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GCSE MATHS

Algebra

Edexcel 1MA1 | Subtopic collection Topic 17

Linear equations

Higher tier

Past paper question booklet

160	2003-2025	Higher
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

3. Solve $7r + 2 = 5(r - 4)$

Leave blank

$r =$ .....

(2)

7. Solve

$$2x - 3y = 11$$
$$5x + 2y = 18$$

$x =$ .....

$y =$ .....

(4)

Page Total

17.

Leave blank

$$x = 2^p, \quad y = 2^q$$

(a) Express in terms of x and/or y,

(i) 2^{p+q}

.....

(ii) 2^{2q}

.....

(iii) 2^{p-1}

.....

(3)

$$xy = 32$$

and $$2xy^2 = 32$$

(b) Find the value of p and the value of q.

$p =$ .....

$q =$ .....

(2)

2. Nassim thinks of a number.
When he multiplies his number by 5 and subtracts 16 from the result, he gets the same answer as when he adds 10 to his number and multiplies the result by 3.

Find the number Nassim is thinking of.

.....

(4)

11. The fraction, p, of an adult's dose of medicine which should be given to a child who weighs w kg is given by the formula

$$p = \frac{3w + 20}{200}$$

(a) Use the formula $p = \frac{3w + 20}{200}$ to find the weight of a child whose dose is the same as an adult's dose.

..... kg
(3)

(b) Make w the subject of the formula $p = \frac{3w + 20}{200}$

$w =$ .....
(3)

$$\frac{3w + 20}{200} = \frac{A}{A + 12}$$

(c) Express A in terms of w.

$A =$ .....
(4)

21. The depth, D metres, of the water at the end of a jetty in the afternoon can be modelled by this formula

$$D = 5.5 + A \sin 30(t - k)°$$

where

t hours is the number of hours after midday,
A and k are constants.

Yesterday the low tide was at 3 p.m.
The depth of water at low tide was 3.5 m.

Find the value of A and k.

$A =$ .....

$k =$ .....

(4)

1. (a) Make t the subject of the formula $v = u + 5t$

$t =$ .....

(2)

(b) Solve $\frac{x-3}{5} = x - 5$

$x =$ .....

(3)

(Total 5 marks)

Q1

8. Solve

$$x + 2y = 4$$
$$3x - 4y = 7$$

$x =$ .....

$y =$ .....

(Total 3 marks)

Q8

12.

$$P = \pi r + 2r + 2a$$

$P = 84$
$r = 6.7$

(a) Work out the value of a.
Give your answer correct to 3 significant figures.

$a =$ .....
(3)

(b) Make r the subject of the formula

$$P = \pi r + 2r + 2a$$

$r =$ .....
(3)

(Total 6 marks)

Q12

5. (a) Solve $3(x - 4) = x + 24$

$x =$ .....

(3)

(b) Simplify fully $(2x^3y)^4$

.....

(2)

(Total 5 marks)

Q5

12.

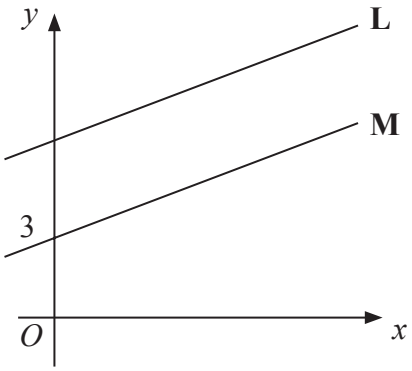


Diagram **NOT** accurately drawn

The straight line **L** has equation $y = \frac{1}{2}x + 7$

The straight line **M** is parallel to **L** and passes through the point (0, 3).

Write down an equation for the line **M**.

.....

(Total 2 marks)

Q12

22. Solve the equation

$$\frac{3}{x+3} - \frac{4}{x-3} = \frac{5x}{x^2-9}$$

$x =$ .....

Q22

(Total 4 marks)

Blank

4. $P = 4k - 10$

$P = 50$

(a) Work out the value of k.

.....

(2)

$y = 4n - 3d$

$n = 2$
$d = 5$

(b) Work out the value of y.

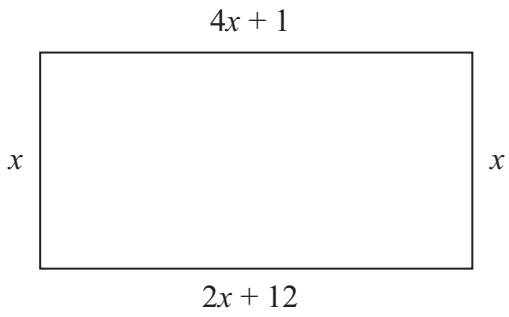
.....

(2) **Q4**

(Total 4 marks)

6.

Diagram **NOT** accurately drawn



The diagram shows a rectangle.
All the measurements are in centimetres.

(a) Explain why $4x + 1 = 2x + 12$

.....

(1)

(b) Solve $4x + 1 = 2x + 12$

$x =$ .....

(2)

(c) Use your answer to part (b) to work out the perimeter of the rectangle.

..... cm

(2)

(Total 5 marks)

Q6

25.

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

$u = 2\frac{1}{2}$, $v = 3\frac{1}{3}$

(a) Find the value of f.

.....

(3)

(b) Rearrange $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

to make u the subject of the formula.

Give your answer in its simplest form.

.....

(2)

(Total 5 marks)

Q25

6. $F = 1.8C + 32$

(a) Work out the value of F when $C = -8$

.....

(2)

(b) Work out the value of C when $F = 68$

.....

(2) **Q6**

(Total 4 marks)

19. Toby invested £4500 for 2 years in a savings account.
He was paid 4% per annum compound interest.

(a) How much did Toby have in his savings account after 2 years?

£ .....
(3)

Jaspir invested £2400 for n years in a savings account.
He was paid 7.5% per annum compound interest.

At the end of the n years he had £3445.51 in the savings account.

(b) Work out the value of n.

.....
(2)

(Total 5 marks)

Q19

10. (a) Simplify $3a + 4c - a + 3c$

.....

(2)

(b) Expand $y(2y - 3)$

.....

(1)

(c) Factorise $x^2 - 4x$

.....

(2)

(d) Expand and simplify $2(x + 3) + 3(2x - 1)$

.....

(2)

(e) Solve $3(x + 2) = 8$

$x =$ .....

(2)

Q10

(Total 9 marks)

12.

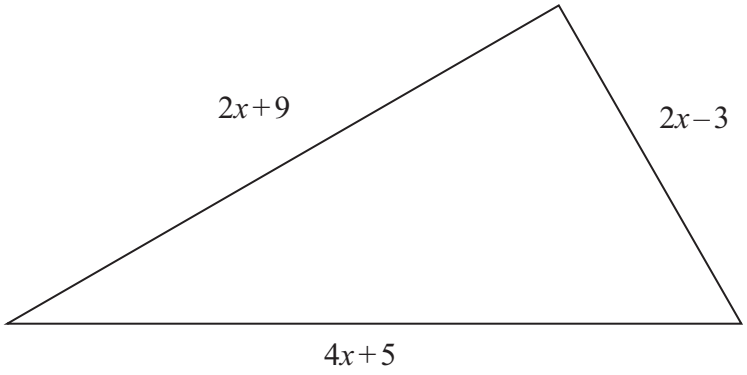


Diagram **NOT** accurately drawn

In the diagram, all measurements are in centimetres.

The lengths of the sides of the triangle are

$2x+9$
$2x-3$
$4x+5$

(a) Find an expression, in terms of x, for the perimeter of the triangle.
Give your expression in its simplest form.

.....

(2)

The perimeter of the triangle is 39 cm.

(b) Find the value of x.

x = ...

(2)

Q12

(Total 4 marks)

19. (a) Expand and simplify $(x - 3)(x + 5)$

.....

(2)

(b) Solve $\frac{29-x}{4} = x+5$

$x =$ .....

(3)

Q19

(Total 5 marks)

28.

$$v = \sqrt{\frac{a}{b}}$$

a = 6.43 correct to 2 decimal places.
b = 5.514 correct to 3 decimal places.

By considering bounds, work out the value of v to a suitable degree of accuracy.

You must show all your working and give a reason for your final answer.

v = ...

Q28

(Total 5 marks)

29. Solve $\frac{4}{x+3}+\frac{3}{2x-1}=1$

.....

(Total 5 marks)

Q29

3.

