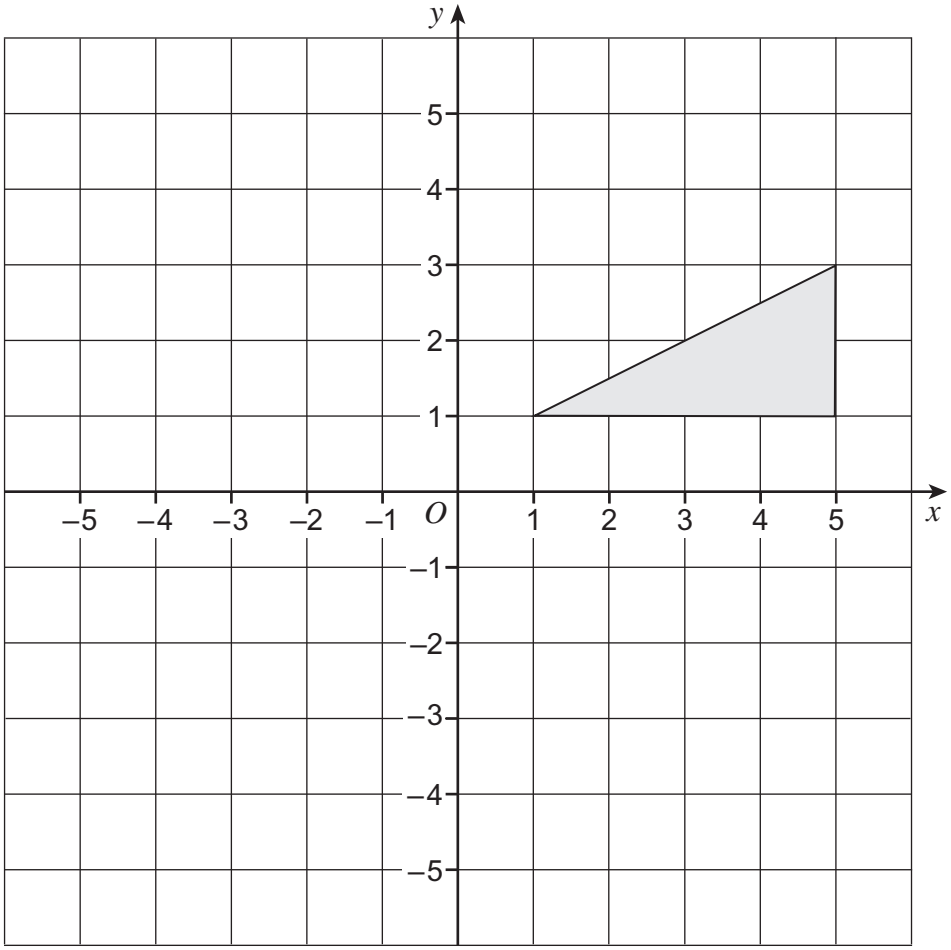
Answer ..... cm *(2 marks)*

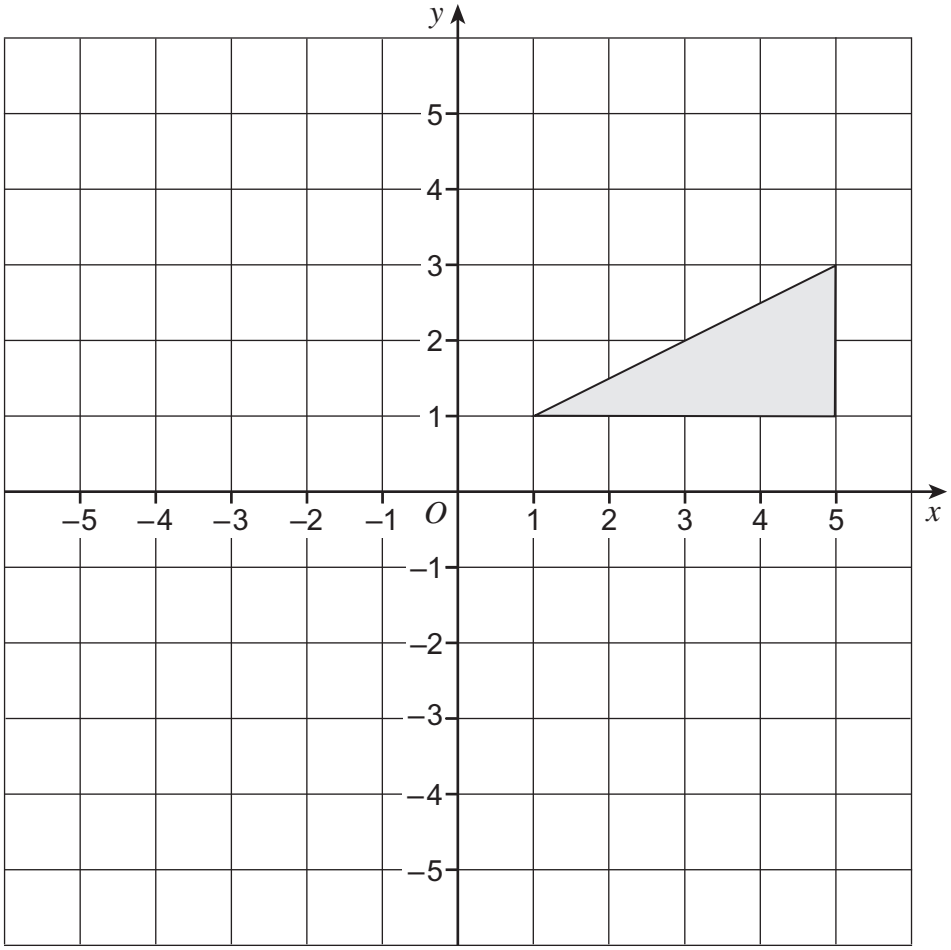
4

2 (a) Reflect the triangle in the line $x = 1$



(2 marks)

2 (b) Rotate the triangle through 180º about the origin.

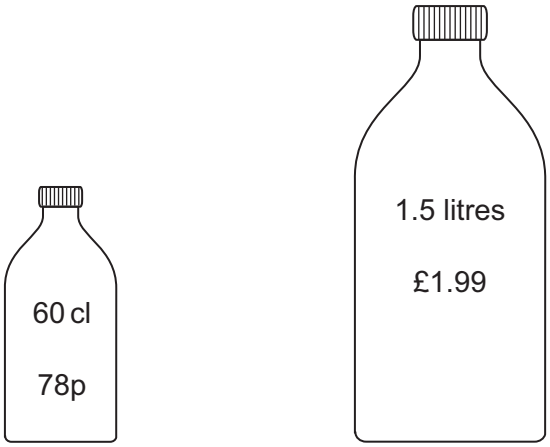


(2 marks)

Turn over for the next question

4

***3** The diagram shows two bottles of the same drink.



Small Large

You are given that 1 litre = 100 cl

Which bottle is better value for money?
You **must** show your working.

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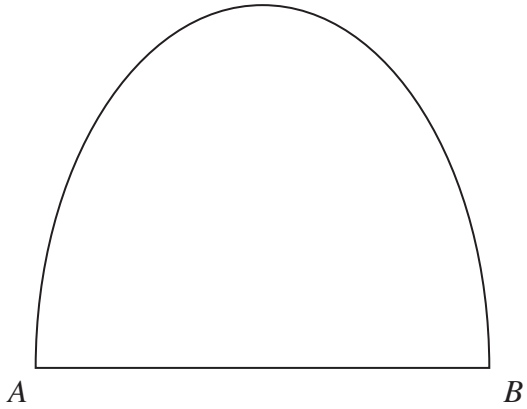
Answer ..... *(4 marks)*

4 Here is a scale drawing of a play area.



Scale 1 : 800

A straight wall is to be built from A to B.
250 bricks are needed for each metre of wall.

Work out the total number of bricks needed to build the wall.

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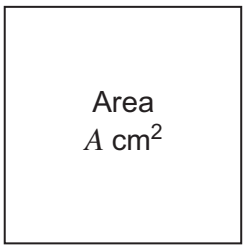
Answer ..... *(4 marks)*

8

5 (a) The diagram shows a square piece of card.



Write down a formula connecting A and w.

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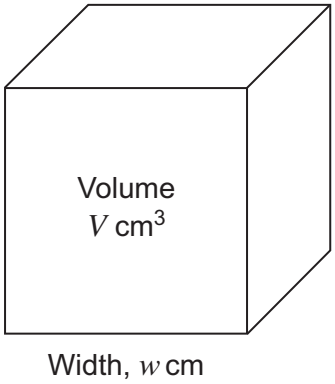
Answer ..... *(1 mark)*

5 (b) This diagram shows a cube.



Write down a formula connecting V and w.

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

5 (c) The area of one face of a cube is 20 cm^2.

Work out the volume of the cube.

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Answer ..... cm^3 *(3 marks)*

Turn over for the next question

5

6 (a) Three angles are in the ratio 2 : 3 : 7
The smallest angle is 60º.

Show that these three angles will fit together at a point with no gaps.

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(3 marks)

6 (b) Two angles form a straight line.
One of the angles is $(x + 30)$ degrees.

Write down an expression for the size of the other angle.
Give your answer in its simplest form.

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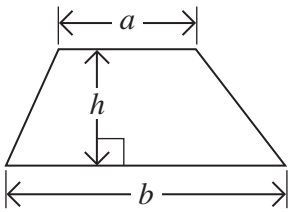
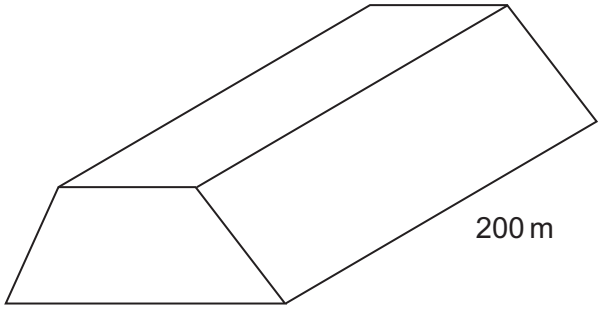
Answer ..... degrees *(2 marks)*

7 In the trapezium, a = 6.5 m, b = 8.3 m and h = 3.2 m



Not drawn accurately

The trapezium is the cross-section of a tunnel.
The tunnel is 200 metres long.



Work out the volume of the tunnel.

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Answer ..... m^3 *(4 marks)*

9

8 Solve the equation $x^2 - 5 = 0$
Give your answers to 1 decimal place.

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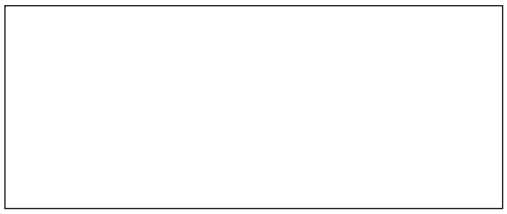
Answer ..... and ..... *(2 marks)*

9 The diagram shows a rectangle.



$(x - 5)$ cm

$(x + 4)$ cm

The area of the rectangle is 90 cm^2.

Set up and solve a quadratic equation to work out the value of x.

