Maths Foundation Christmas Pack
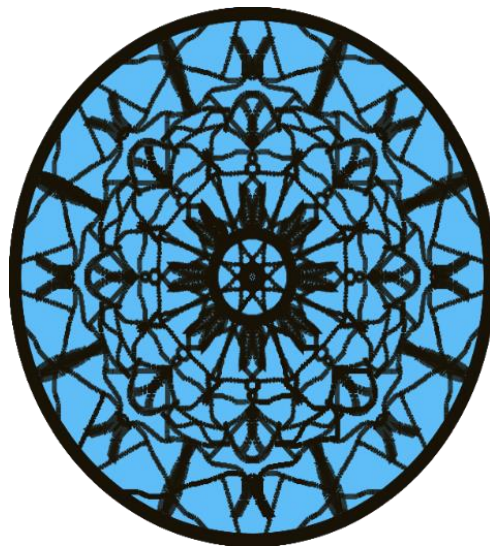
Name: …………………………….

Teacher: ……………….

1. (a) Write the number 5076 in words.

....
(1)

(b) Write the number **twelve thousand, five hundred and seven** in figures.

....
(1)

(c) Write the number 72 879 to the nearest thousand.

....
(1)

(d) Write down the value of the 7 in the number 5709

....
(1)

(Total 4 marks)

3. Complete this table.

Write a sensible unit for each measurement.

	Metric	**Imperial**
The weight of a bicycle	....	pounds
The volume of water in a watering can	....	pints
The length of this page	centimetres	....

(Total 3 marks)

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3. Minnie invested £250 for 3 years at 4% simple interest.

Work out the total interest Minnie gets.

£ ....

(Total 3 marks)

4. Rosie and Jim are going on holiday to the USA.

Jim changes £350 into dollars ($).

The exchange rate is £1 = $1.34

(a) Work out how many dollars ($) Jim gets.

$ ....

(2)

In the USA Rosie sees some jeans costing $67

In London the same make of jeans costs £47.50

The exchange rate is still £1 = $1.34

(b) Work out the difference between the cost of the jeans in the USA and in London.

Give your answer in pounds (£).

£ ....

(3)

(Total 5 marks)

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5. (a) Use your calculator to work out $\dfrac{\sqrt{2.5^2 + 3.75}}{3.9 - 1.7}$

Write down all the figures on your calculator display.

You must give your answer as a decimal.

....

(3)

(b) Write your answer to part (a) correct to 2 decimal places.

....

(1)

(Total 4 marks)

6. Caleb measured the heights of 30 plants.

The table gives some information about the heights, h cm, of the plants.

Height (h cm) of plants	Frequency		
$0 < h \le 10$	2		
$10 < h \le 20$	8		
$20 < h \le 30$	9		
$30 < h \le 40$	7		
$40 < h \le 50$	4		

Work out an estimate for the mean height of a plant.

.... cm

(Total 4 marks)

7. (a) Simplify $2a + 3b - a - b$

....

(2)

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(b) Expand $4(2m - 3n)$

....
(1)

(Total 3 marks)

8. Work out an estimate for the value of $\dfrac{60.2 \times 0.799}{223}$

Give your answer as a decimal.

....

(Total 3 marks)

9. Fred buys 18 tins of polish costing £2.37 each.

(a) Work out the total cost.

£ ....
(3)

A vacuum cleaner costs £85
Fred gets 10% off the price of the vacuum cleaner.
(b) Work out how much he has to pay.

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£ ....
(3)

(Total 6 marks)

10.

Diagram **NOT**
accurately drawn
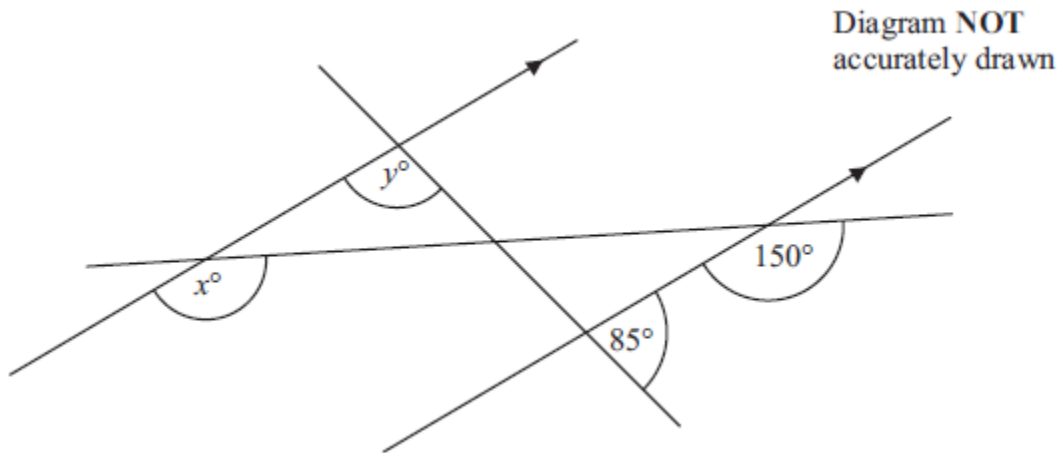
(a) Find the value of *x*.

....
(1)

(b) Find the value of *y*.

Give reasons for your answer.