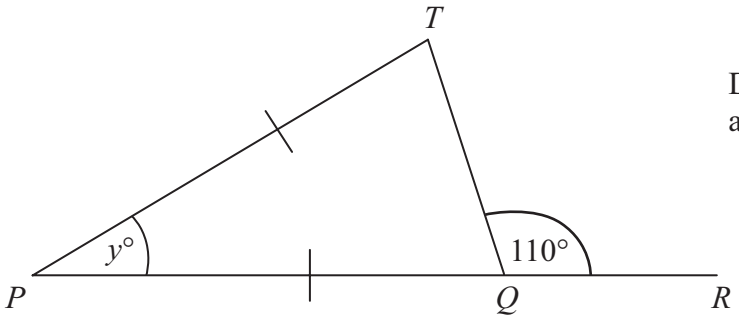


Diagram **NOT** accurately drawn

PQR is a straight line.
PT = *PQ*.

(i) Work out the value of *y*.

.....

(ii) Give reasons for your answer.

.....

.....

.....

Q3

(Total 4 marks)

Blank

17. (a) Factorise $3x + 12$

.....

(1)

(b) Solve $4(2x - 3) = 5x + 7$

$x =$ .....

(3)

(c) Expand and simplify $(y + 4)(y + 5)$

.....

(2)

(d) Factorise fully $8x^2 + 12xy$

.....

(2)

Q17

(Total 8 marks)

11.

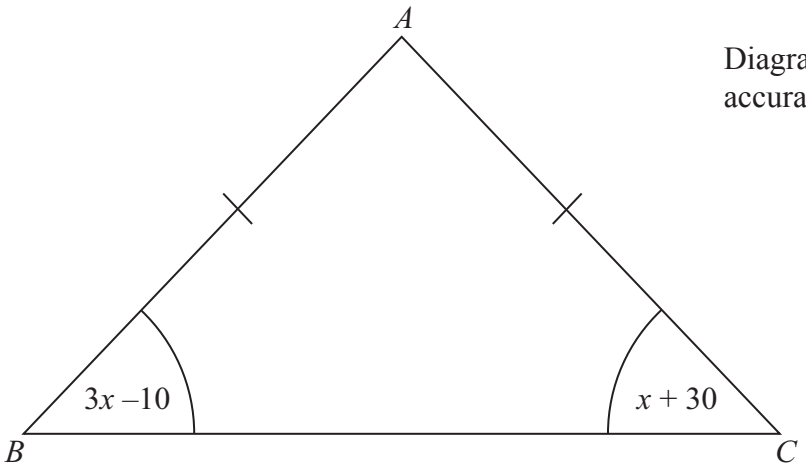


Diagram **NOT** accurately drawn

ABC is an isosceles triangle.
AB = *AC*.

(a) Explain why $3x - 10 = x + 30$

.....

(1)

(b) Solve $3x - 10 = x + 30$

$x =$ .....

(2)

(Total 3 marks)

Q11

15. $-4 < n \leqslant 1$
n is an integer.

(a) Write down all the possible values of n.

.....
(2)

(b) Solve $3x - 2 > x + 7$

.....
(2)

(Total 4 marks)

Q15

6. (a) Simplify $7x + 2y - x + 3y$

.....

(2)

(b) Solve $2x + 3 = 10$

$x =$ .....

(2)

(c) Simplify

(i) $c^5 \times c^6$

.....

(ii) $e^{12} \div e^4$

.....

(2) **Q6**

(Total 6 marks)

9 Mary plays a game of throwing a ball at a target.

The table shows information about the probability of each possible score.

Score	0	1	2	3	4	5
Probability	0.09	x	$3x$	0.16	0.21	0.30

Mary is 3 times as likely to score 2 points than to score 1 point.

(a) Work out the value of x.

.....

(3)

Mary plays the game twice.

(b) Work out the probability of Mary scoring a total of 8

.....

(3)

(Total for Question 9 is 6 marks)

13 Aminata invested £2500 for n years in a savings account.
She was paid 3% per annum compound interest.

At the end of n years, Aminata has £2813.77 in the savings account.

Work out the value of n.

.....

(Total for Question 13 is 2 marks)

blank

5. $h = 5t^2 + 2$

(a) (i) Work out the value of h when $t = -2$

.....

(ii) Work out a value of t when $h = 47$

.....

(3)

(b) $-1 \leqslant n < 4$

n is an integer.
Write down all the possible values of n.

.....

(2)

Q5

(Total 5 marks)

22. (a) Find the value of $27^{-\frac{2}{3}}$

.....

(2)

(b) Given that

$$\frac{8-\sqrt{18}}{\sqrt{2}} = a+b\sqrt{2}\text{, where } a \text{ and } b \text{ are integers,}$$

find the value of a and the value of b.

$a =$ .....

$b =$ .....

(3)

(Total 5 marks)

Q22

10. (a) Simplify $6e + 5f + e - 3f$

.....

(2)

(b) Solve $4(2x - 1) = 3x - 19$

$x =$ .....

(3)

(c) Solve $\frac{y+4}{5} = 30$

$y =$ .....

(2)

Q10

(Total 7 marks)

7. (a) Solve $3(2t - 4) = 2t + 12$

$t =$ .....

(3)

(b) Expand and simplify $2(x - y) - 3(x - 2y)$

.....

(2)

(c) Expand and simplify $(x - 5)(x + 7)$

.....

(2)

Q7

(Total 7 marks)

17. $y = p - 2qx^2$

$p = -10$
$q = 3$
$x = -5$

(a) Work out the value of y.

.....

(2)

(b) Rearrange $y = p - 2qx^2$

to make x the subject of the formula.

.....

(3)

Q17

(Total 5 marks)

6.

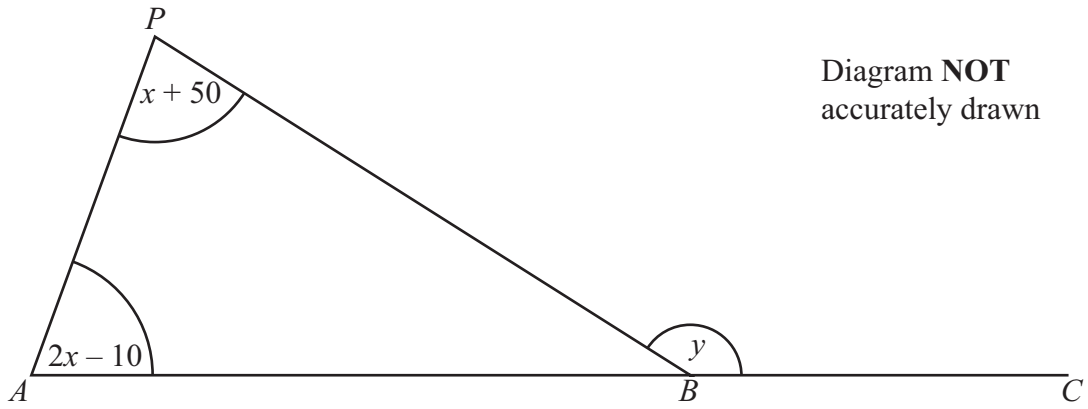


Diagram **NOT** accurately drawn

All angles are measured in degrees.

ABC is a straight line.
Angle *APB* = $x + 50$
Angle *PAB* = $2x - 10$
Angle *PBC* = y

(a) Show that $y = 3x + 40$
Give reasons for each stage of your working.

(3)

(b) Given that $y = 145$,

(i) work out the value of x,

$x =$ .....

(ii) work out the size of the largest angle in triangle *ABP*.