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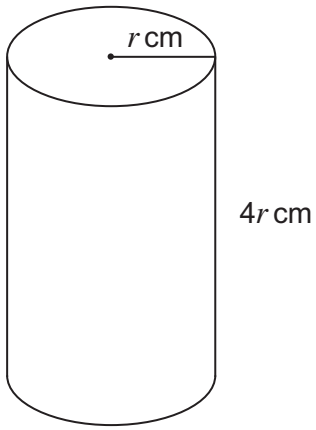
x = ... cm *(5 marks)*

10 The diagram shows a cylinder of radius r cm and height $4r$ cm.



10 (a) Work out a formula for the volume, V of the cylinder in terms of π and r.
Simplify your answer.

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

10 (b) Work out the volume of the cylinder when $r = 8$

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Answer ..... cm^3 *(2 marks)*

11

Turn over ▶

11 This is a formula for the time to cook a turkey.

$T = 15 + 20m$

This is a formula for the time to cook a goose.

$T = 40 + 15m$

m is the mass in kilograms.
T is the time in minutes.

A turkey and a goose have the same mass and take the same time to cook.

Work out this time.

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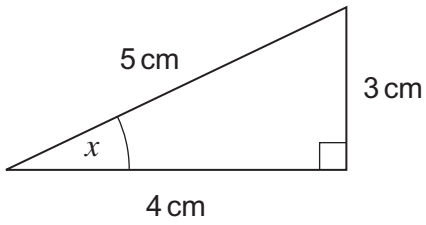
Answer ..... minutes *(4 marks)*

12 (a) The diagram shows a right-angled triangle.



Not drawn accurately

Write down the value of sin x.

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

12 (b) In a different right-angled triangle, tan $y = 0.7$

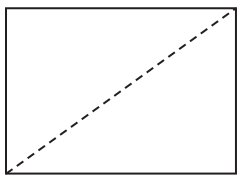
Work out the value of y.

Answer ..... degrees *(1 mark)*

Turn over for the next question

6

13 (a) The diagram shows a rectangle.



Not drawn accurately

Work out the length of the diagonal.

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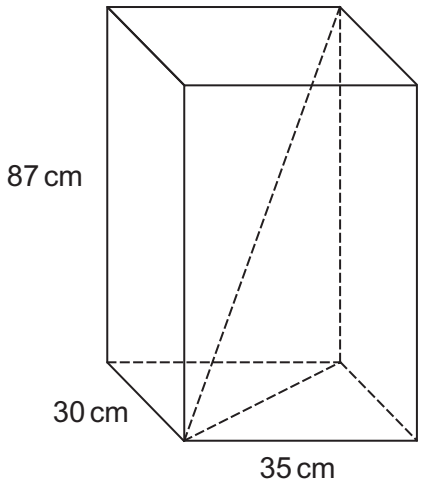
Answer ..... cm *(3 marks)*

13 (b) The rectangle in part (a) is the base of this box.
The box is a cuboid.



Will a straight rod of length 1 metre fit in the box?
You **must** show your working.

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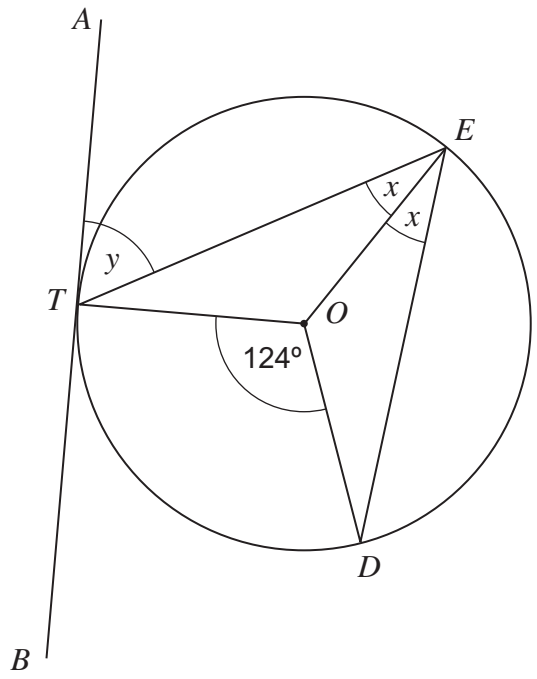
(3 marks)

Turn over for the next question

6

14 The diagram shows a circle, centre O.
ATB is a tangent at T.



Not drawn accurately

14 (a) Work out the value of x.

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

14 (b) Work out the value of y.

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

15 W is inversely proportional to x.
When $W = 6$, $x = 20$

Work out the value of W when $x = 24$

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

Turn over for the next question

9

16 (a) You are given that 1 mile = 1.6 kilometres

Convert $6\frac{1}{2}$ miles into kilometres.

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Answer ..... km *(2 marks)*

***16 (b)** A manufacturer claims a car like mine uses 5.5 litres per 100 km.

My car does 50 miles per gallon.

Is my car using more or less fuel than the manufacturer claims?
You **must** show your working.

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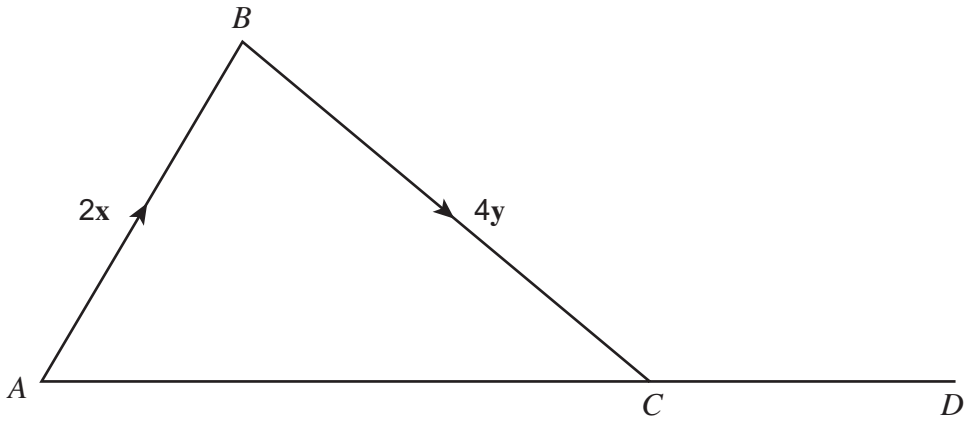
(5 marks)

17 $\overrightarrow{AB} = 2\mathbf{x}$ and $\overrightarrow{BC} = 4\mathbf{y}$
ACD is a straight line.



17 (a) Write down the vector $\overrightarrow{AC}$ in terms of $\mathbf{x}$ and $\mathbf{y}$.

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

17 (b) $AC : CD = 2 : 1$

Work out the vector $\overrightarrow{AD}$ in terms of $\mathbf{x}$ and $\mathbf{y}$.
Give your answer as simply as possible.

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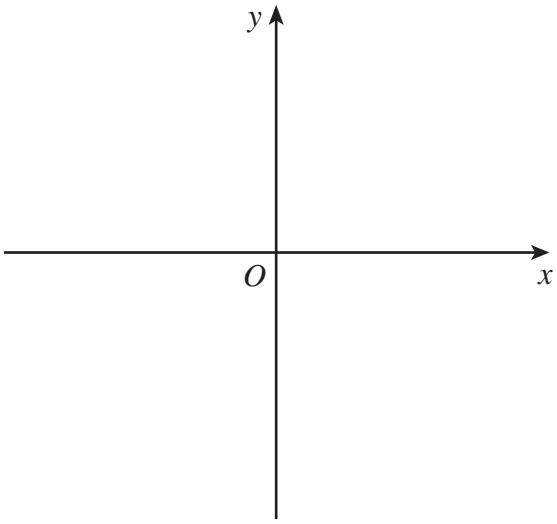
Answer ..... *(2 marks)*

Turn over for the next question

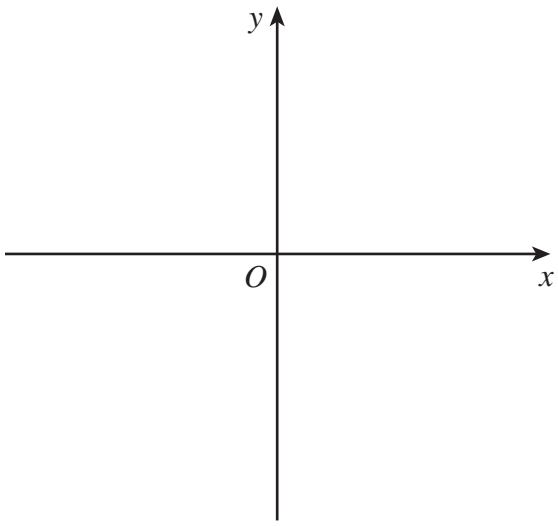
10

18 (a) On the axes below sketch the graph of $y = x^3$



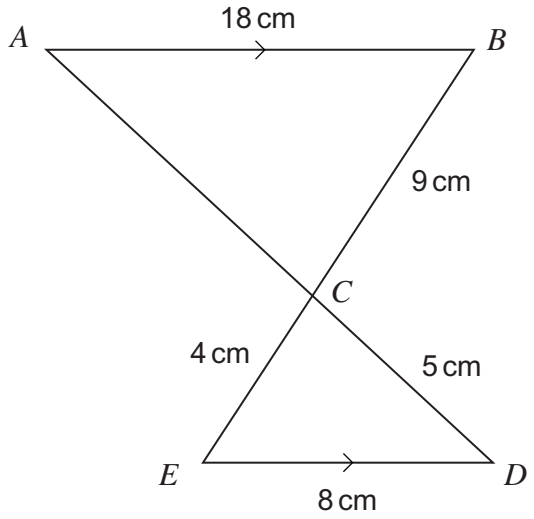
(1 mark)

18 (b) On the axes below sketch the graph of $y = x^3 + 8$



(1 mark)

19 ACD and BCE are straight lines.
Triangle ABC is similar to triangle DEC.
AB is parallel to ED.



Not drawn accurately

Work out the area of triangle ABC.

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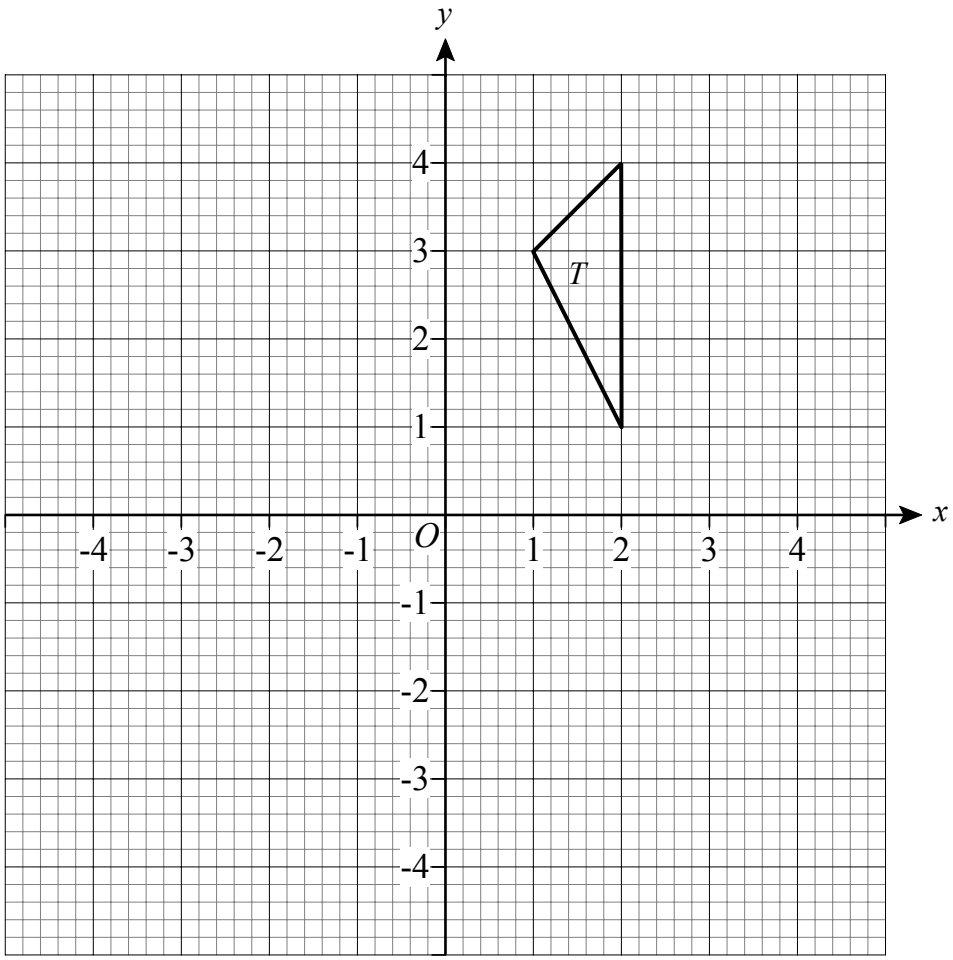
Answer ..... cm^2 *(6 marks)*

END OF QUESTIONS

8

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

1 Triangle T is drawn on the grid.



1 (a) Draw the image of T after a rotation of 90° anticlockwise about O.