.................................**(2)**

(Total 3 marks)

11.
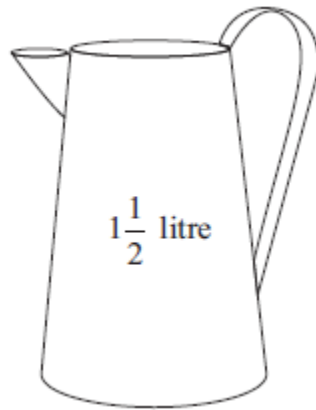
There are $1\frac{1}{2}$ litres of juice in a jug.

Lisa is going to pour the juice into some glasses.

She will fill each glass with 175 ml of juice.

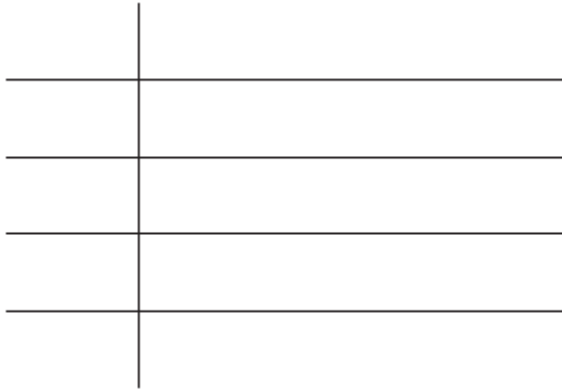Work out the greatest number of glasses she can fill.

....

(Total 4 marks)

12. Jo measured the times in seconds it took 18 students to run 400 m.

Here are the times.

67	78	79	98	96	103
75	85	94	92	61	80
82	86	90	95	90	89

(a) Draw an ordered stem and leaf diagram to show this information.

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Key:

(3)

(b) Work out the median.

.... seconds **(2)**

(Total 5 marks)

13. (a) Solve $13x + 1 = 11x + 8$

$x = $ ....

(2)

(b) Show that $y = -2$ is a solution of the equation $\dfrac{4}{y} + y = 2y$

(2)

(Total 4 marks)

14.
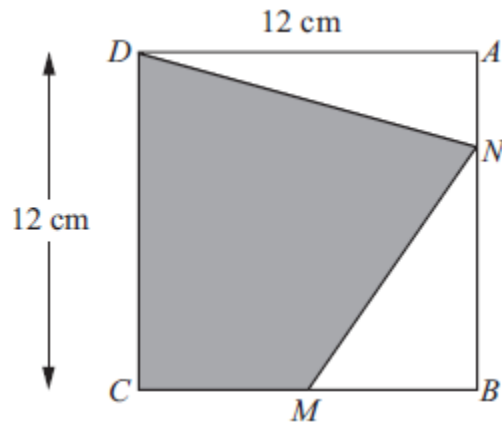
12 cm

Diagram **NOT** accurately drawn

12 cm

ABCD is a square of side 12 cm.

M is the midpoint of *CB*.

N is a point on *AB*.

$AN = \dfrac{1}{4}AB$.
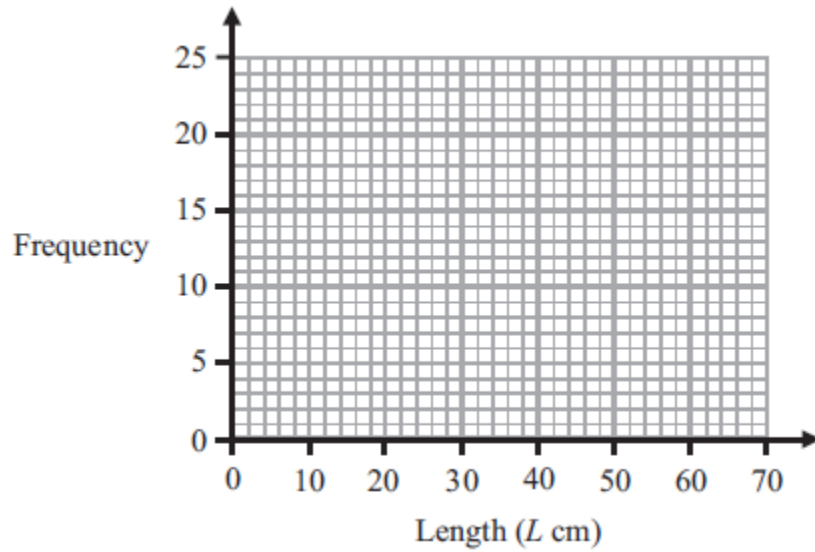
Calculate the area of the shaded region *CDNM*.

.... cm^2

(Total 6 marks)

15. The table gives information about the lengths of the branches on a bush.

Length(*L*cm)	Frequency
$0 \leq L < 10$	20
$10 \leq L < 20$	12
$20 \leq L < 30$	10
$30 \leq L < 40$	8
$40 \leq L < 50$	6
$50 \leq L < 60$	0

(a) Draw a frequency polygon to show this information.

(2)

(c) Write down the modal class interval.

....
(1)

(Total 3 marks)

16. (a) Write 6.43×10^5 as an ordinary number.

....
(1)

(b) Work out the value of $2 \times 10^7 \times 8 \times 10^{-12}$
   Give your answer in standard form.