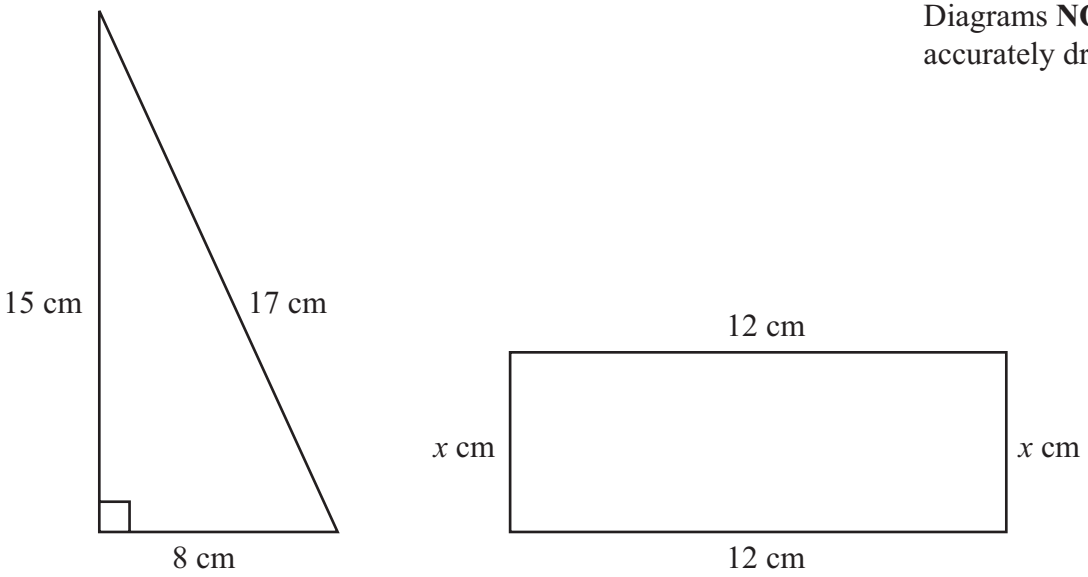
..... °

(4) **Q6**

(Total 7 marks)

7. The diagrams show a right-angled triangle and a rectangle.

Diagrams **NOT** accurately drawn



The area of the right-angled triangle is equal to the area of the rectangle.

Find the value of x.

x = ...

(Total 4 marks)

Q7

11

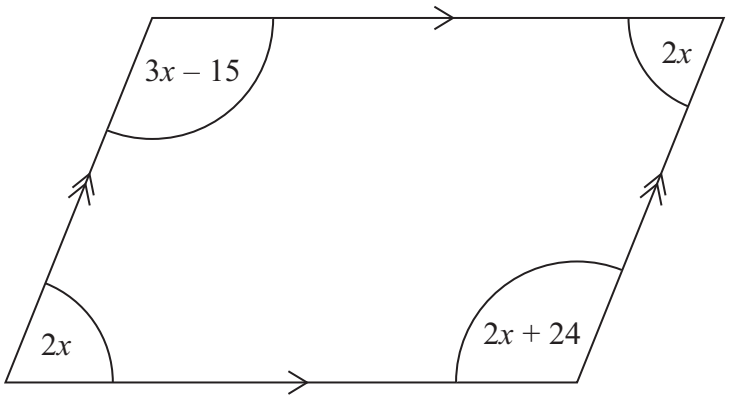


Diagram **NOT** accurately drawn

The diagram shows a parallelogram.
The sizes of the angles, in degrees, are

$2x$
$3x - 15$
$2x$
$2x + 24$

Work out the value of x.

$x =$ .....

(Total for Question 11 is 3 marks)

10 m is an integer such that $-2 < m \leqslant 3$

(a) Write down all the possible values of m.

.....

(2)

(b) Solve $7x - 9 < 3x + 4$

.....

(2)

(Total for Question 10 is 4 marks)

19 $p^2 = \dfrac{x - y}{xy}$

$x = 8.5 \times 10^9$
$y = 4 \times 10^8$

Find the value of p.
Give your answer in standard form correct to 2 significant figures.

.....

(Total for Question 19 is 3 marks)

16 The diagram shows a triangle.

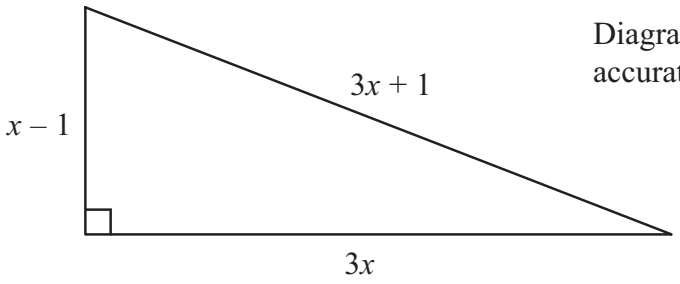


Diagram **NOT** accurately drawn

In the diagram, all the measurements are in metres.

The perimeter of the triangle is 56 m.
The area of the triangle is A m^2.

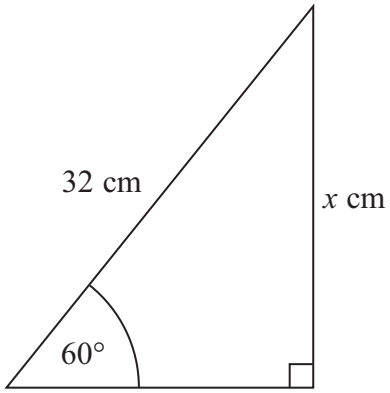
Work out the value of A.

.....

(Total for Question 16 is 4 marks)

17

Diagram **NOT** accurately drawn



Calculate the value of x.
Give your answer correct to 3 significant figures.

.....

(Total for Question 17 is 3 marks)

2 Brian is x years old.
Peter is 4 years older than Brian.
Amy is 2 years younger than Brian.

The total of their ages is 26 years.

Work out the value of x.

.....

(Total for Question 2 is 4 marks)

6 (a) Solve $3(2p - 5) = 21$

$p =$ .....

(3)

(b) Solve $9x - 11 = 5x + 7$

$x =$ .....

(3)

(Total for Question 6 is 6 marks)

7 (a) Simplify $5x + 4y + x - 7y$

.....

(2)

(b) Solve $7(x + 2) = 7$

.....

(2)

(Total for Question 7 is 4 marks)

Question 45

17 Solve $\frac{4x-1}{5} + \frac{x+4}{2} = 3$

$x =$ .....

(Total for Question 17 is 3 marks)

14 $A = 4bc$

$A = 100$
$b = 2$

(a) Work out the value of c.

.....

(2)

$$m = \sqrt{\frac{k+1}{4}}$$

(b) Make k the subject of the formula.

.....

(3)

(Total for Question 14 is 5 marks)

*24 $m = \frac{\sqrt{s}}{t}$

$s = 3.47$ correct to 2 decimal places
$t = 8.132$ correct to 3 decimal places

By considering bounds, work out the value of m to a suitable degree of accuracy.

You must show all your working and give a reason for your final answer.

(Total for Question 24 is 5 marks)

12 (a) Solve $2x + 3 = x - 4$

$x =$ .....

(2)

(b) Solve $4(x - 5) = 14$

$x =$ .....

(2)

(Total for Question 12 is 4 marks)

10 The diagram shows a garden in the shape of a rectangle.

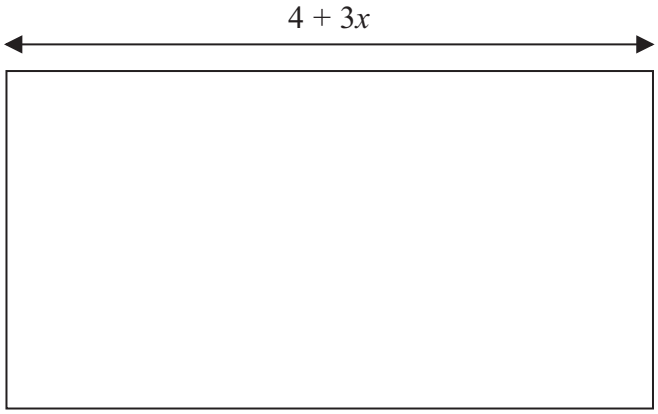


Diagram **NOT** accurately drawn

All measurements are in metres.
The perimeter of the garden is 32 metres.

Work out the value of x

.....

(Total for Question 10 is 4 marks)

12 (a) Solve $3(x - 2) = x + 7$

$x =$ .....

(3)

(b) Solve $\frac{2 - y}{5} = 1$

$y =$ .....

(2)

(Total for Question 12 is 5 marks)

5 $k = 3e + 5$

(a) Work out the value of k when $e = -2$

.....

(2)

(b) Solve $4y + 3 = 2y + 14$

$y =$ .....

(2)

(c) Solve $3(x - 5) = 21$

$x =$ .....

(2)

$-3 < n < 4$
n is an integer.

(d) Write down all the possible values of n.

.....

(2)

(Total for Question 5 is 8 marks)

Question 52

8 Dan has some marbles.
Ellie has twice as many marbles as Dan.
Frank has 15 marbles.

Dan, Ellie and Frank have a total of 63 marbles.

How many marbles does Dan have?

.....