(3 marks)

1 (b) The triangle T is reflected to form a new triangle S.
The coordinates of S are (–4, 4), (–3, 3), and (–4, 1).

Work out the equation of the mirror line.

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

5

2 The speed limit through some roadworks is 50 mph.

Cameras recorded the time taken for a car to travel 600 m through the roadworks as 27 seconds.

10 mph is approximately 4.47 m/s

Was the car speeding through the roadworks?

You **must** show your working.

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(4 marks)

3 Is the statement below always true, sometimes true or never true?

Tick the correct box.

The circumference of a circle of diameter 10 cm is greater than the perimeter of triangle with a base 10 cm.

☐ Always true ☐ Sometimes true ☐ Never true

Explain your answer

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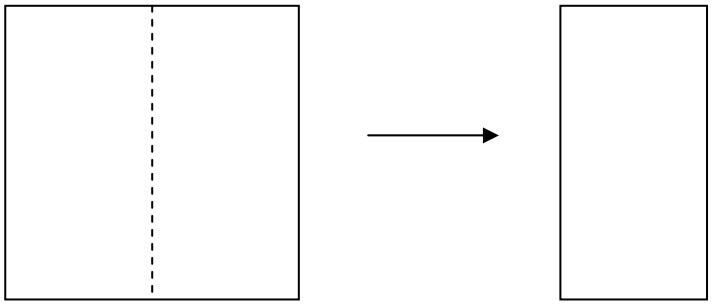
(2 marks)

4 You have a square piece of paper which is folded in half to form a rectangle as shown.



The perimeter of the rectangle is 39 centimetres.

What is the area of the square you started with?

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Answer ..... cm^2 *(4 marks)*

5 At a wedding reception there are 103 people at 12 tables.
There are eight or nine people at each table.

How many tables are there with eight people?

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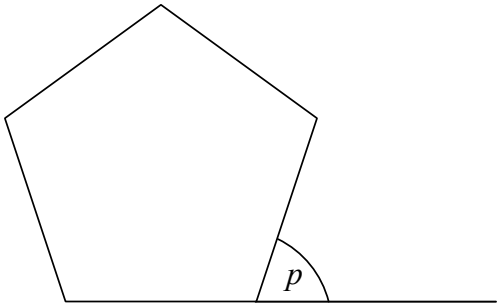
Answer ..... *(4 marks)*

14

6 (a) Explain why the exterior angle of a regular pentagon, marked p on the diagram, is 72°.



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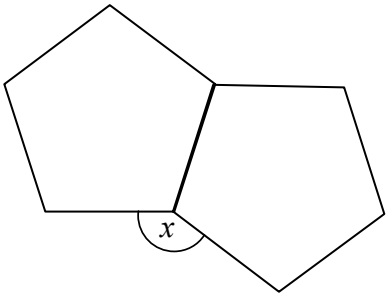
(1 mark)

6 (b) Two identical regular pentagons are joined as shown.



Not drawn accurately

Work out the size of angle x.

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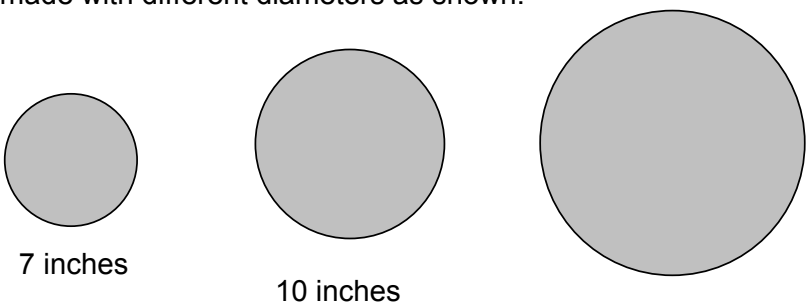
Answer ..... degrees *(2 marks)*

7 A restaurant serves garlic bread.

All the garlic breads are circular and the same thickness.
They can be made with different diameters as shown.

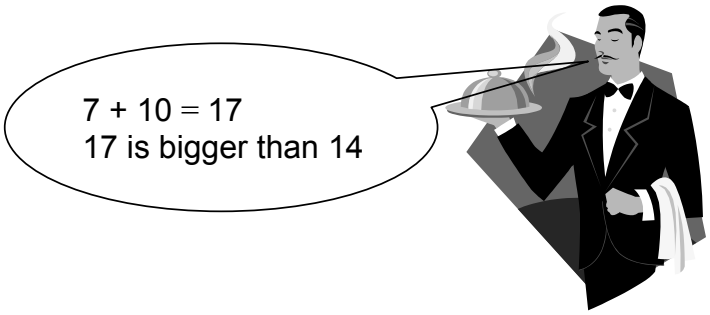


Robert is going to order a 14-inch garlic bread.

The restaurant has a special offer.

Special Offer

Get one 7-inch garlic bread **and** one 10-inch garlic bread for the same price as a 14-inch garlic bread.



Robert says that if he has the special offer he will get less garlic bread.

Is Robert correct?

You **must** show your working.

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(4 marks)

7

Turn over ▶

8 (a) Factorise $x^2 + 10x$

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

8 (b) Factorise $y^2 - 36$

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

8 (c) Solve the equation $5w + 6 = 9 - w$

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Answer $w =$ ..... *(3 marks)*

8 (d) Solve the equation $\frac{2x+3}{4} + \frac{x-5}{3} = \frac{3}{2}$

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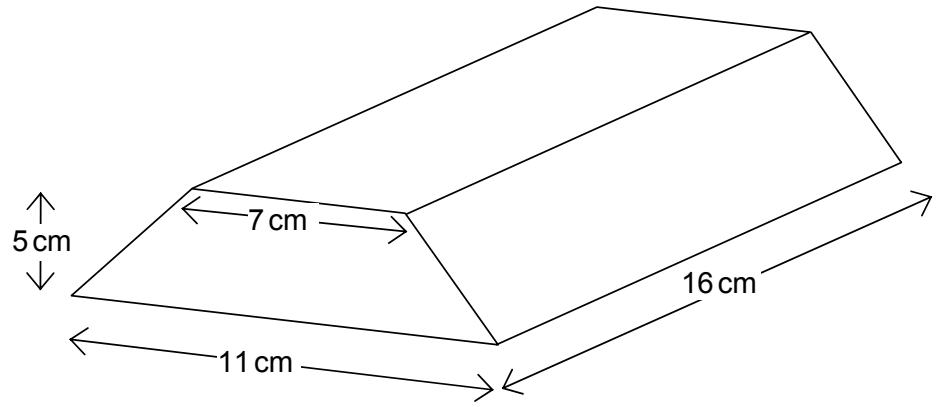
Answer $x =$ ..... *(4 marks)*

9 A gold bar has a trapezium cross-sectional area.

The dimensions are shown in the diagram.

Not drawn accurately



9 (a) Calculate the cross-sectional area of the gold bar.

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Answer ..... cm^2 *(2 marks)*

9 (b) Gold has a density of 19.3 grams per cm^3.

Work out the mass of the gold bar.

Give your answer in kilograms.

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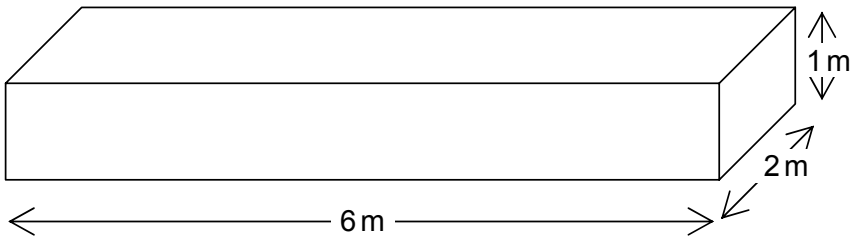
Answer ..... kg *(4 marks)*

15

Turn over ▶

✶**10** The shape of a flower bed is a cuboid as shown.

Not drawn accurately



$1\,m^3$ of soil weighs 1.25 tonnes

A gardener wants to fill the flower bed with soil as cheaply as possible.

The table shows the costs for Company A and Company B.

Company A	£49.50 per tonne	Delivery £30
Company B	10 tonnes for £430 then £67.50 per extra tonne	Delivery free

Which company should she use and how much will it cost?

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Answer Company .....

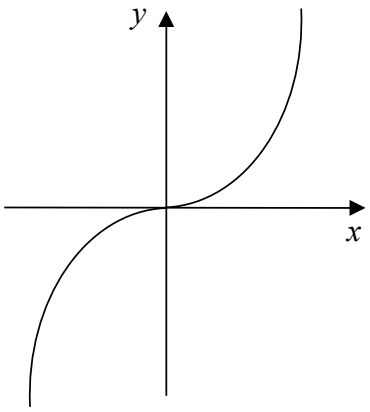
£ ..... *(6 marks)*

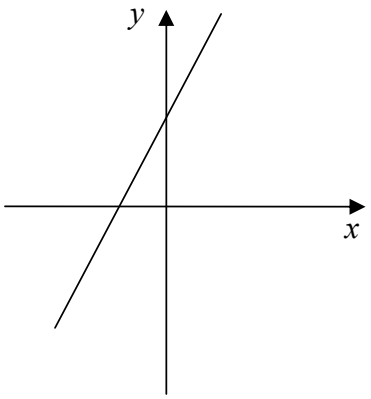
11 Here are four equations of graphs.

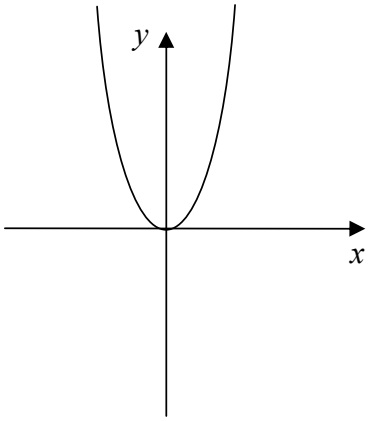
A $y = 3x + 2$ B $2x + 3y = 6$ C $y = 3x^2$ D $y = x^3$

11 (a) Here are three sketch graphs.