....
(2)

(Total 3 marks)

17. (a) Factorise fully $2x^2 - 4xy$

....
(2)

(b) Factorise $p2 - 6p + 8$

....
(2)

(c) Simplify $\dfrac{(x+2)^2}{x+2}$

....
(1)

(d) Simplify $2a^2b \times 3a^3b$

....
(2)

(Total 7 marks)

18. All the students in Mathstown school had a test.

The lowest mark was 18
The highest mark was 86
The median was 57
The lower quartile was 32
The interquartile range was 38

On the grid, draw a box plot to show this information.
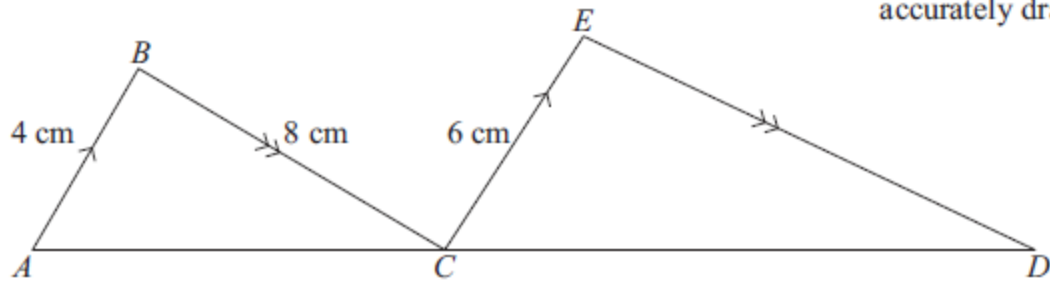

Mark

(Total 3 marks)

@cchristian
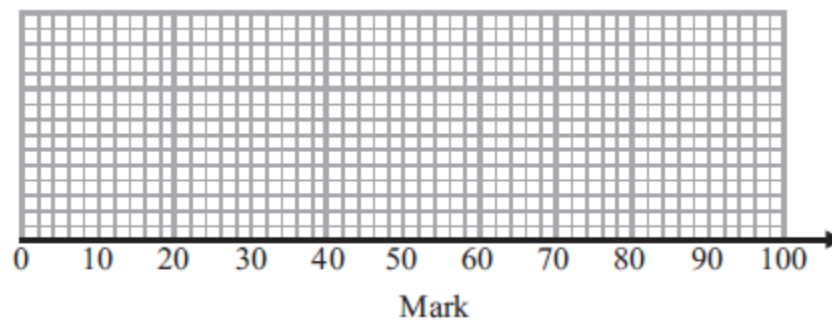
19.

Diagram **NOT** accurately drawn

ACD is a straight line.
AB is parallel to *CE*.
BC is parallel to *ED*.

AB = 4 cm.
CE = 6 cm.
BC = 8 cm.

(a) Calculate the length of *ED*.

.... cm
(2)

AD = 25 cm.

(b) Calculate the length of *AC*.

.... cm
(2)

(Total 4 marks)

20.   There are only red marbles and green marbles in a bag.
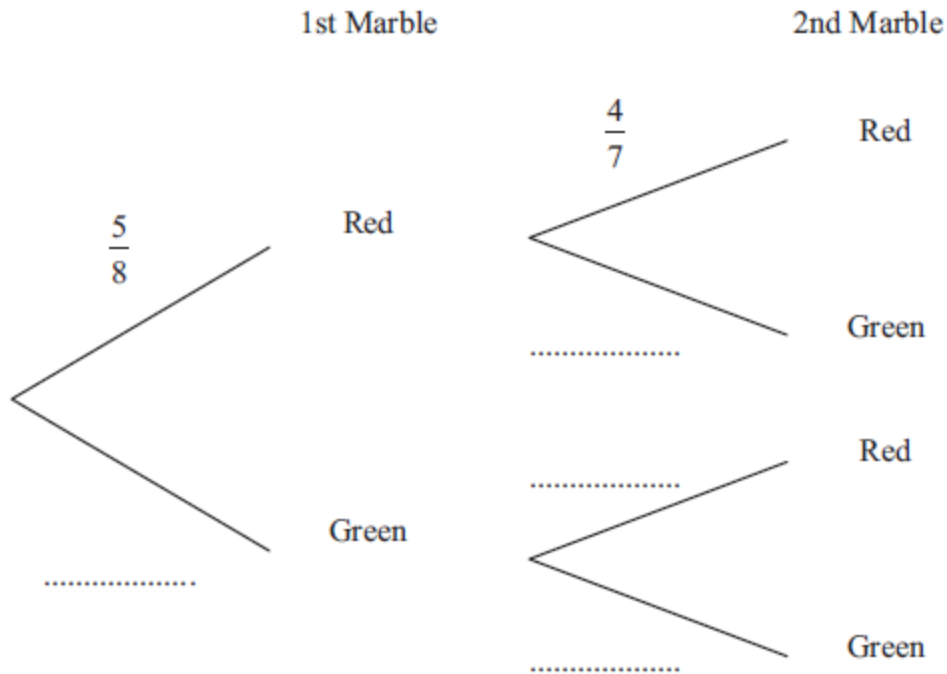There are 5 red marbles and 3 green marbles.

Dwayne takes at random a marble from the bag.

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He does not put the marble back in the bag.

Dwayne takes at random a second marble from the bag.

(a) Complete the probability tree diagram.