(Total for Question 8 is 3 marks)

8 ABC is a triangle.

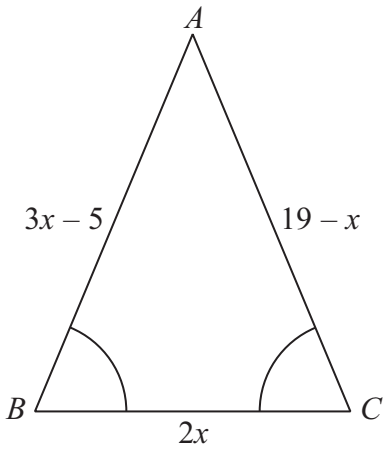


Diagram **NOT** accurately drawn

Angle ABC = angle BCA.

The length of side AB is $(3x - 5)$ cm.
The length of side AC is $(19 - x)$ cm.
The length of side BC is $2x$ cm.

Work out the perimeter of the triangle.
Give your answer as a number of centimetres.

..... cm

(Total for Question 8 is 5 marks)

20 (a) Solve $\frac{4(8x - 2)}{3x} = 10$

.....

(3)

(b) Write as a single fraction in its simplest form

$$\frac{2}{y + 3} - \frac{1}{y - 6}$$

.....

(3)

(Total for Question 20 is 6 marks)

16 (a) Solve $5(f-3) = f+10$

.....

(3)

(b) Solve $\frac{h+7}{3} + \frac{2h-1}{2} = \frac{5}{6}$

.....

(4)

(Total for Question 16 is 7 marks)

Question 56

3 $t = x^2 - 5y$
$x = 6$
$y = 4$

Work out the value of t.

.....

(Total for Question 3 is 2 marks)

***5** Vicky makes 8 purses and 9 key rings to sell for charity.
The price of a purse will be twice as much as the price of a key ring.

Vicky wants to get a total of exactly £40 when she sells all the purses and all the key rings.

Work out the price Vicky needs to charge for each purse and for each key ring.

(Total for Question 5 is 4 marks)

10 (a) Solve $4(y - 7) = 13$

$y =$ .....

(2)

(b) Make t the subject of the formula $P = 4t - 3$

.....

(2)

(Total for Question 10 is 4 marks)

***5** Vicky makes 8 purses and 9 key rings to sell for charity.
The price of a purse will be twice as much as the price of a key ring.

Vicky wants to get a total of exactly £40 when she sells all the purses and all the key rings.

Work out the price Vicky needs to charge for each purse and for each key ring.

(Total for Question 5 is 4 marks)

10 (a) Solve $4(y - 7) = 13$

$y =$ .....

(2)

(b) Make t the subject of the formula $P = 4t - 3$

.....

(2)

(Total for Question 10 is 4 marks)

20 Steve has a photo and a rectangular piece of card.

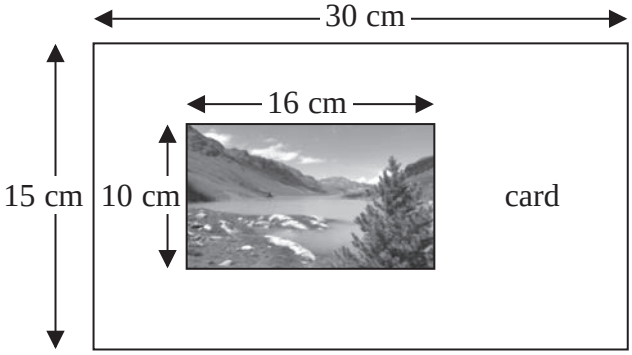
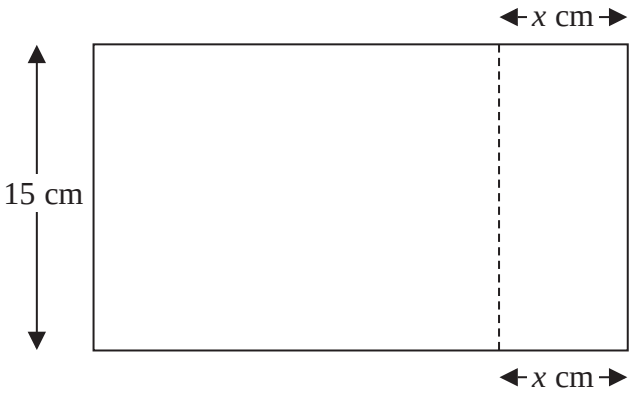


Diagram **NOT** accurately drawn

The photo is 16 cm by 10 cm.
The card is 30 cm by 15 cm.

Steve cuts the card along the dotted line shown in the diagram below.



Steve throws away the piece of card that is 15 cm by x cm.
The piece of card he has left is mathematically similar to the photo.

Work out the value of x.

.....

(Total for Question 20 is 3 marks)

***7**

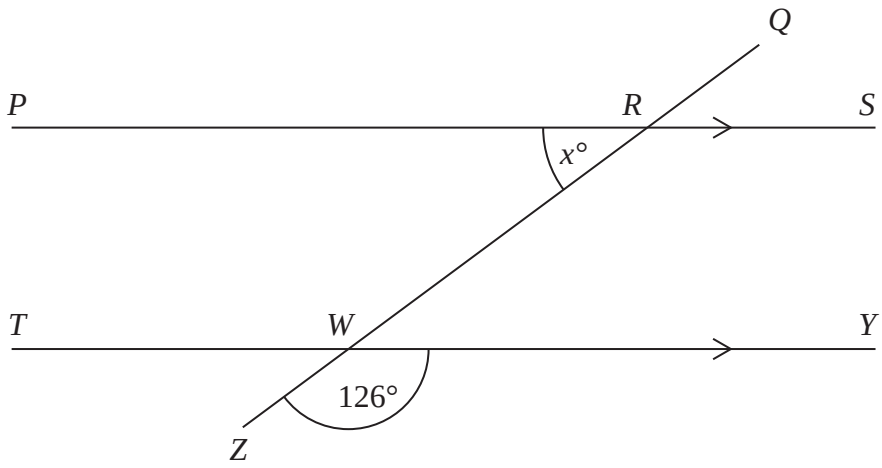


Diagram **NOT** accurately drawn

PRS and *TWY* are parallel straight lines.
QRWZ is a straight line.

Work out the value of *x*.
Give reasons for your answer.

(Total for Question 7 is 3 marks)

9 The diagram shows a trapezium.

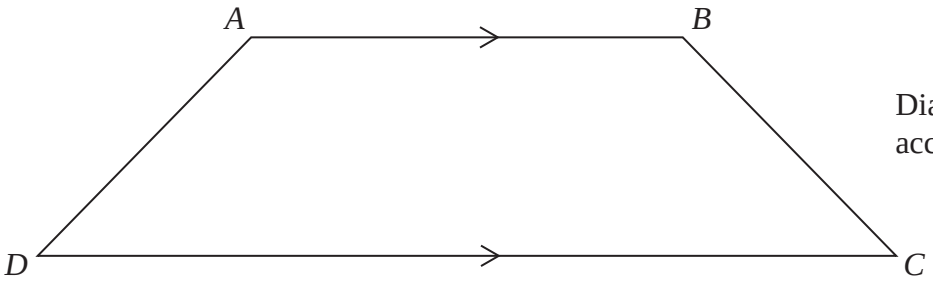


Diagram **NOT** accurately drawn

$AD = x$ cm.
BC is the same length as AD.
AB is twice the length of AD.
DC is 4 cm longer than AB.

The perimeter of the trapezium is 38 cm.

Work out the length of AD.

..... cm

(Total for Question 9 is 4 marks)

10 (a) Simplify $(p^3)^2$

.....

(1)

(b) Simplify $\frac{t^8}{t^3}$

.....

(1)

$2^3 \times 2^n = 2^9$

(c) Work out the value of n.

.....

(1)

$2x^3 = 128$

(d) Work out the value of x.

.....

(1)

(Total for Question 10 is 4 marks)

13 $-5 < y \leqslant 0$

y is an integer.

(a) Write down all the possible values of y.

.....

(2)

(b) Solve $6(x - 2) > 15$

.....

(2)

(Total for Question 13 is 4 marks)

12 The value of a van depreciates at the rate of 20% per year.
Gary buys a new van for £27 500
After n years the value of the van is £11 264

Find the value of n.

.....

(Total for Question 12 is 2 marks)

6 Stephanie is x years old.
Tobi is twice as old as Stephanie.
Ulrika is 3 years younger than Tobi.

The sum of all their ages is 52 years.

(a) Show that $5x - 3 = 52$

(3)

(b) Work out the value of x.

$x =$ .....