Match each graph to its equation.



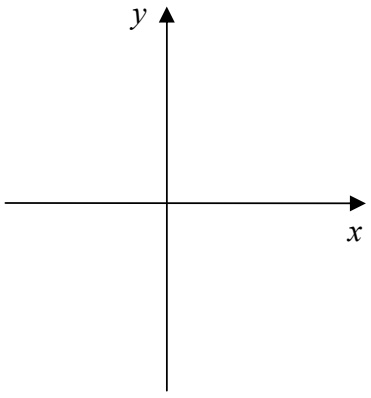




Equation ..... Equation ..... Equation .....

(3 marks)

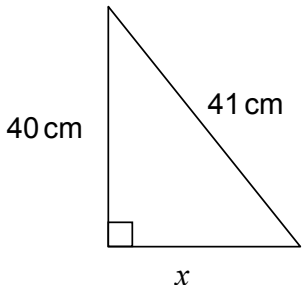
11 (b) On the axes below, sketch the graph of the other equation.



(1 mark)

10

12(a) The right-angled triangle has sides shown.



Not drawn accurately

Show that $x = 9$ cm

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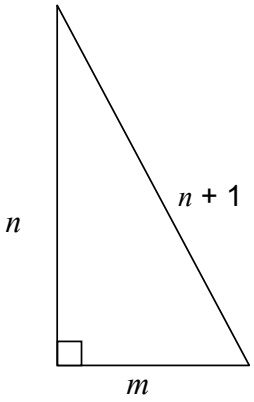
(2 marks)

12 (b) This right-angled triangle has sides n, m and $n + 1$.

m are n are integers.



Prove that m must be an odd number.

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(5 marks)

13 Katy is using the quadratic formula to solve a quadratic equation.

After correctly substituting the values, she writes

$$x = \frac{7 \pm \sqrt{49 - 72}}{4}$$

13 (a) What is the quadratic equation Katy is trying to solve?

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

13 (b) Explain why Katy will **not** be able to find any solutions to the equation.

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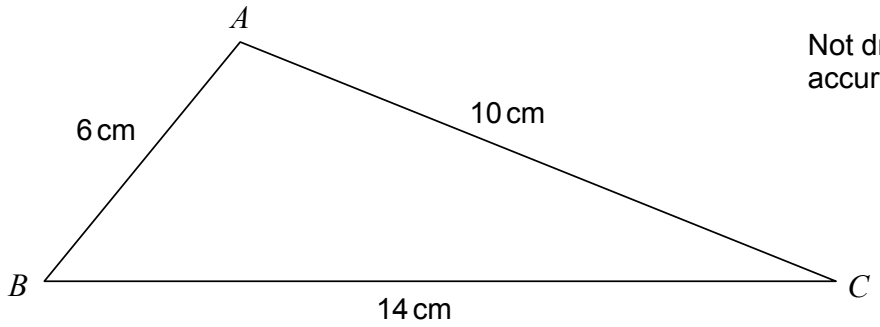
(1 mark)

11

14 Triangle ABC has AB = 6 cm, AC = 10 cm, BC = 14 cm



Calculate the largest angle in the triangle.

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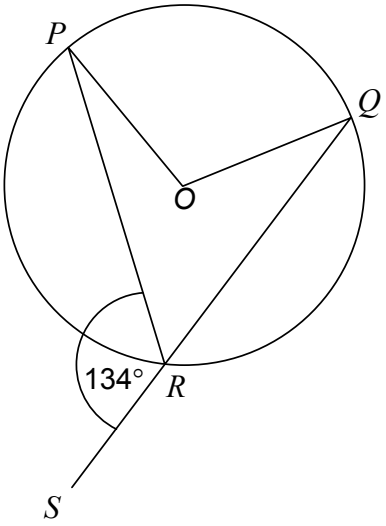
Answer ..... degrees *(3 marks)*

15 O is the centre of the circle.

Angle $PRS = 134°$

Not drawn accurately



Work out the size of the reflex angle *POQ*.

You **must** show your working.

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.....

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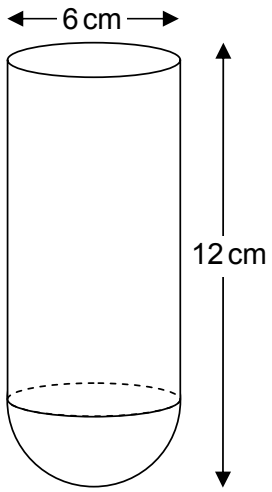
Answer ..... degrees *(3 marks)*

Turn over for the next question

6

✶**16 (a)** A test tube is formed from a cylinder and a hemisphere as shown.



Work out the total volume of the test tube.

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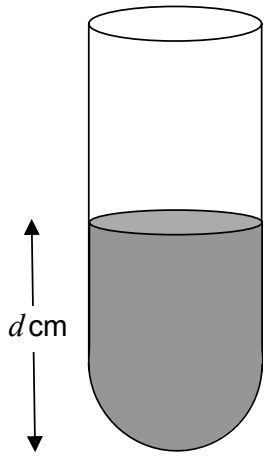
Answer ..... cm^3 *(4 marks)*

✶**16 (b)** The test tube is filled with water to a depth of d cm, as shown in the next diagram.



The water occupies exactly half the full capacity of the test tube.

Work out the value of d.

.....

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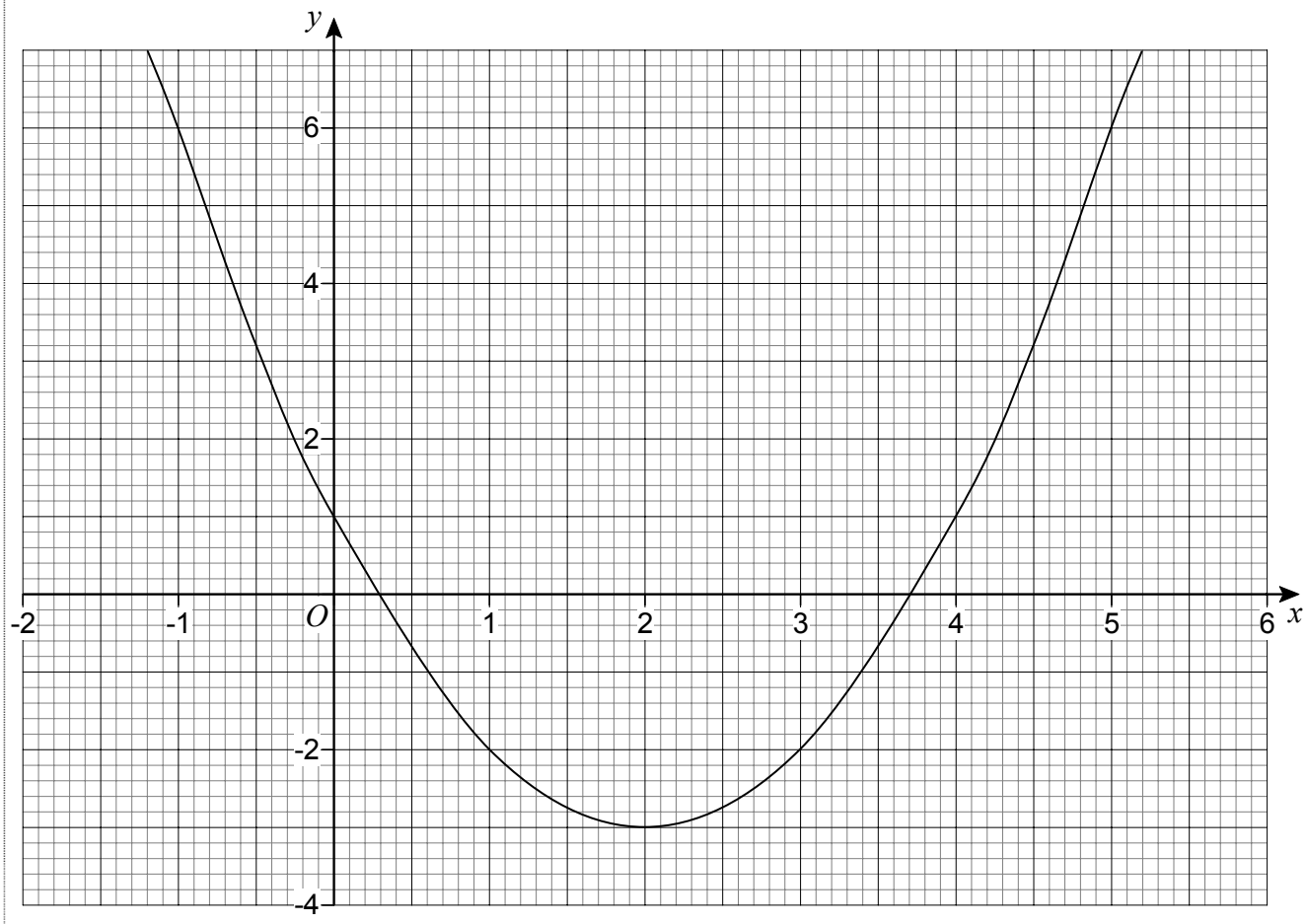
Answer ..... cm *(4 marks)*

Turn over for the next question

8

17 This is the graph of $y = x^2 - 4x + 1$



By drawing an appropriate linear graph, solve the equation $x^2 - 5x + 3 = 0$

.....

.....

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

END OF QUESTIONS

4

1 Calculate.

(a) $\dfrac{16.5}{8.25+5.15}$

Give your answer correct to 1 decimal place.

.....

.....

(a) _____ **[2]**

(b) $\dfrac{45}{(0.3)^2}$

.....

.....

(b) _____ **[2]**

2 Josh painted his bedroom.

Complete his paint bill by working out the three missing values.

.....

.....

.....

.....

Paint Bill		
3 tins silk emulsion	@ £17.99 per tin	£_____
_____ tins gloss	@ £11.99 per tin	£_____
	Total cost	**£ 77.95**

[4]

3 **(a)** Factorise.

(i) $6x + 16$

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

(ii) $x^2 + 6x$

(ii) _____ **[1]**

(b) Solve.

(i) $\frac{x}{12} = 6$

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

(ii) $6x + 1 = 11 + 4x$

.....

.....

(ii) _____ **[3]**

(iii) $\frac{x}{6} + 2 = 9$

.....

.....

(iii) _____ **[2]**

(c) Rearrange the following to make x the subject.

$y = 6x - 7$

.....

.....

.....

(c) _____ **[2]**

4 15 women each changed a car wheel.
These are the times taken, in minutes.

22	15	13	17	22
8	16	21	7	10
12	33	9	18	22

(a) Draw an ordered stem and leaf diagram to show these times.

.....

.....

.....

.....

.....

.....

Key:

[3]

(b) Work out the median and range of these times.

.....

.....

(b) Median = _____ minutes

Range = _____minutes **[2]**

15 men each changed a car wheel.
The median time taken by these men was 16 minutes.
The range of their times was 33 minutes.

(c) Write down one comparison between the times taken by these men and women.

_____

_____ **[1]**

5 **(a)** The nth term of a sequence is $n^2 + 2$.

Write down the first three terms of this sequence.

.....

.....