1st Marble   2nd Marble

$\frac{5}{8}$ Red

$\frac{4}{7}$ Red

.... Green

.... Red

Green

....

.... Green

(2)

(b) Work out the probability that Dwayne takes marbles of different colours.

....

(3)

(Total 5 marks

21. A rugby team played six games.
The mean score for the six games is 14.5

The rugby team played one more game.
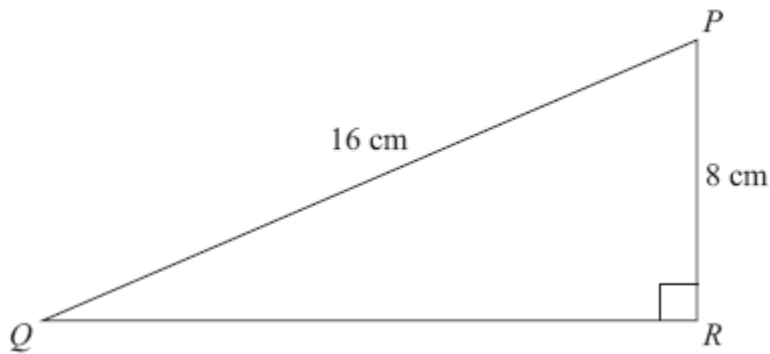The mean score for all seven games is 16

Work out the number of points the team scored in the seventh game.

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22.

Diagram **NOT** accurately drawn

PQR is a right-angled triangle.

PQ = 16 cm.

PR = 8 cm.

Calculate the length of *QR*.

Give your answer correct to 2 decimal places.

.... cm

(Total 3 marks)

23. (a) Simplify $x^5 \times x^4$

....

(1)

(b) Simplify $y^7 \div y^2$

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....
(1)

(c) Expand and simplify $3(2a + 5) + 5(a - 2)$

....
(2)

(d) Expand and simplify $(y + 5)(y + 7)$

....
(2)

(e) Factorise $p^2 - 6p + 8$

....
(2)

(Total 8 marks)

24. *ABCD* is a trapezium.
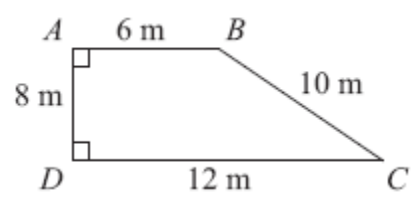
Diagram **NOT** accurately drawn

Work out the area of the trapezium.

.... m^2

(Total 2 marks)
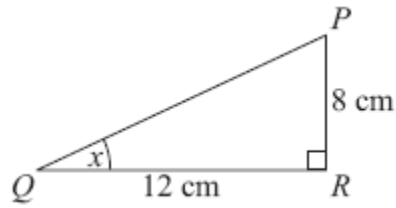
25. *PQR* is a right-angled triangle.

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Diagram **NOT** accurately drawn

PR = 8 cm.
QR = 12 cm.

(a) Find the size of the angle marked *x*.
Give your answer correct to 1 decimal place.

.... °
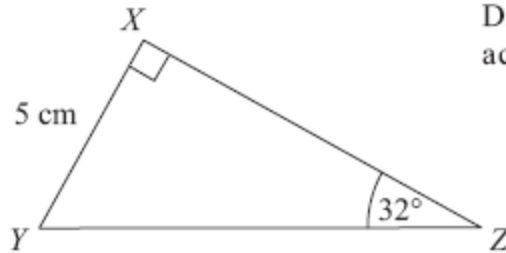
(3)

XYZ is a different right-angled triangle.
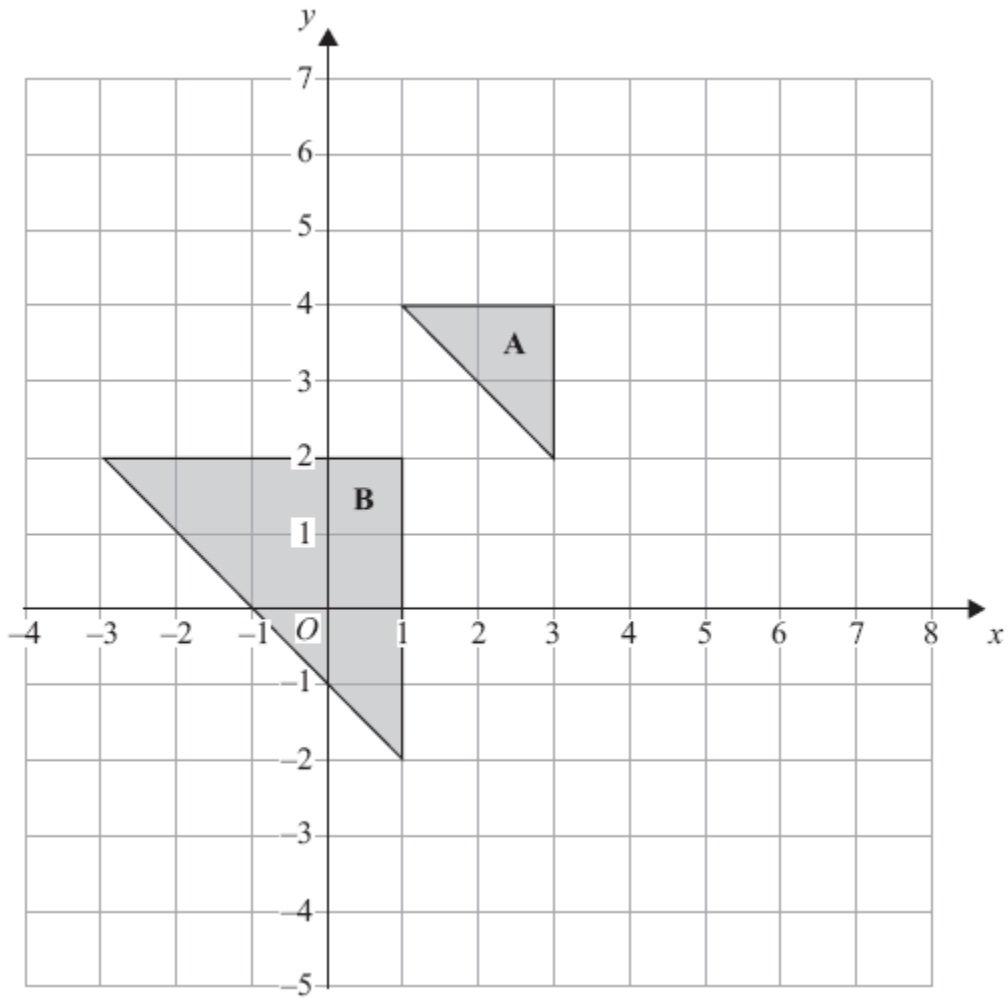