(2)

(Total for Question 6 is 5 marks)

Question 68

21 Solve $\frac{4-2x}{x+1} = x$

.....

(Total for Question 21 is 4 marks)

7 The diagram shows the plan of a floor.

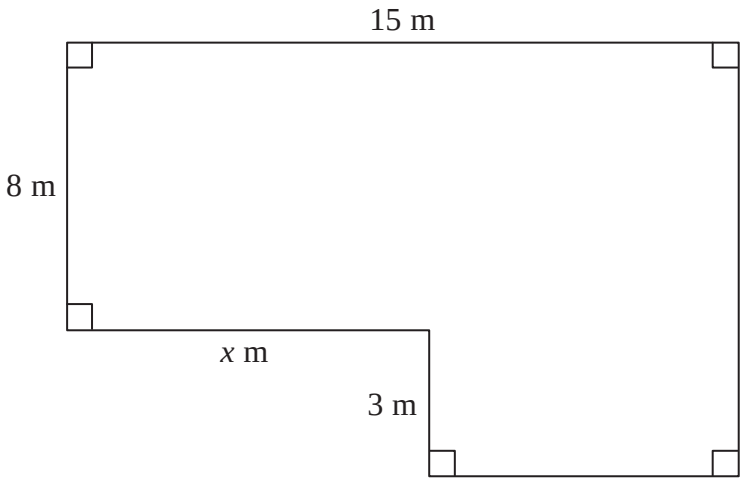


Diagram **NOT** accurately drawn

The area of the floor is 138 m^2.

Work out the value of x.

.....

(Total for Question 7 is 4 marks)

3 $f = 3g + 7h$

(a) Work out the value of f when $g = -5$ and $h = 2$

$f =$ .....

(2)

(b) Factorise $3x + 6$

.....

(1)

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

.....

(2)

(d) Simplify $m^5 \times m^3$

.....

(1)

(e) Simplify $\frac{p^6}{p^2}$

.....

(1)

(Total for Question 3 is 7 marks)

5 There are only red counters, yellow counters, blue counters and green counters in a bag.
Olu takes at random a counter from the bag.

The table shows each of the probabilities.

Colour	**Red**	**Yellow**	**Blue**	**Green**
Probability	0.6	0.25	$2x$	x

The probability that Olu will take a blue counter is twice the probability that he will take a green counter.

(a) Work out the value of x.

.....

(3)

Olu takes a counter from the bag.
He writes down the colour of the counter.
He puts the counter back in the bag.

Olu does this 50 times.

(b) Work out an estimate for the number of times that Olu takes a red counter from the bag.

.....

(2)

(Total for Question 5 is 5 marks)

12 $-2 \leqslant n < 3$

n is an integer.

(a) Write down all the possible values of n.

.....

(2)

(b) Solve $4 - x < 2x - 5$

.....

(2)

(Total for Question 12 is 4 marks)

2 $x = 3$

(a) Work out the value of $4x^2$

.....

(1)

(b) Solve $5x + 4 = 14 + x$

$x =$ .....

(2)

(Total for Question 2 is 3 marks)

23 The diagram shows a container for grain.

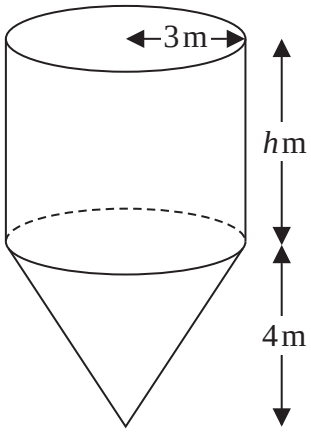


Diagram **NOT** accurately drawn

The container is a cylinder on top of a cone.
The cylinder has a radius of 3m and a height of hm.
The cone has a base radius of 3m and a vertical height of 4m.

The container is empty.
The container is then filled with grain at a constant rate.

After 5 hours the depth of the grain is 6 metres above the vertex of the cone.
After 9 hours the container is full of grain.

Work out the value of h.
Give your answer as a fraction in its simplest form.
You must show all your working.

.....

(Total for Question 23 is 5 marks)

Question 75

6 Asha and Lucy are selling pencils in a school shop.
They sell boxes of pencils and single pencils.

Asha sells 7 boxes of pencils and 22 single pencils.
Lucy sells 5 boxes of pencils and 2 single pencils.
Asha sells twice as many pencils as Lucy.

Work out how many pencils there are in a box.

.....

(Total for Question 6 is 4 marks)

Question 76

17 Solve

$$2x + 3y = \frac{2}{3}$$

$$3x - 4y = 18$$

x = ...

y = ...

(Total for Question 17 is 4 marks)

16 Solve $\frac{x+1}{2} + \frac{2x-1}{3} = \frac{5}{6}$

$x =$ .....

(Total for Question 16 is 4 marks)

17 (a) Solve $3x - 5 < 16$

.....

(2)

(b) Solve $\frac{11 - w}{4} = 1 + w$

$w =$ .....

(3)

(Total for Question 17 is 5 marks)

3 The diagram shows a rectangle.

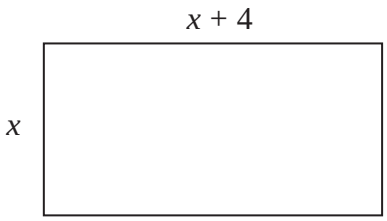


Diagram **NOT** accurately drawn

All measurements are given in centimetres.

The perimeter of the rectangle is 45 cm.

Work out the value of x.

x = ...

(Total for Question 3 is 3 marks)

11 Danielle invested £2800 for n years in a savings account.

She was paid 2.5% per annum compound interest.
The interest is paid into the account at the end of each year.

At the end of n years, the amount of money in the savings account is greater than £3000 for the first time.

Work out the value of n.

.....

(Total for Question 11 is 2 marks)

Question 81

2 $p = n^3 - 5$
$n = 2$

Work out the value of p.

.....

(Total for Question 2 is 2 marks)

Question 82

16 $\frac{\sqrt{3}}{5} + \frac{2}{\sqrt{3}} = a\sqrt{3}$, where a is a fraction.

Find the value of a.

.....

(Total for Question 16 is 3 marks)

4 PQR is an isosceles triangle.

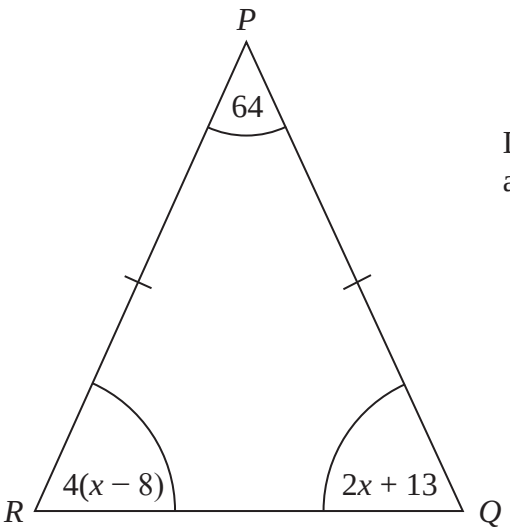


Diagram **NOT** accurately drawn

$PQ = PR$
All the angles are in degrees.

Work out the value of x.

$x =$ .....

(Total for Question 4 is 4 marks)

17 Solve $x^2 - 17x - 56 = 0$
Give your solutions correct to 2 decimal places.

.....

(Total for Question 17 is 3 marks)

***19** $p = \sqrt{\frac{s}{t}}$

s = 10.8 correct to 1 decimal place.
t = 75.06 correct to 2 decimal places.

By considering bounds, work out the value of p to a suitable degree of accuracy.

You must show all your working and give a reason for your final answer.

(Total for Question 19 is 5 marks)

13 $h = 3t^2$

(a) Work out the value of h when $t = 5$

.....

(2)

$h = 3t^2$

(b) Work out the value of t when $h = 108$

.....

(2)

(c) Make a the subject of the formula

$$v = u + at$$

.....