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

(b) Another sequence begins

7, 11, 15, 19, ……

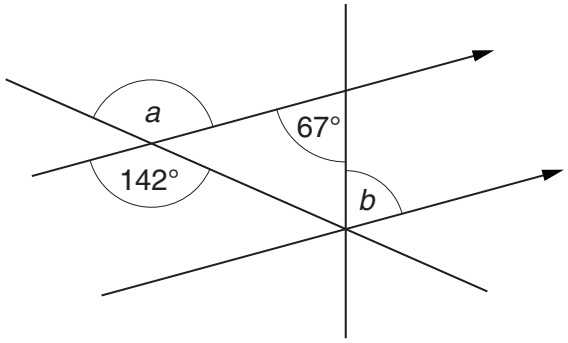
Write down the nth term of this sequence.

.....

.....

(b) _____ **[2]**

6 **(a)** Find the sizes of angle a and angle b.
Write down a reason for each answer.



NOT TO SCALE

a = _____ ° Reason _____

b = _____ ° Reason _____ **[4]**

(b) **(i)** The sum of the interior angles of a regular pentagon is 540°.

Without measuring any angles, explain why this is true.

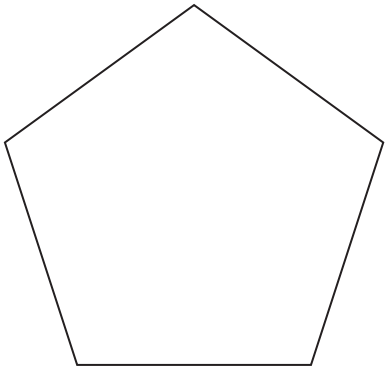
_____

_____

_____

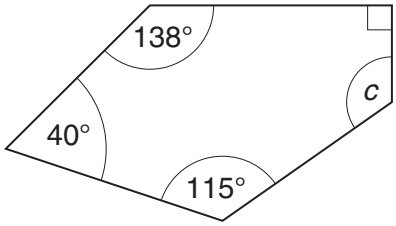
_____

_____



[3]

(ii) This is an irregular pentagon.



NOT TO SCALE

Work out angle *c*.

.....

.....

(b)(ii) _____ ° **[2]**

(iii) The area of another pentagon is 4.5 cm^2.

Change 4.5 cm^2 into mm^2.

.....

.....

(iii) _____ mm^2 **[2]**

(c) In the following expressions, the letters *f*, *g*, and *h* represent lengths.

fgh $\quad$ $f^2(g + h)$ $\quad$ $2f(g + h)$

Which one of these expressions could represent an area?

(c) _____ **[1]**

7 **(a)** $5x^3 = 40$.

Work out the value of x.

.....

.....

(a) _____ **[2]**

(b) Write 52 as a product of prime factors.

.....

.....

(b) _____ **[2]**

(c) What is the LCM (least common multiple) of 27 and 33?

.....

.....

(c) _____ **[2]**

(d) What is the HCF (highest common factor) of 96 and 144?

.....

.....

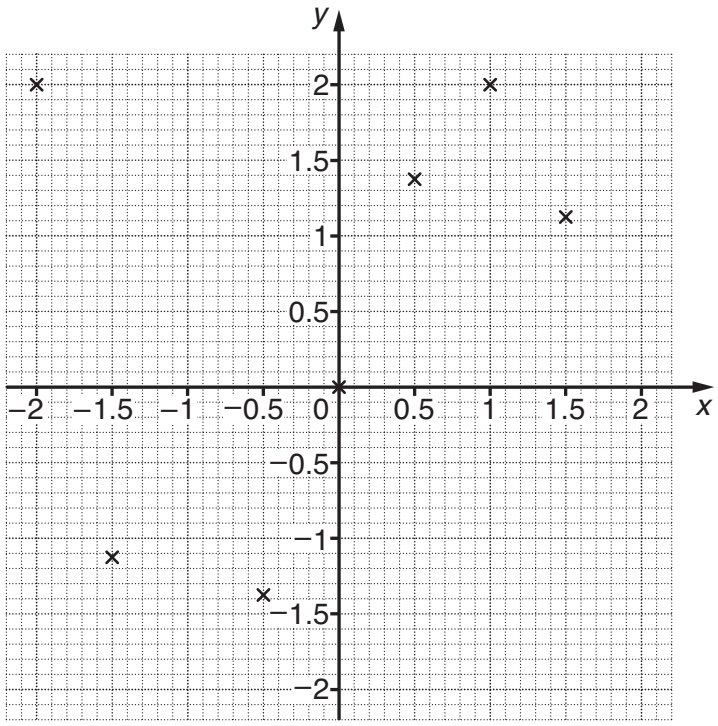
(d) _____ **[2]**

8 **(a)** Complete this table for $y = 3x - x^3$.

x	–2	–1.5	–1	–0.5	0	0.5	1	1.5	2
y	2	–1.125		–1.375	0	1.375	2	1.125	

[2]

(b) Complete the graph of $y = 3x - x^3$ for $-2 \leqslant x \leqslant 2$.



[2]

(c) Use your graph to estimate the values of x when $y = 1$.

(c) _____ **[2]**

(d) Sam wants to use this graph to solve $2x - x^3 = 0$.

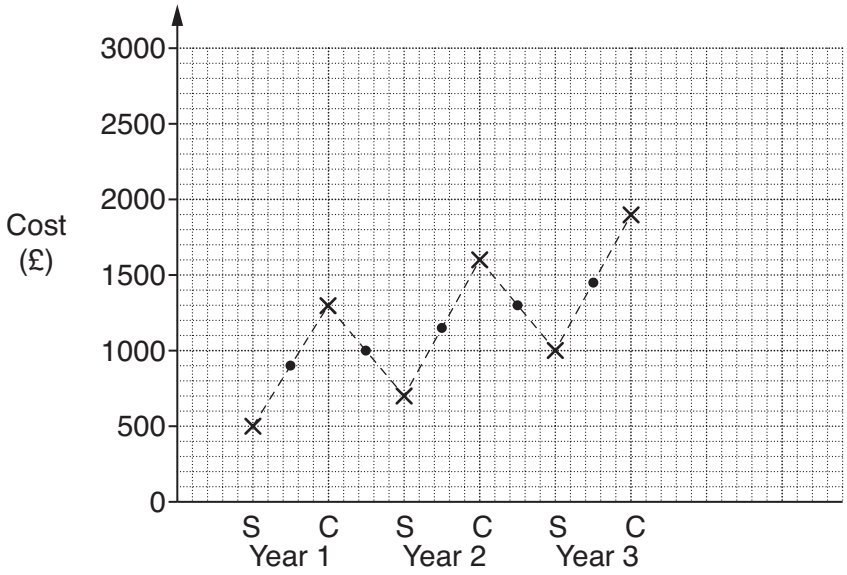
Find the equation of the line she should draw on the graph.

.....

.....

(d) _____ **[2]**

9 Barney kept a record of the cost, in £, of his office Summer parties (S) and Christmas parties (C). The graph shows these costs (×) and the 2-point moving averages (•) for three years.



(a) Explain why Barney used 2-point moving averages.

_____ **[1]**

(b) Show how the first moving average has been calculated.

_____

_____

_____ **[2]**

(c) The moving average calculated from the Year 3 Christmas and Year 4 Summer parties is £1420.

Calculate the cost of the Year 4 Summer party.

.....

.....

.....

.....

(c) £_____ **[2]**

(d) 89 women and 31 men work for Barney.
He wishes to take a representative sample, stratified by gender, of his staff.
He decides on a sample of size 20.

How many women should Barney include in the sample?

.....

.....

.....

(d) _____ **[2]**

10 Evan invested £50 in a savings account for 4 years at 6% compound interest per year.

He wants to use this formula to work out the amount, in £, in the savings account at the end of the 4 years.

$$\text{Amount} = 50 \times c^d$$

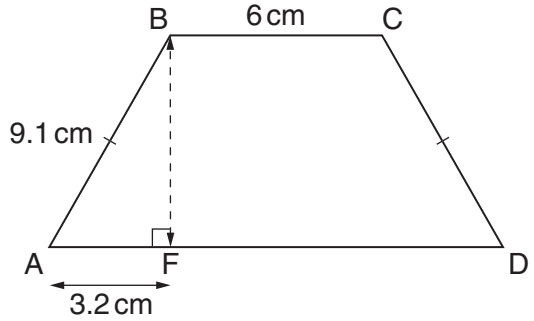
What values should he use for c and d?

.....

.....

$c =$ _____ $d =$ _____ **[3]**

11 **(a)** ABCD is an isosceles trapezium.
BF is perpendicular to AD.



NOT TO SCALE

(i) Calculate BF.

.....

.....

.....

.....

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

(ii) Calculate the area of ABCD.

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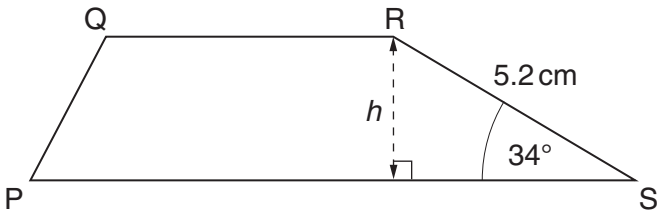
(ii) _____ cm^2 **[3]**

(b) PQRS is a trapezium.



NOT TO SCALE

Calculate *h*.

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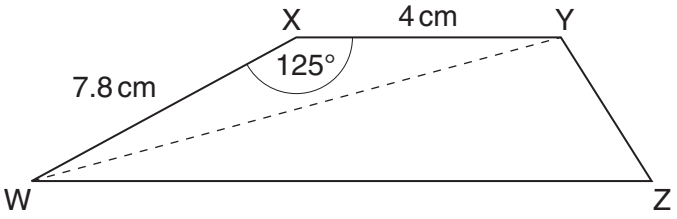
.....

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

(c) WXYZ is a trapezium.



NOT TO SCALE

Calculate WY.

.....

.....

.....

.....

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

12 Simplify.

(a) $t^2 \times t^7$

(a) _____ **[1]**

(b) $\dfrac{s^3}{s^6}$

(b) _____ **[1]**

(c) $s^3t^3 \times s^4t^2$

.....

(c) _____ **[2]**

(d) $(s^3t)^4$

.....

(d) _____ **[2]**

13 y is proportional to the square of x.
$y = 18$ when $x = 6$.

(a) Find an equation connecting y and x.

.....

.....

.....

.....

(a) _____ **[3]**

(b) Find the values of x when $y = 5$.

.....

.....

.....

(b) _____ **[2]**

14 A toy car travels 180 cm, correct to the nearest 10 cm.
It takes 7 seconds, correct to the nearest second, to travel this distance.

Work out the greatest possible value of the average speed of the toy car.
You must show all your working.