Diagram **NOT** accurately drawn

XY = 5 cm.
Angle *Z* = 32°.

(b) Calculate the length *YZ*.
Give your answer correct to 3 significant figures.

.... cm

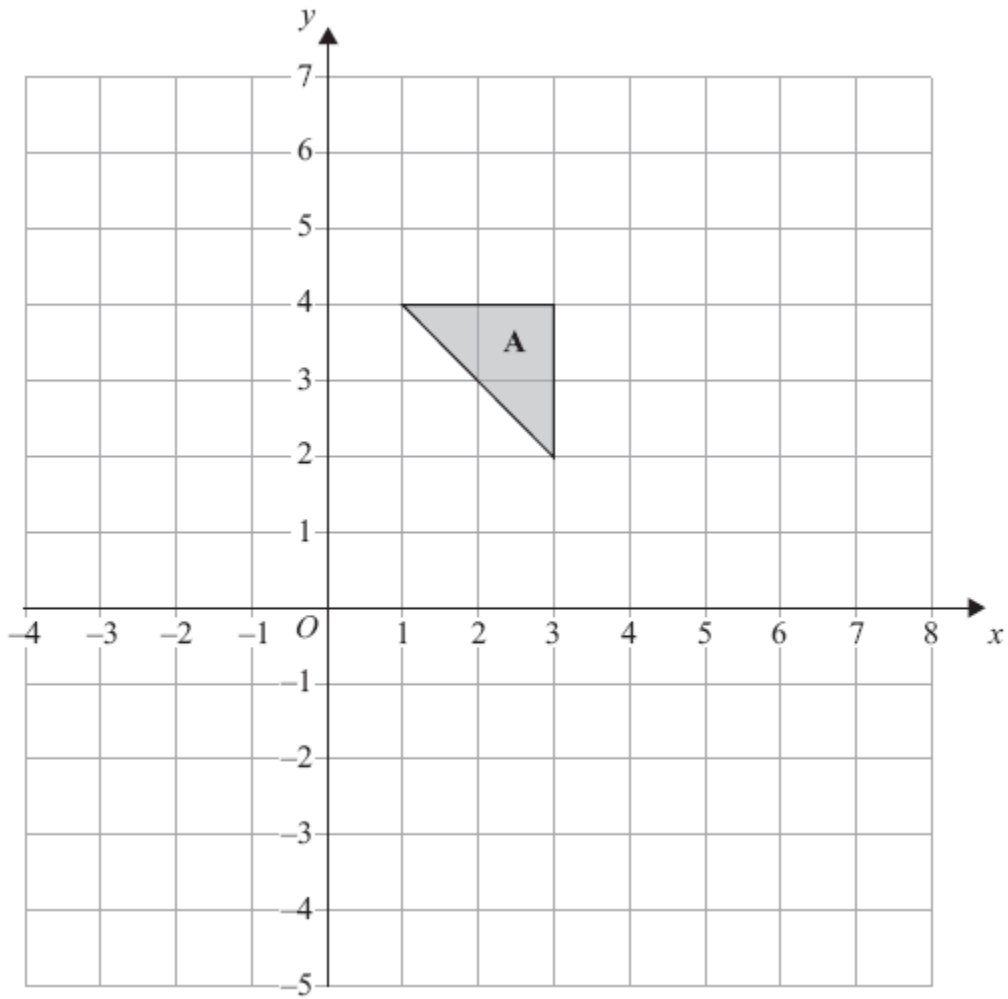**(Total 6 marks)**

26.

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Triangle **A** and triangle **B** are drawn on the grid.

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

....

....