(2)

(Total for Question 13 is 6 marks)

3

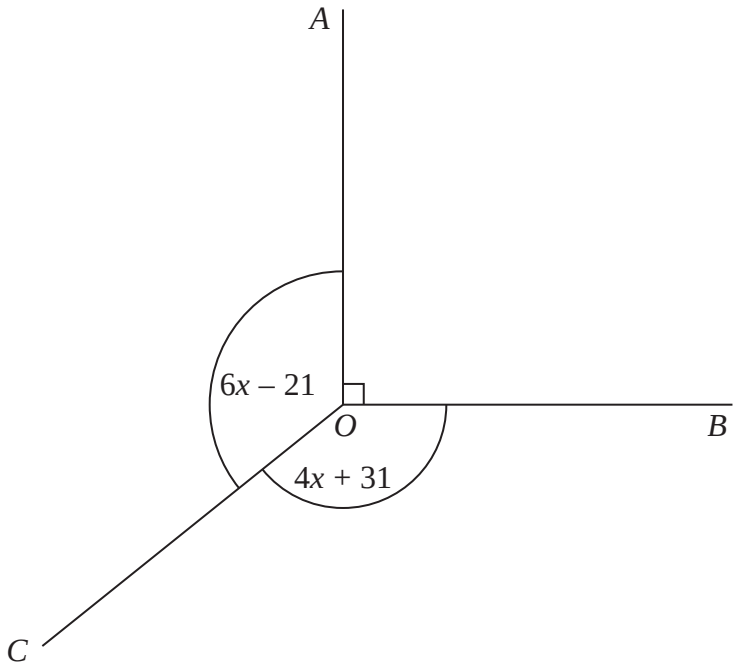


Diagram **NOT** accurately drawn

In the diagram, all angles are in degrees.

Angle *AOB* is a right angle.
Angle *AOC* = Angle *BOC*.

Work out the value of *x*.

.....

(Total for Question 3 is 3 marks)

16 Julie and Liam write down the same number.

Julie multiplies the number by 5 and then adds 4 to the result.
She writes down her answer.

Liam subtracts the number from 10
He writes down his answer.

Julie's answer is two thirds of Liam's answer.

Work out the number that Julie and Liam started with.
You must show your working.

.....

(Total for Question 16 is 5 marks)

21 Helen invested £6000 for n years in a savings account.
She got 3% compound interest each year.

At the end of n years Helen had £7379.24 in her savings account.

Work out the value of n.
You must show your working.

.....

(Total for Question 21 is 2 marks)

1 (a) Simplify $x^7 \times x^5$

.....

(1)

(b) Simplify $2y \div y$

.....

(1)

$v = 2t^2$

$t = 3$

(c) Work out the value of v.

.....

(1)

(d) Give an example to show that, when n is a whole number, $6n + 1$ is **not** always a prime number.
You must give your value of n.

$n =$ .....

(1)

(Total for Question 1 is 4 marks)

Question 91

June 2017 | 1MA0/1H | Original Q4 | Legacy

4 Solve $4(x + 3) = 2x + 8$

$x =$ .....

(Total for Question 4 is 3 marks)

Question 92

17 Solve $\frac{x+1}{3} + \frac{2x+5}{4} = 2$

$x =$ .....

(Total for Question 17 is 4 marks)

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

.....

(1)

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

$x =$ .....

(3)

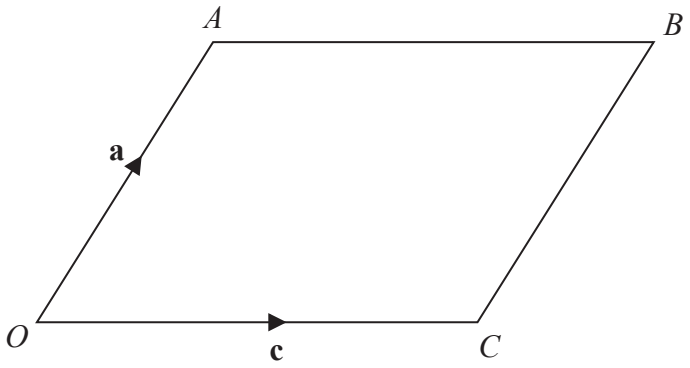
(c) Make m the subject of the formula $v = \sqrt{\dfrac{2E}{m}}$

.....

(3)

(Total for Question 17 is 7 marks)

19



$OABC$ is a parallelogram.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$

X is the midpoint of the line AC.
OCD is a straight line so that $OC : CD = k : 1$

Given that $\overrightarrow{XD} = 3\mathbf{c} - \frac{1}{2}\mathbf{a}$

find the value of k.

$k =$ .....

(Total for Question 19 is 4 marks)

Question 95

June 2017 | 1MA1/2H | Original Q11

11 Solve $\frac{3x-2}{4} - \frac{2x+5}{3} = \frac{1-x}{6}$

$x =$ .....

(Total for Question 11 is 4 marks)

Question 96

June 2017 | 1MA1/2H | Original Q19

19 $2 - \dfrac{x+2}{x-3} - \dfrac{x-6}{x+3}$ can be written as a single fraction in the form $\dfrac{ax+b}{x^2-9}$ where a and b are integers.

Work out the value of a and the value of b.

$a =$ .....

$b =$ .....

(Total for Question 19 is 4 marks)

Question 97

10 Naoby invests £6000 for 5 years.
The investment gets compound interest of x% per annum.

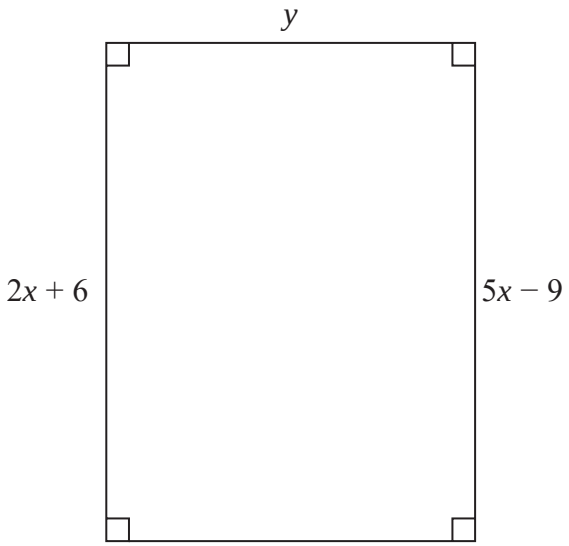
At the end of 5 years the investment is worth £8029.35

Work out the value of x.

.....

(Total for Question 10 is 3 marks)

6 Here is a rectangle.



All measurements are in centimetres.

The area of the rectangle is 48 cm^2.

Show that $y = 3$

(Total for Question 6 is 4 marks)

20 The table shows some values of x and y that satisfy the equation $y = a\cos x° + b$

x	0	30	60	90	120	150	180
y	3	$1 + \sqrt{3}$	2	1	0	$1 - \sqrt{3}$	-1

Find the value of y when $x = 45$

.....

(Total for Question 20 is 4 marks)

Question 100

November 2017 | 1MA1/2H | Original Q1

1 Solve $5x - 6 = 3(x - 1)$

$x =$.....

(Total for Question 1 is 3 marks)

13 At the beginning of 2009, Mr Veale bought a company.
The value of the company was £50 000

Each year the value of the company increased by 2%.

(a) Calculate the value of the company at the beginning of 2017
Give your answer correct to the nearest £100

£.....

(2)

At the beginning of 2009 the value of a different company was £250 000
In 6 years the value of this company increased to £325 000

This is equivalent to an increase of x% each year.

(b) Find the value of x.
Give your answer correct to 2 significant figures.

.....

(3)

(Total for Question 13 is 5 marks)

Question 102

16 Solve $(x-2)^2 = 3$

Give your solutions correct to 3 significant figures.

.....

(Total for Question 16 is 2 marks)

23 S is a geometric sequence.

(a) Given that $(\sqrt{x} - 1)$, 1 and $(\sqrt{x} + 1)$ are the first three terms of S, find the value of x.
You must show all your working.

.....

(3)

(b) Show that the 5th term of S is $7 + 5\sqrt{2}$

(2)

(Total for Question 23 is 5 marks)

9 Jack bought a new boat for £12 500

The value, £V, of Jack's boat at the end of n years is given by the formula

$$V = 12\,500 \times (0.85)^n$$

(a) At the end of how many years was the value of Jack's boat first less than 50% of the value of the boat when it was new?

.....

(2)

A savings account pays interest at a rate of R% per year.
Jack invests £5500 in the account for one year.