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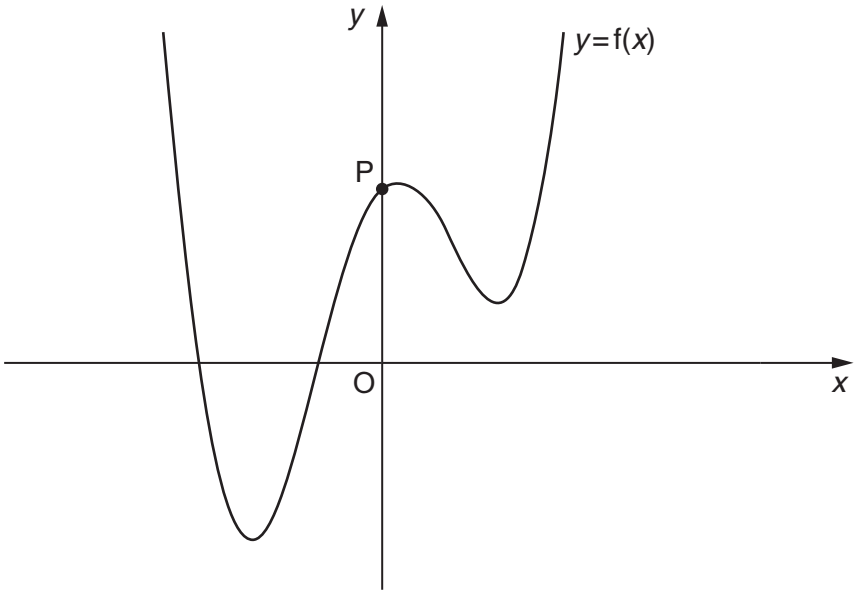
_____ cm/s **[4]**

15 The diagram shows the graph of $y = f(x)$.



The graph passes through the point P (0, 2).

Write down the coordinates of the image of P when $y = f(x)$ is transformed to

(a) $y = f(x) - 3$,

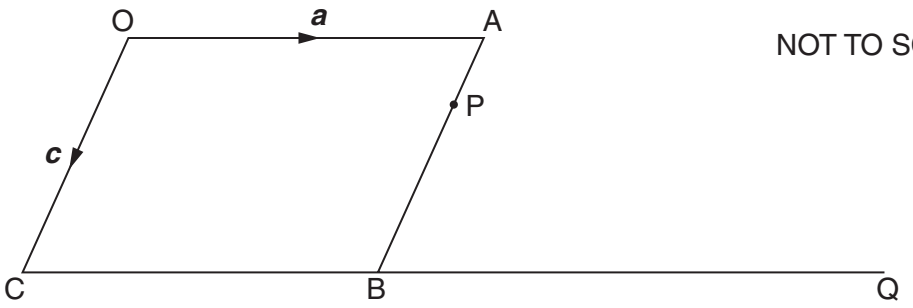
(a) (_____ , _____) **[1]**

(b) $y = f(x - 3)$.

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

16 OABC is a parallelogram.

$\overrightarrow{OA} = \boldsymbol{a}$ $\overrightarrow{OC} = \boldsymbol{c}$



NOT TO SCALE

P is the point on AB such that $\overrightarrow{AP} = \frac{1}{4}\overrightarrow{AB}$.

CBQ is a straight line such that CB : BQ = 1 : 3.

(a) Write down, in terms of ***a*** and ***c***, the vectors

(i) $\overrightarrow{AP}$,

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

(ii) $\overrightarrow{OP}$,

(ii) _____ **[1]**

(iii) $\overrightarrow{BQ}$,

(iii) _____ **[1]**

(iv) $\overrightarrow{OQ}$.

(iv) _____ **[1]**

(b) Explain, using vectors, why O, P and Q lie on a straight line.

.....

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.....

(b) _____ **[1]**

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

1 Use approximations to estimate the value of $\frac{\sqrt{98.7}}{1.94}$

.....

.....

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

2 You are given that $23.5 \times 64 = 1504$

2 (a) Work out 23.5×6.4

.....

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

2 (b) Work out $\frac{1504}{640}$

.....

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

2 (c) Work out 23.5×65

.....

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

3 The value of $\frac{x(y+2)}{9}$ is -10

Work out a possible pair of values for x and y.

.....

.....

.....

.....

Answer x = ... y = ... *(2 marks)*

4 Liz has a £20 voucher for an online music shop.
She buys ten songs costing 80p each.

What percentage of her voucher has Liz spent?

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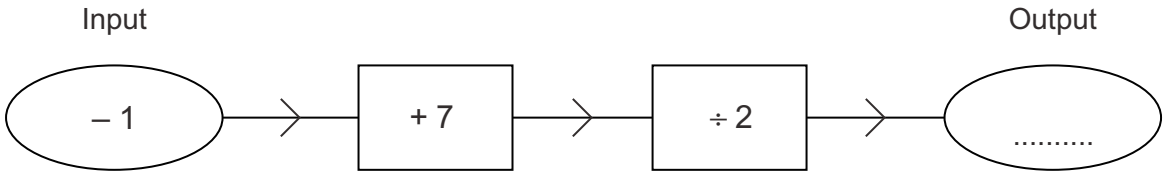
.....

Answer .....% *(3 marks)*

Turn over for the next question

11

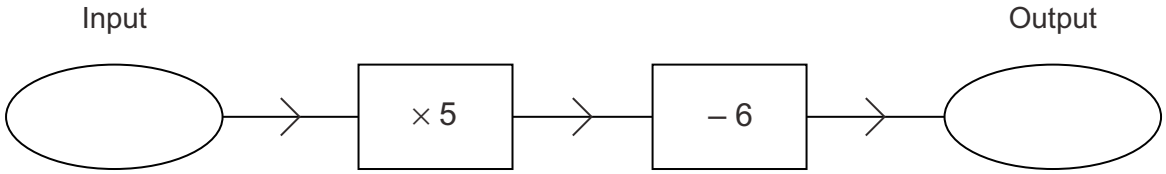
5 (a) Here is a number machine.



Calculate the output when the input is –1

(1 mark)

5 (b) Here is a different number machine.



The output is equal to the input.

Work out the input.

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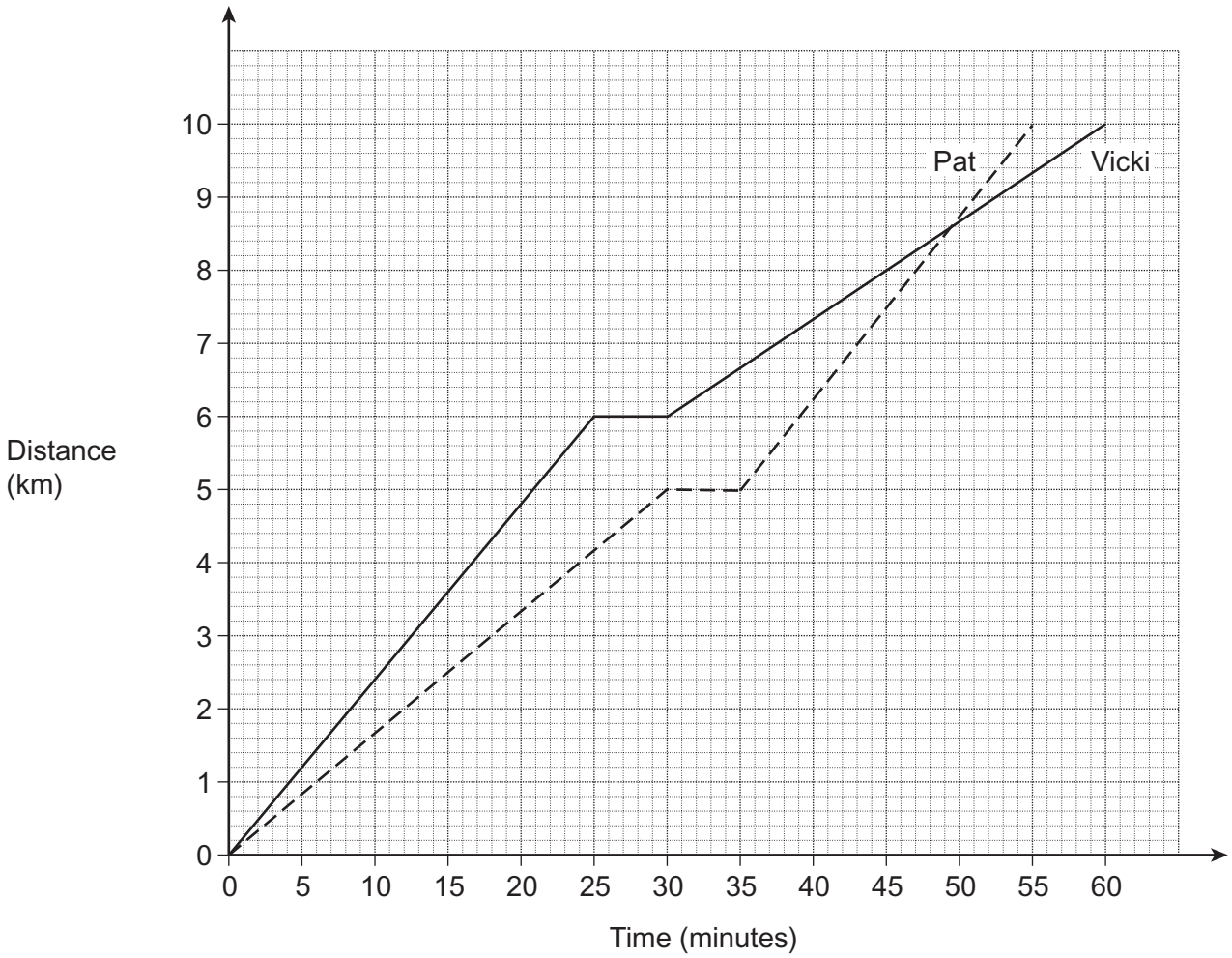
Answer ..... *(3 marks)*

6 The graph shows two training runs by Pat and Vicki.



6 (a) After how many minutes does Pat overtake Vicki?

Answer ..... minutes *(1 mark)*

6 (b) How far ahead is Vicki when Pat starts again after her rest?

.....

Answer ..... km *(2 marks)*

7

7 Divide £600 in the ratio 9 : 6 : 5

.....

.....

.....

.....

Answer £ ..... : £ ..... : £ ..... *(3 marks)*

***8** Martha sells jars of jam at a farmers' market.
She has 80 jars to sell at £3 each.
She sells 50 jars and then reduces the price by 40%.
Martha then sells the remaining jars at the reduced price.

It costs her £95 to make the jars of jam.
Her target is to make a profit of at least £100.

Does she meet her target?
You **must** show your working.

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(5 marks)

9 (a) Solve $\frac{x}{5} = -6$

.....

Answer x = ... *(1 mark)*

9 (b) Factorise fully $4t - 20$

.....

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

9 (c) Expand and simplify $3(2m - 4) + 5(m + 2)$

.....

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.....

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

9 (d) Simplify fully $4gk^2 \times 2g^3k^3$

.....

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.....

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

9 (e) Factorise fully $10q^2 - 15qr$

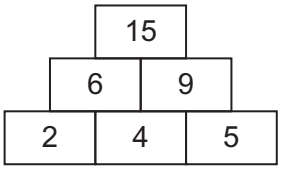
.....

.....

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

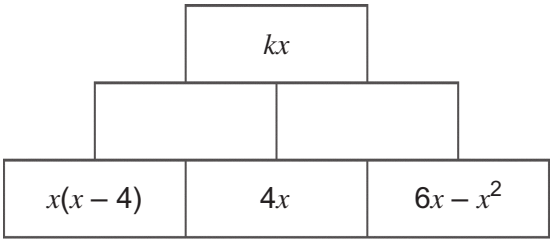
16

10 Here is an addition pyramid.



Each number is the sum of the two numbers below it.

Here is an algebraic addition pyramid.



Work out the value of k.

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.....

Answer k = ... *(4 marks)*

11 Work out the value of $27^{\frac{2}{3}}$

.....

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.....

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

12 Dan has lost weight.
He now weighs 108 kg.
He has lost 10% of his weight since March.

How much did he weigh in March?

.....

.....

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.....