(3)

(b) Reflect triangle **A** in the line $x = 4$

(2)

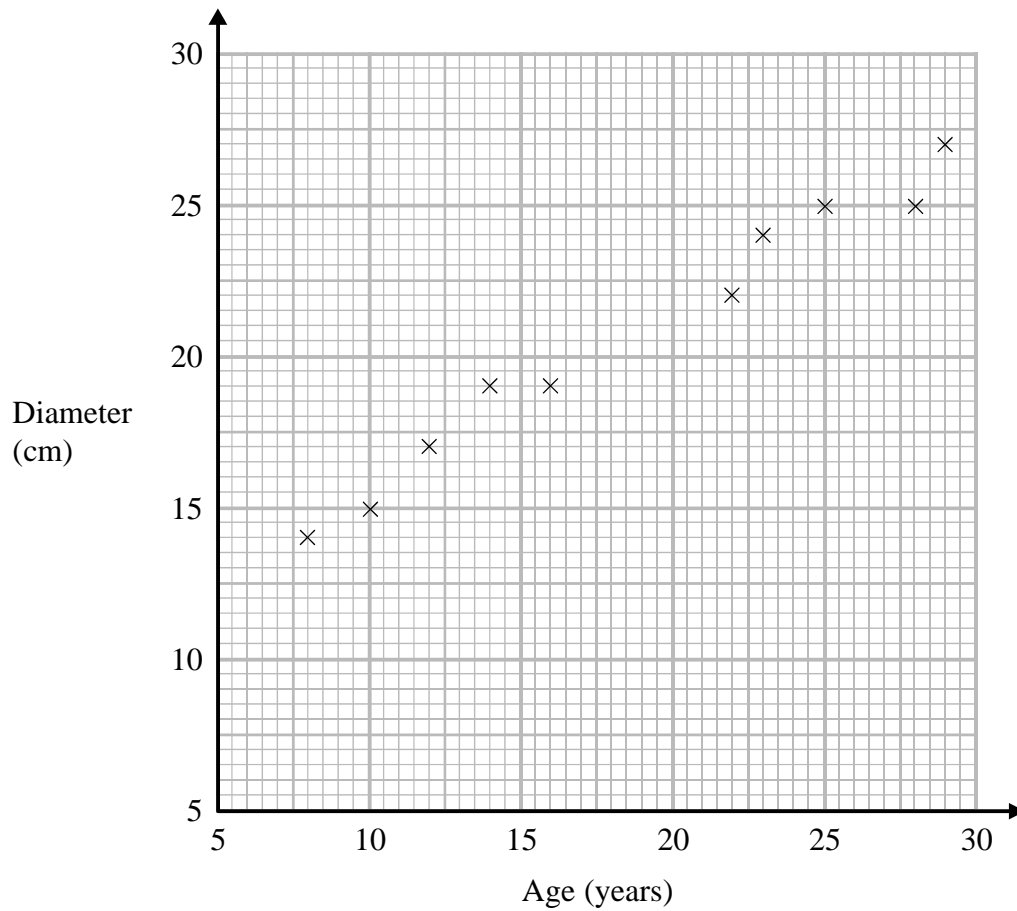**(Total 5 marks)**

27. Solve the equations

$$3x + 5y = 19$$
$$4x - 2y = -18$$

$x = $ ....

$y = $ ....

(Total 4 marks)

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28 The scatter graph shows information about ten trees of the same type.
It shows the age and the diameter of the trunk of each tree.

(*a*) What type of correlation does this scatter graph show?

....
(1)

Another tree of the same type has a trunk with diameter 21 cm.

(*b*) Estimate the age of this tree.

.... years
(2)

(Total for Question 28 is 3 marks)

29 George wants to watch all 23 games that a football team will play at home next season.

He can buy
        a season ticket costing £425.

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or 23 separate tickets costing £24 each ticket.

What percentage of the total cost of 23 separate tickets does George save by buying a season ticket?

....%

(Total for Question 29 is 3 marks)

30 Gemma has the same number of sweets as Betty.

Gemma gives 24 of her sweets to Betty.
Betty now has 5 times as many sweets as Gemma.

Work out the total number of sweets that Gemma and Betty have.

....

(Total for Question 30 is 4 marks)

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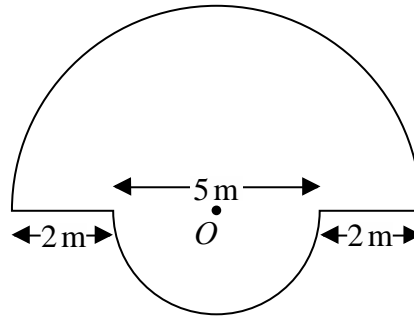
*31   The diagram shows a plan of Brian's lawn.

Diagram **NOT** accurately drawn

The edge of the lawn consists of two semicircles and two straight lines.
Each semicircle has centre O.
The diameters of the semicircles are 9 m and 5 m.

Brian is going to put lawn edging around the edge of the lawn.
Lawn edging is sold in 2.4 metre rolls.

Brian has £35.

Has Brian got enough money to buy all the rolls of lawn edging he needs?
You must show all your working.

Lawn edging
£3.99 per roll
or
3 rolls for £10

(Total for Question 31 is 5 marks)

32   Identical pairs of boots are sold in London, in Geneva and in Paris.

These boots have a price of

> £115 in London
> 189 Swiss francs in Geneva
> 174 euros in Paris

The exchange rates are

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£1 = 1.39 Swiss francs
£1 = 1.27 euros

Are the boots the best value for money in London or in Geneva or in Paris?
You must show how you get your answer.