At the end of the year, Jack pays tax on the interest at a rate of 40%.
After paying tax, he gets £79.20

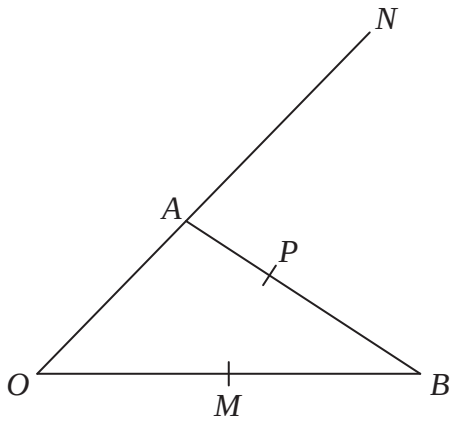
(b) Work out the value of R.

.....

(3)

(Total for Question 9 is 5 marks)

21



OAN, *OMB* and *APB* are straight lines.
$AN = 2OA$.
M is the midpoint of *OB*.

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

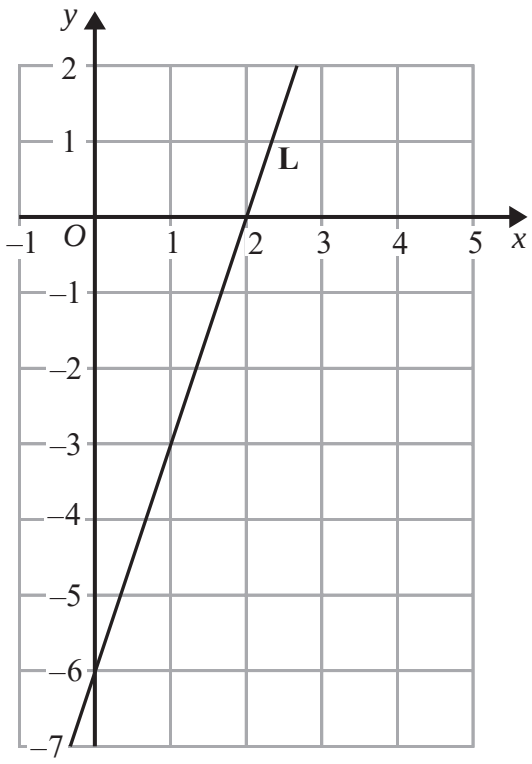
$\overrightarrow{AP} = k\overrightarrow{AB}$ where *k* is a scalar quantity.

Given that *MPN* is a straight line, find the value of *k*.

.....

(Total for Question 21 is 5 marks)

3 The line **L** is shown on the grid.



Find an equation for **L**.

.....

(Total for Question 3 is 3 marks)

Question 107

7 Solve $\dfrac{5-x}{2} = 2x - 7$

$x =$ .....

(Total for Question 7 is 3 marks)

Question 108

9 $T = \sqrt{\frac{w}{d^3}}$

$w = 5.6 \times 10^{-5}$
$d = 1.4 \times 10^{-4}$

(a) Work out the value of T.
Give your answer in standard form correct to 3 significant figures.

$T =$ .....

(2)

w is increased by 10%
d is increased by 5%

Lottie says,

"The value of T will increase because both w and d are increased."

(b) Lottie is wrong.
Explain why.

.....

.....

(2)

(Total for Question 9 is 4 marks)

14 (a) Work out the value of $\left(\frac{16}{81}\right)^{\frac{3}{4}}$

.....

(2)

$3^a = \frac{1}{9}$ $3^b = 9\sqrt{3}$ $3^c = \frac{1}{\sqrt{3}}$

(b) Work out the value of $a + b + c$

.....

(2)

(Total for Question 14 is 4 marks)

19 Solve $22 < \frac{m^2 + 7}{4} < 32$

Show all your working.

.....

(Total for Question 19 is 5 marks)

10 $f(x) = 4\sin x°$

(a) Find f(23)
Give your answer correct to 3 significant figures.

.....

(1)

$g(x) = 2x - 3$

(b) Find fg(34)
Give your answer correct to 3 significant figures.

.....

(2)

$h(x) = (x + 4)^2$

Ivan needs to solve the following equation $h(x) = 25$

He writes

$(x + 4)^2 = 25$
$x + 4 = 5$
$x = 1$

This is not fully correct.

(c) Explain why.

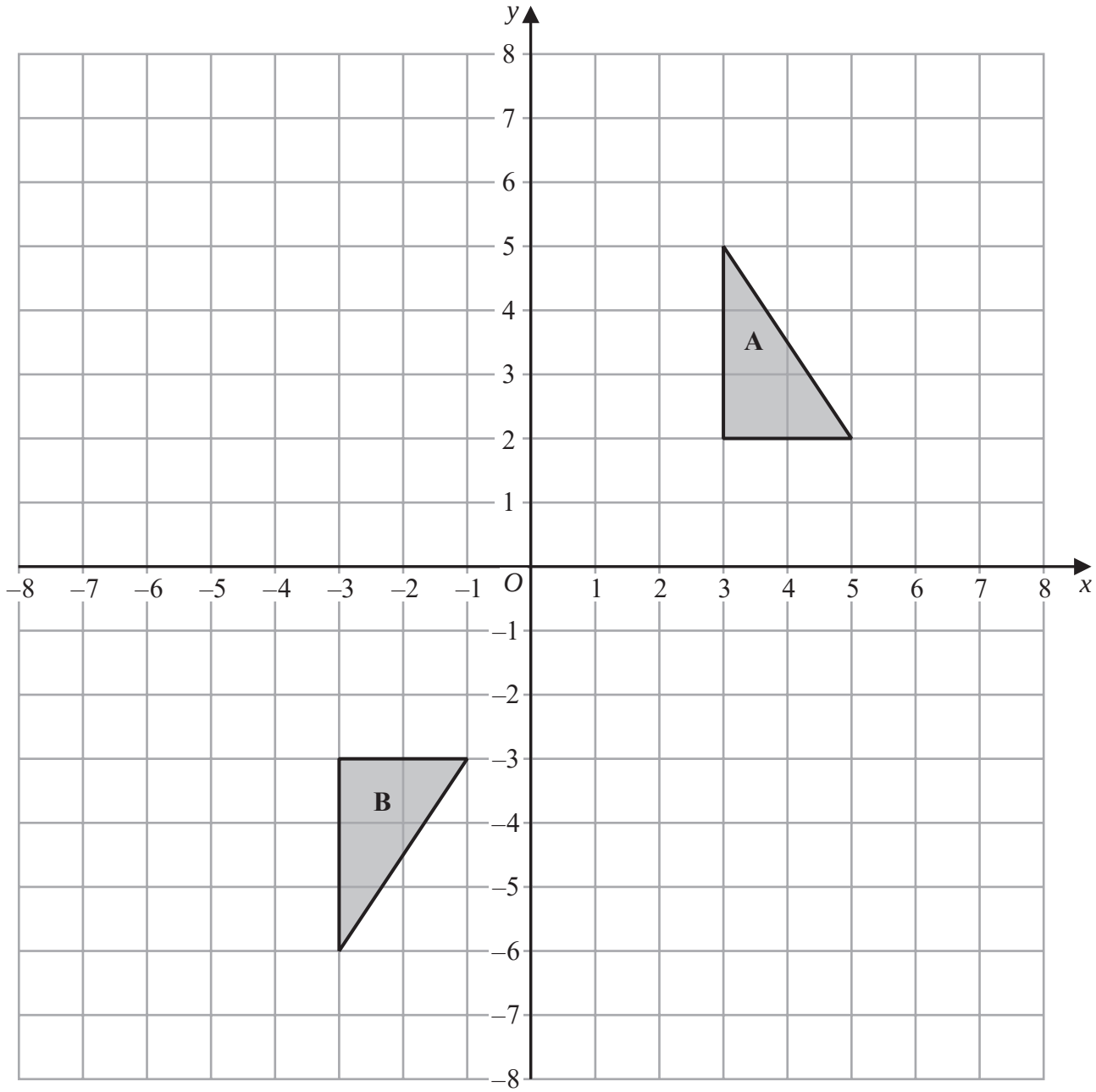
.....

.....