Answer ..... kg *(3 marks)*

***13** The rule for finding the next term in a sequence is

Subtract a and then multiply by 4

The second term is 12.
The third term is 52.

…. 12 52 ….

Work out the first term of the sequence.

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.....

.....

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

13

14 (a) Show clearly that $(x + 5)(x - 5) \equiv x^2 - 25$

.....

.....

(1 mark)

14 (b) Simplify $\dfrac{3x^2 - 19x + 20}{x^2 - 25}$

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

15 Make y the subject of the formula $3y - p = h(2 + y)$

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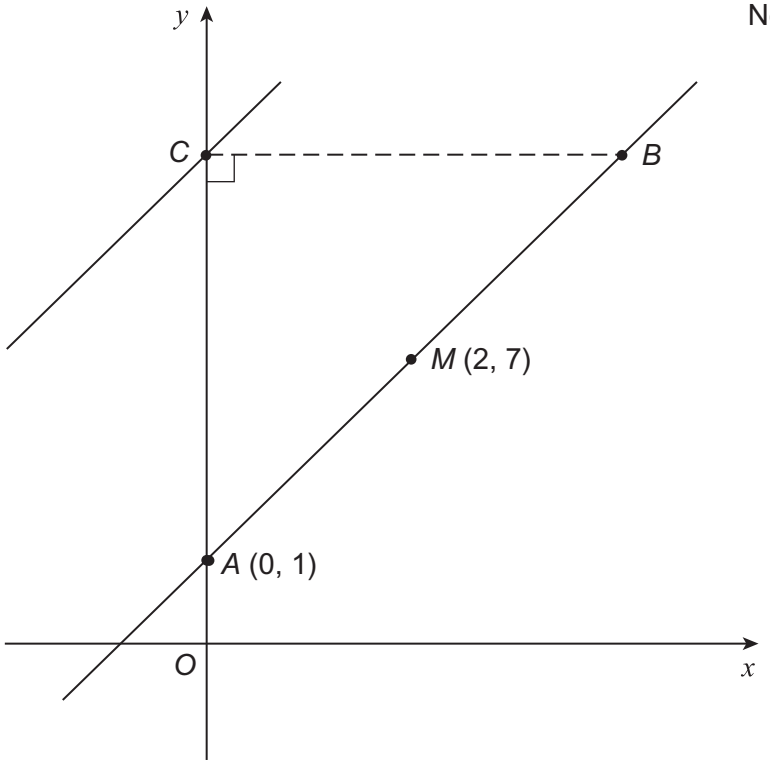
Answer ..... *(4 marks)*

16 On the grid, A is the point (0, 1).
The midpoint, M, of AB is (2, 7).
The gradient of AB is 3.

Not drawn accurately



Work out the equation of the line through C that is parallel to AB.

.....

.....

.....

.....

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

Turn over for the next question

17 Write $\frac{6}{\sqrt{3}} + \sqrt{75}$ in the form $a\sqrt{3}$, where a is an integer.

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.....

.....

.....

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

***18** Two integers have a difference of 3.
The difference between the squares of the two integers is three times the sum of the integers.

For example, $13 - 10 = 3$, $13^2 - 10^2 = 169 - 100 = 69$
and $3 \times (13 + 10) = 3 \times 23 = 69$

Prove this result algebraically.

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(4 marks)

END OF QUESTIONS

8

1 Calculate.

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

.....

.....

(a) _____ **[2]**

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

.....

.....

(b) _____ **[2]**

2 Jayne uses these ingredients to make play dough.

Play dough for 2 children	
Plain flour	225 g
Oil	2 tablespoons
Water	¾ pint
Salt	140 g

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

Work out the amount of water Jayne will need.

.....

.....

(a) _____ 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.

.....

.....

.....

.....

(b) _____ **[3]**

3 **(a)** 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.

(i) Design a two-way table for Jenna to use. **[3]**

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

Show this data in your table in part **(a)(i)**. **[1]**

(b) Jenna uses this question in a survey.

'How many bicycles are there in your household?'

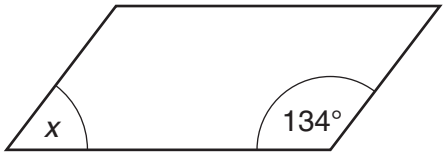
None ☐ 1 – 2 ☐ More than 3 ☐

What mistake has Jenna made?

_____

_____ **[1]**

4 **(a)** A parallelogram has angles as shown.



NOT TO SCALE

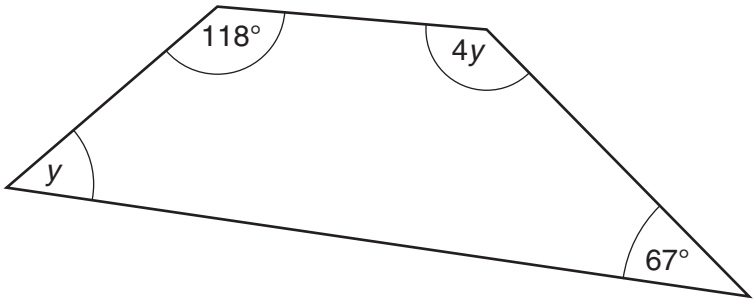
Work out angle *x*.
Give a reason for your answer.

.....

x = _____° because _____

_____ **[2]**

(b) A quadrilateral has angles as shown.



NOT TO SCALE

Work out angle *y*.

.....

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.....

.....

(b) _____ ° **[4]**

5 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.

_____

_____

_____

_____ **[3]**

6 **(a)** The nth term of a sequence is given by $n^2 - 2$.

Work out the first three terms of this sequence.

.....

.....

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

(b) In another sequence of three numbers, the difference between each number and the next is 4.
The total of the three numbers is 6.

What are the three numbers?

.....

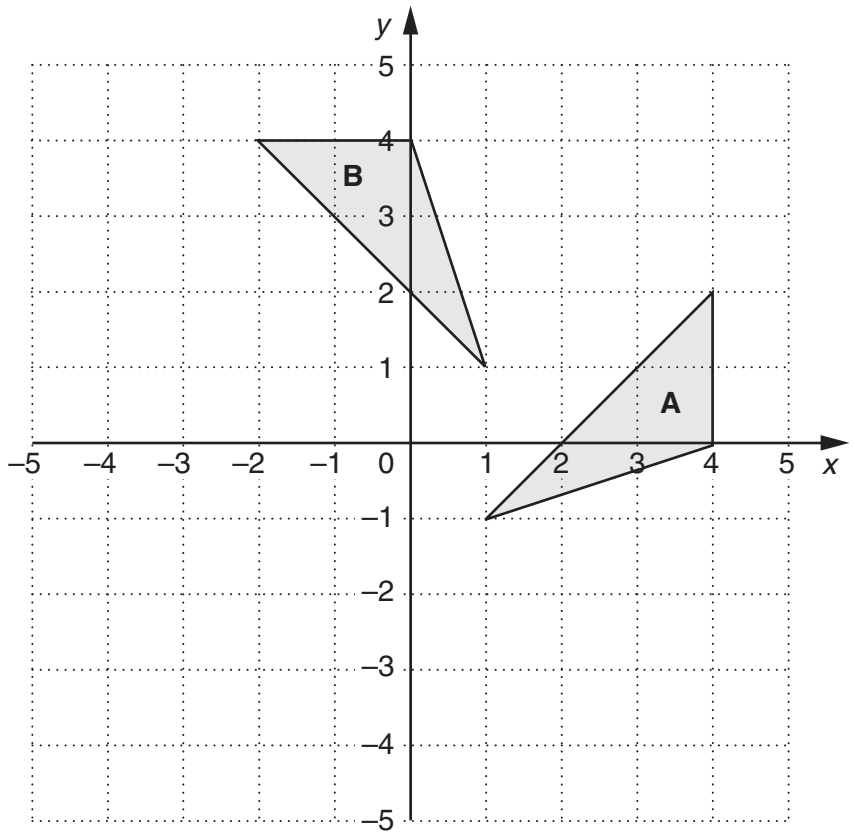
.....

.....

.....

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

7



(a) Describe fully the **single** transformation that maps triangle **A** onto triangle **B**.

_____

_____ **[3]**

(b) Draw the reflection of triangle **A** in the *x*-axis. **[2]**

8 Tom made an electronic dice which gave scores of 1, 2, 3, 4, 5 or 6.
This table summarises 100 scores.

Score	Frequency
1	17
2	19
3	15
4	17
5	18
6	14

(a) Work out the mean score.

.....

.....

.....

.....

.....

(a) _____ **[3]**

(b) Is the dice biased?
Give a reason for your answer.

_____

_____ **[1]**

9 Simplify.

(a) $d^7 \times d^4$

.....

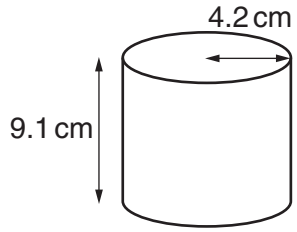
(a) _____ **[1]**

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

.....

(b) _____ **[1]**

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



Work out the curved surface area of the tin.
Give your answer to an appropriate degree of accuracy.

.....

.....

.....

_____ cm^2 **[4]**

11 **(a)** Work out the integer values of n that satisfy this inequality.

$$7 < 4n \leqslant 20$$

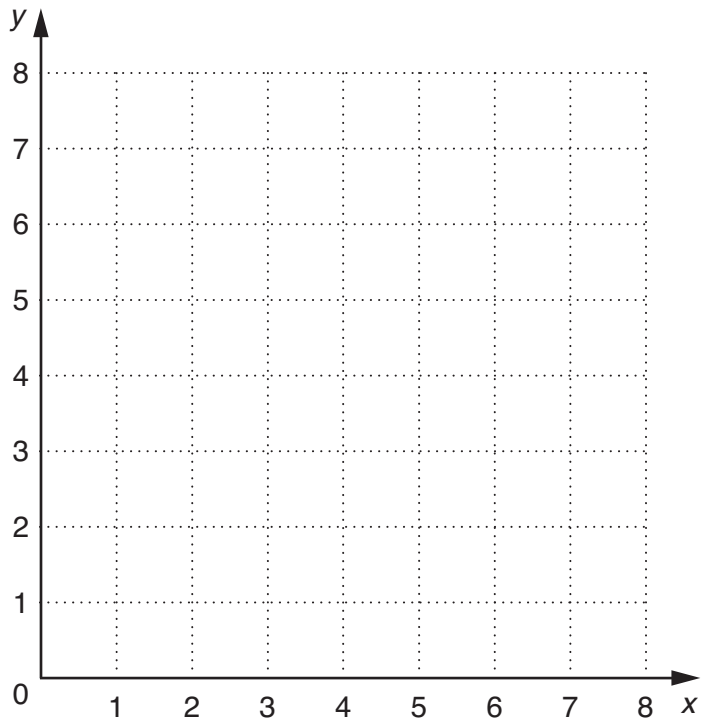
.....

.....

(a) _____ **[3]**

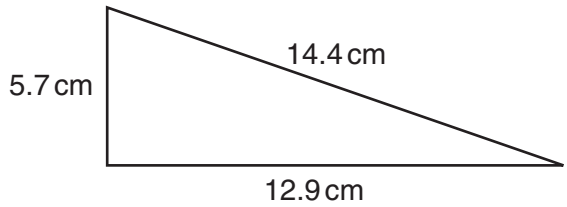
(b) On the grid, indicate clearly the region that satisfies all these inequalities.