....

(Total for Question 32 is 3 marks)

*33

Best vans	**Vans for hire**
$\frac{1}{3}$ off normal price of £87 for each day	£44 for each day
	plus
No charge for the miles	15p for each extra mile over 250 miles

Scott wants to hire a van for 2 days.
He is going to drive 400 miles in the van.

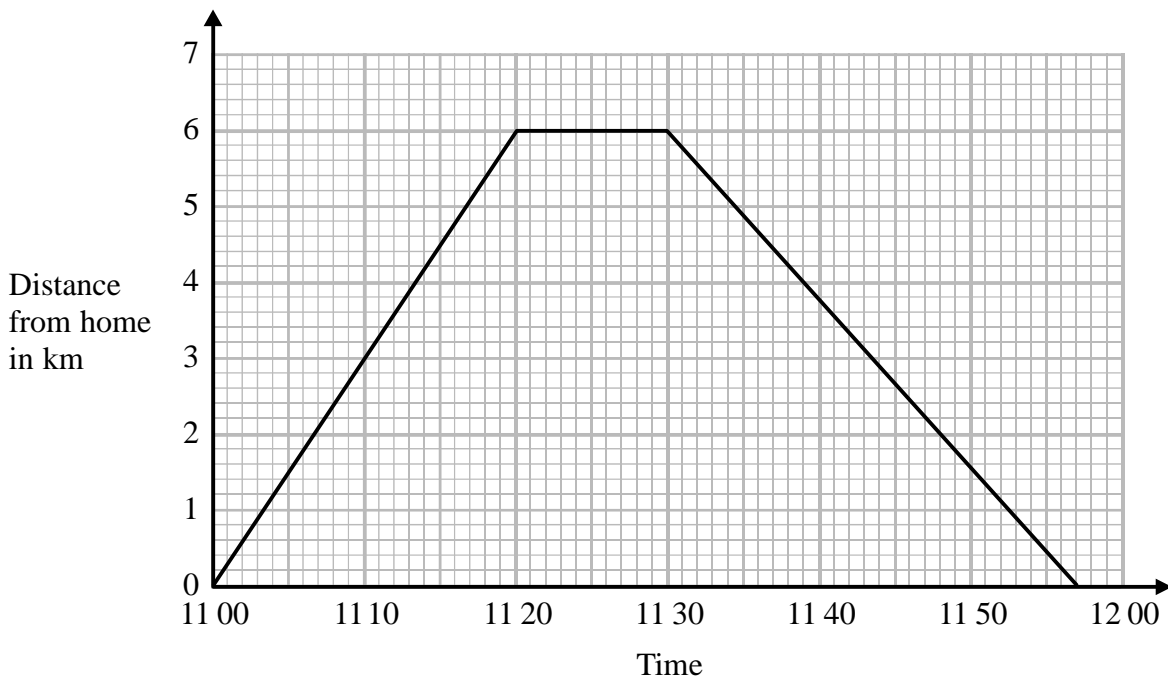Scott wants to pay the least possible money to hire the van.

Should Scott hire the van from Best vans or from Vans for hire?
You must show all your working.

34   Amina cycled from her home to a shop.
She then cycled home.

The travel graph shows information about Amina's journey.

At 11 20 Amina stopped to go into the shop.

(*a*)   How many minutes did Amina stop for?

.... minutes

(1)

Amina took more time to cycle home from the shop than she took to cycle to the shop.

(*b*)   How many minutes more?

.... minutes

(2)

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(*c*)   What was the total distance Amina cycled?

.... km

(1)

(Total for Question 34 is 4 marks)

35   30% of the people at a concert are female.
1295 of the people at the concert are male.

Work out the number of people at the concert who are female.

....
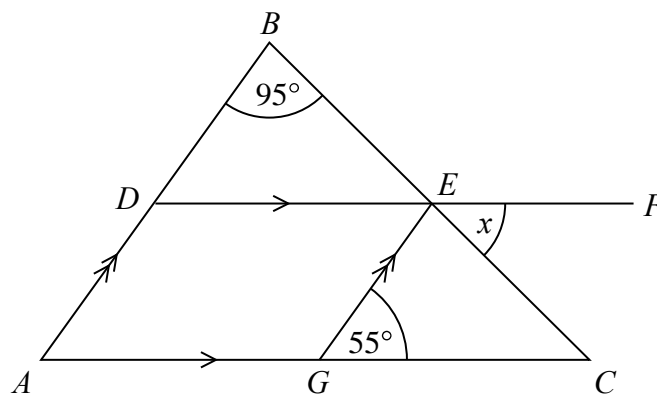
(Total for Question 35 is 3 marks)

*36

Diagram **NOT**
accurately drawn

AGC and *DEF* are parallel lines.
ADB and *GE* are parallel lines.
*BE*C is a straight line.

Angle *DBE* = 95°
Angle *CGE* = 55°

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Work out the size of the angle marked *x*.
Give reasons for each stage of your working.

(Total for Question 36 is 4 marks)

*37 Jack has £15 000 to invest in a savings account for 3 years.

He finds information about two savings accounts.

Simple	**Compound**
Simple interest	Compound interest
2.3% each year	2.15% each year

Jack wants to have as much money as possible in his savings account at the end of the 3 years.