$x \geqslant 2$ $y \geqslant 3$ $x + y \leqslant 7$



[3]

12



NOT TO SCALE

Is a triangle with these lengths right-angled?
Explain your answer using calculations.

_____

_____

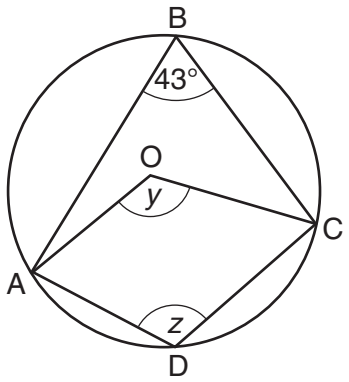
_____

_____

_____

_____ **[3]**

13 The points A, B, C and D lie on the circumference of a circle, centre O.



NOT TO SCALE

Find the size of angle *y* and angle *z*.
Give a reason for each answer.

.....

.....

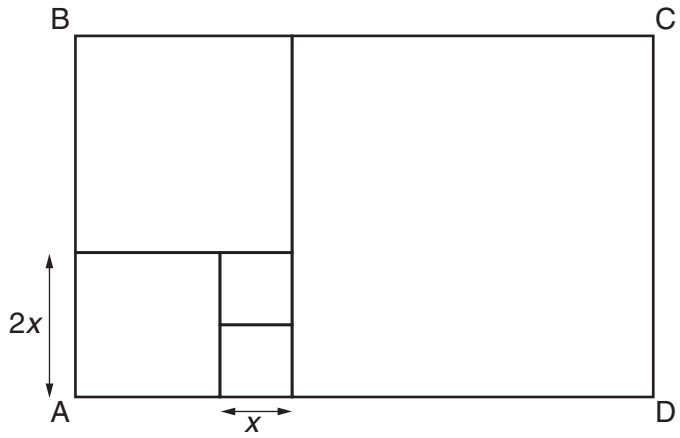
y = _____° because _____

_____

z = _____° because _____

_____ **[4]**

14 Rectangle ABCD is made from five **squares**.



NOT TO SCALE

The area of rectangle ABCD is 810 cm^2.

Work out the value of x.
Show all your working.

.....

.....

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.....

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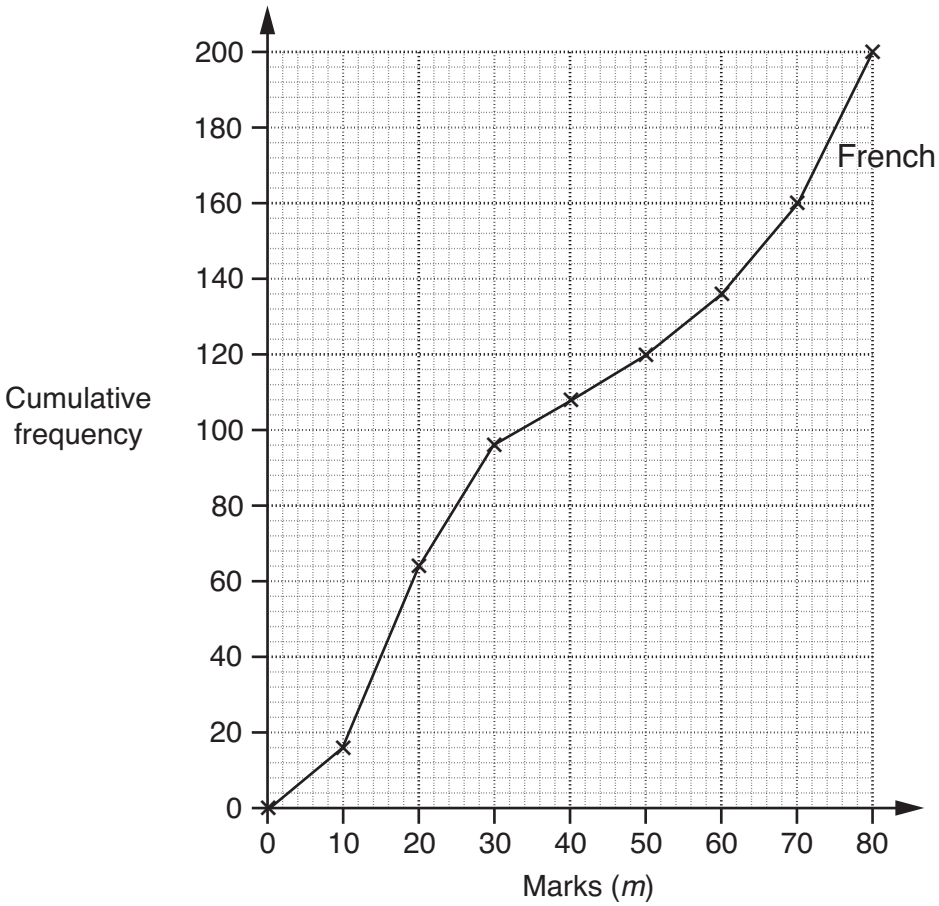
.....

_____cm **[5]**

15 The cumulative frequency graph summarises the marks obtained in a French exam by 200 students.



The table gives the cumulative frequencies of marks obtained in a German exam by 120 students.

Marks (m)	$m \leqslant 10$	$m \leqslant 20$	$m \leqslant 30$	$m \leqslant 40$	$m \leqslant 50$	$m \leqslant 60$	$m \leqslant 70$	$m \leqslant 80$
Cumulative frequency	4	20	36	60	84	104	112	120

(a) On the grid, draw a cumulative frequency graph to summarise the marks obtained by the students in the German exam. **[3]**

(b) In which exam, French or German, was the median mark higher, and by how much?

.....

.....

(b) _____ by _____ marks **[2]**

16 **(a)** Factorise.

(i) $x^2 - 8x$

.....

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

(ii) $6x^3 + 10xy^3$

.....

.....

(ii) _____ **[2]**

(iii) $4x^2 - y^2$

.....

(iii) _____ **[2]**

(b) Simplify.

$$\frac{x^2 + 3x}{3x^2}$$

.....

.....

.....

(b) _____ **[2]**

17 **(a)** Write 91 000 000 in standard form.

.....

(a) _____ **[1]**

(b) A picometre is 10^{-12} m.
A nanometre is 10^{-9} m.

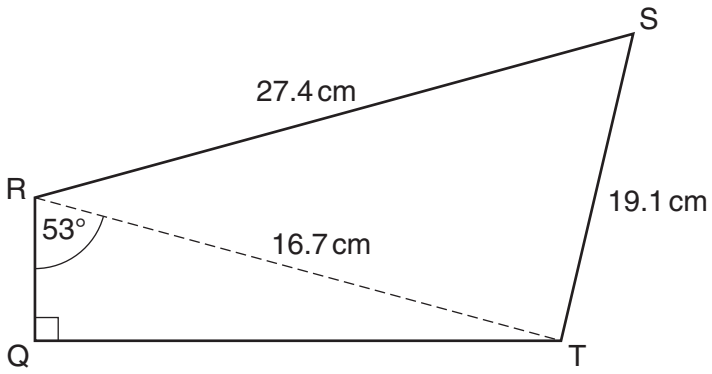
How many picometres are there in a nanometre?

.....

.....

(b) _____ **[2]**

18



NOT TO SCALE

(a) Calculate length QT.

.....

.....

.....

.....

(a) _____cm **[3]**

(b) Calculate angle RST.

.....

.....

.....

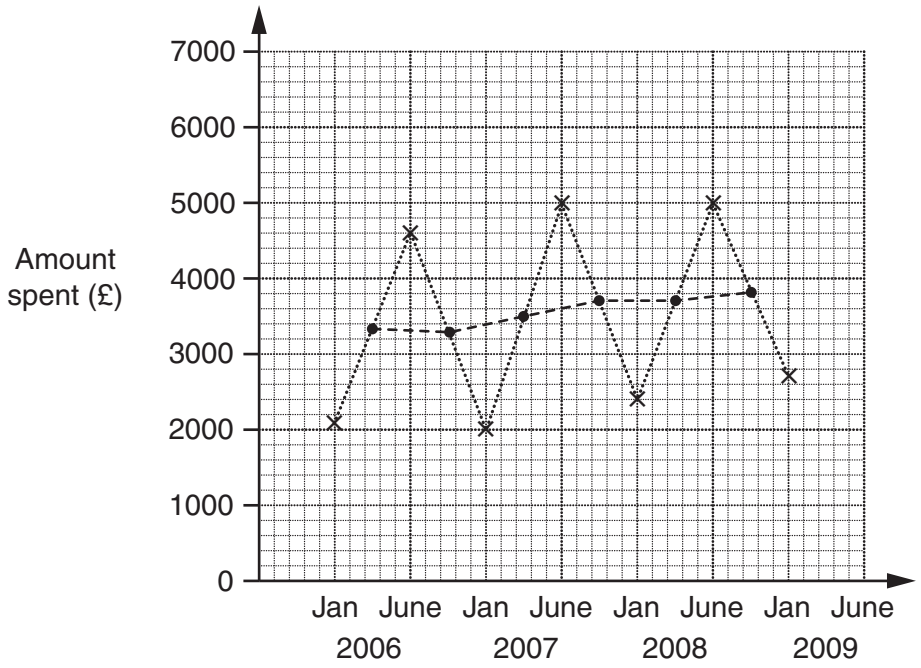
.....

.....

.....

(b) _____ ° **[3]**

19 The time series graph shows the amounts spent by a school on exams in January and in June each year.
The two-point moving averages (•) are also shown.



(a) Give a reason why it is appropriate to use a two-point moving average.

_____

_____ **[1]**

(b) Predict the next moving average and use this to work out an estimate of the amount spent on exams by the school in June 2009.

.....

.....

.....

.....

(b) £ _____ **[3]**

20 Use trial and improvement to solve $7^x = 27$.
Give your answer correct to 2 decimal places.
Show all your trials and their outcomes.

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_____ **[4]**

21 **(a)** Express $\sqrt{45}$ in the form $a\sqrt{b}$, where a and b are integers and b is as small as possible.

.....

.....

(a) _____ **[1]**

(b) Rationalise the denominator of $\frac{9}{\sqrt{6}}$.

Give your answer in its simplest form.

.....

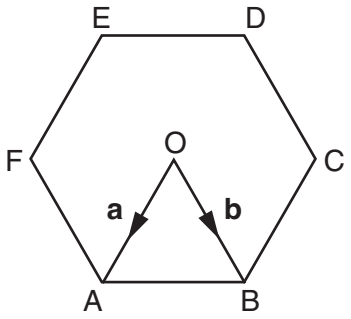
.....

.....

(b) _____ **[2]**

22 ABCDEF is a regular hexagon, centre O.

$\overrightarrow{OA} = \mathbf{a}$. $\overrightarrow{OB} = \mathbf{b}$.



(a) Find in terms of **a** and **b** the vectors

(i) $\overrightarrow{CB}$,

.....

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

(ii) $\overrightarrow{DB}$.

.....

(ii) _____ **[1]**

(b) X lies on DB such that DX : XB = 1 : 2.

Find $\overrightarrow{OX}$, in terms of **a** and **b**.
Give your answer in a simplified form.

.....

.....

.....

.....

(b) _____ **[3]**

23 **(a)** Explain why $(x - y)^2 \geqslant 0$.

_____

_____

_____ **[2]**

(b) Hence, show that $x^2 + y^2 \geqslant 2xy$.

_____

_____ **[1]**