Which of these two savings accounts should he choose?

37 (*a*) Simplify $\dfrac{3(x+1)}{(x+1)^2}$

....
(1)

(*b*) Solve $\dfrac{15 - x}{5} = 3x + 11$

$x =$ ....
(3)

(*c*) Make *m* the subject of the formula $v = \sqrt{\dfrac{2E}{m}}$

....
(3)

(Total for Question 37 is 7 marks)

38 *T* is inversely proportional to d^2
T = 12 when *d* = 8

Find the value of *T* when *d* = 0.5

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....

(Total for Question 38 is 3 marks)

*39   The diagram shows the plan of a floor.

2.5 m   2.5 m

2 m   2 m

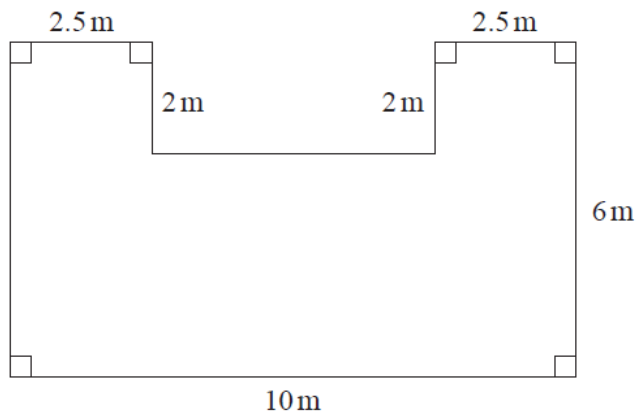Diagram **NOT**
accurately drawn

6 m

10 m

Angie is going to varnish the floor.

She needs 1 litre of varnish for 5 m² of floor.
There are 2.5 litres of varnish in each tin of varnish.

Angie has 3 tins of varnish.

Does she have enough varnish for all the floor?
You must show all your working.

(Total for Question 24 is 5 marks)

40 One of the teachers at a school is chosen at random.

The probability that this teacher is female is $\frac{3}{5}$

There are 36 **male** teachers at the school.

Work out the total number of teachers at the school.

....

(Total for Question 40 is 3 marks)

Section 2 F/H

Question 1

Use your calculator to work out the exact value of

$$\frac{14.82 \ \square \ (17.4 \ \square \ 9.25)}{(54.3 + 23.7) \ \square \ 3.8}$$

(3 marks)

Matthew uses this formula to calculate the value of D.

$$D = \frac{a - 3c}{a - c^2}$$

(a) Calculate the value of *D* when *a* = 19.9 and *c* = 4.05. Write down all the figures on your calculator display.

Matthew estimates the value of *D* without using a calculator.

(b) i) Write down an approximate value for each of *a* and *c* that Matthew could use to estimate the value of *D*.

ii) Work out the estimate that these approximations give for the value of *D*.

Show all your working.

The number 175 can be written as a product of its prime factors,

$$175 = 5^2 \ \square \ 7$$

Write as a product of its prime factors

(i) 50

(ii) 50^2 **(4 marks)**

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Question 4

Change $0.4\dot{5}$ into a fraction in its lowest terms.

Question 5

The temperature from a factory furnace varies inversely as the square of the distance from the furnace.

The temperature 2 metres from the furnace is 50°C.

Calculate the temperature 3.5 metres from the furnace. Give your answer to 2 decimal places.

Question 6

y is directly proportional to the cube of x.

When $x = 2$, $y = 64$.

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(a) Find an expression for y in terms of x. **(3 marks)**

Hence or otherwise,

(b) i) Calculate the value of y when $x = \dfrac{1}{2}$

ii) Calculate the value of x when $y = 27$ **(3 marks)**

Question 7

The star Sirius is 81 900 000 000 000 km from the Earth.

(a) Write 81 900 000 000 000 in standard form. **(2 marks)**

Light travels 3×10^5 km in 1 second.

(b) Calculate the number of seconds that light takes to travel from Sirius

to the Earth. Give your answer in standard form correct to 2 significant figures.
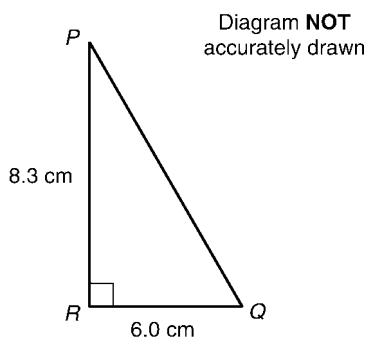
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(3 marks)

(c) Convert your answer to part (b) to days.

Give your answer as an ordinary number. **(2 marks)**

Question 8

PQR is a right-angled triangle.

Diagram **NOT** accurately drawn

RQ= 6.0cm and PR=8.3cm, both correct to 1 decimal place

(a) Write down

    i)   the upper bound of the length of RQ

    ii)   the lower bound of the length of RQ.

(b) Calculate the upper bound of the area of the triangle PQR.

(c) Calculate the upper bound of the angle PQR. Give your value correct to 1 decimal place.

Question 9
Expand and simplify

i) $(2x-3)(x+4)$

ii) $(x^2 + y^2)^2$

iii) $(x+y)^2 - (x-y)^2$ **(6 marks)**