(1)

(Total for Question 10 is 4 marks)

5



Shape **A** can be transformed to shape **B** by a reflection in the x-axis followed by a translation $\begin{pmatrix} c \\ d \end{pmatrix}$

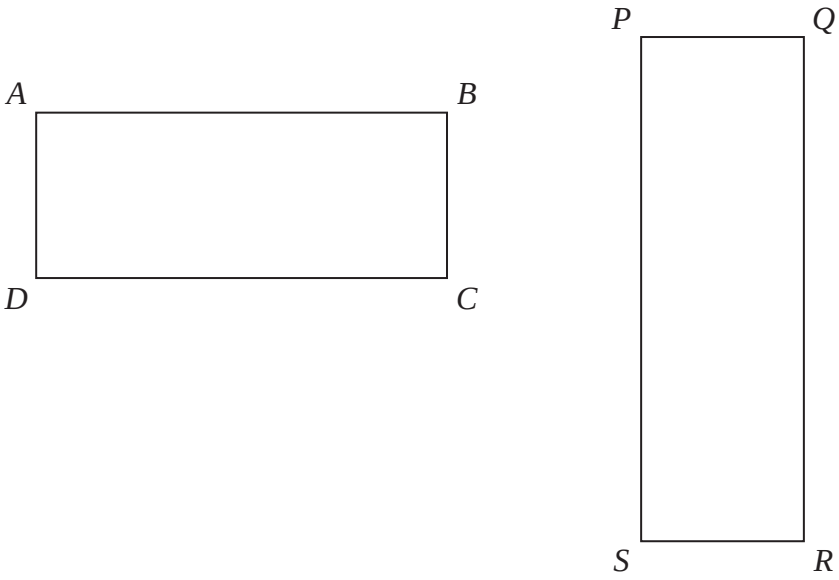
Find the value of c and the value of d.

$c =$ .....

$d =$ .....

(Total for Question 5 is 3 marks)

7 Here are two rectangles.



$QR = 10\,\text{cm}$
$BC = PQ$

The perimeter of $ABCD$ is 26 cm
The area of $PQRS$ is $45\,\text{cm}^2$

Find the length of AB.

..... cm

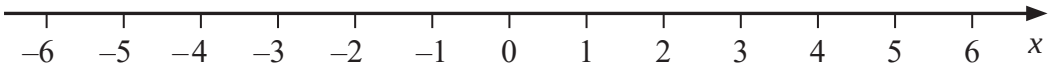
(Total for Question 7 is 4 marks)

1 (a) Solve $14n > 11n + 6$

.....

(2)

(b) On the number line below, show the set of values of x for which $-2 < x + 3 \leqslant 4$



(3)

(Total for Question 1 is 5 marks)

Question 115

June 2019 | 1MA1/2H | Original Q6

6 Sally used her calculator to work out the value of a number y.

The answer on her calculator display began

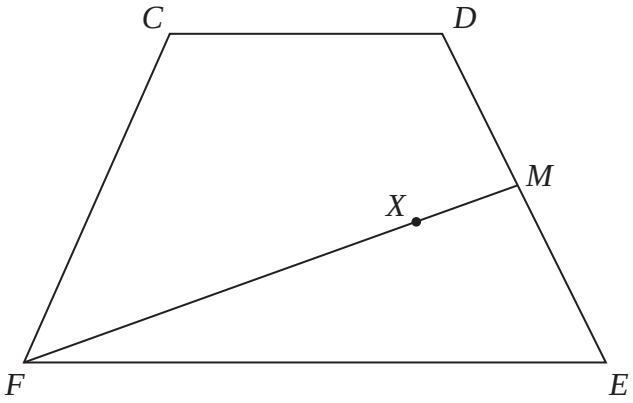
8.3

Complete the error interval for y.

..... $\leqslant y <$ .....

(Total for Question 6 is 2 marks)

20 $CDEF$ is a quadrilateral.



$\overrightarrow{CD} = \mathbf{a}$, $\overrightarrow{DE} = \mathbf{b}$ and $\overrightarrow{FC} = \mathbf{a} - \mathbf{b}$.

(a) Express $\overrightarrow{FE}$ in terms of **a** and/or **b**.
Give your answer in its simplest form.

.....

(2)

M is the midpoint of DE.
X is the point on FM such that $FX : XM = n : 1$
CXE is a straight line.

(b) Work out the value of n.

$n =$ .....

(4)

(Total for Question 20 is 6 marks)

Question 117

2 There are 60 people in a choir.
Half of the people in the choir are women.

The number of women in the choir is 3 times the number of men in the choir.
The rest of the people in the choir are children.

the number of children in the choir : the number of men in the choir = n : 1

Work out the value of n.
You must show how you get your answer.

n = ...

(Total for Question 2 is 4 marks)

13 Sakira invested £3550 in a savings account for 3 years.

She was paid 2.6% per annum compound interest for each of the first 2 years.
She was paid R% interest for the third year.

Sakira had £3819.21 in her savings account at the end of the 3 years.

Work out the value of R.
Give your answer correct to 1 decimal place.

.....

(Total for Question 13 is 3 marks)

20 $d = \frac{1}{8}c^3$

$c = 10.9$ correct to 3 significant figures.

By considering bounds, work out the value of d to a suitable degree of accuracy.
Give a reason for your answer.

(Total for Question 20 is 4 marks)

Question 120

November 2019 | 1MA1/3H | Original Q10

10 (a) Solve $\frac{9+x}{7} = 11 - x$

$x =$ .....

(3)

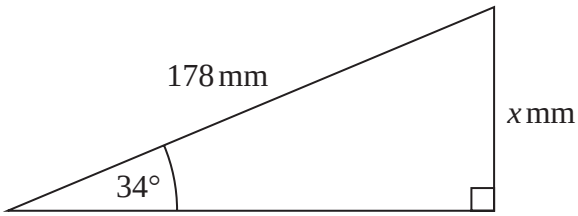
(b) Simplify $\frac{4(y+3)^3}{(y+3)^2}$

.....

(1)

(Total for Question 10 is 4 marks)

5

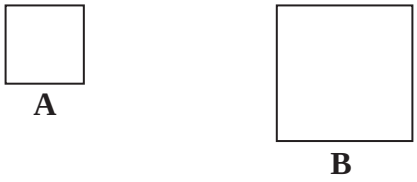


Work out the value of x.
Give your answer correct to 1 decimal place.

.....

(Total for Question 5 is 2 marks)

14 Here are two squares, **A** and **B**.



The length of each side of square **B** is 4 cm greater than the length of each side of square **A**.
The area of square **B** is 70 cm^2 greater than the area of square **A**.

Find the area of square **B**.
Give your answer correct to 3 significant figures.
You must show all your working.

..... cm^2

(Total for Question 14 is 4 marks)

8 The grouped frequency table gives information about the time, in minutes, taken by 50 people to solve a puzzle.

Time (t minutes)	Frequency
$0 < t \leqslant 10$	5
$10 < t \leqslant 20$	8
$20 < t \leqslant 30$	12
$30 < t \leqslant 40$	15
$40 < t \leqslant 50$	7
$50 < t \leqslant 60$	3

Brian was asked to draw a cumulative frequency table for this information.

This is the table that Brian drew.

Time (t minutes)	Cumulative frequency
$0 < t \leqslant 10$	5
$10 < t \leqslant 20$	13
$20 < t \leqslant 30$	25
$30 < t \leqslant 40$	40
$40 < t \leqslant 50$	47
$50 < t \leqslant 60$	50

Write down **one** thing that is wrong with this cumulative frequency table.

.....

.....

.....

(Total for Question 8 is 1 mark)

5 The first four terms of a Fibonacci sequence are

$$a \qquad 2a \qquad 3a \qquad 5a$$

The sum of the first five terms of this sequence is 228

Work out the value of a.

.....

(Total for Question 5 is 3 marks)

Question 125

12 $(ax^6)^{\frac{1}{n}} = 7x^3$

Work out the value of a and the value of n.

$a =$ .....

$n =$ .....

(Total for Question 12 is 2 marks)

Question 126

1 Solve $7x - 27 < 8$

.....

(Total for Question 1 is 2 marks)

Question 127

11 Cormac has some sweets in a bag.
The sweets are lime flavoured or strawberry flavoured or orange flavoured.

In the bag

$$\text{number of lime flavoured sweets} : \text{number of strawberry flavoured sweets} : \text{number of orange flavoured sweets} = 9 : 4 : x$$

Cormac is going to take at random a sweet from the bag.

The probability that he takes a lime flavoured sweet is $\frac{3}{7}$

Work out the value of x.

$x =$ .....

(Total for Question 11 is 3 marks)

2 $T = 4m^2 - 11$

(a) Work out the value of T when $m = -3$

$T =$ .....

(2)

(b) Make p the subject of the formula $d = 3p + 4$

.....

(2)

(Total for Question 2 is 4 marks)

3 Rick, Selma and Tony are playing a game with counters.

Rick has some counters.
Selma has twice as many counters as Rick.
Tony has 6 counters less than Selma.

In total they have 54 counters.

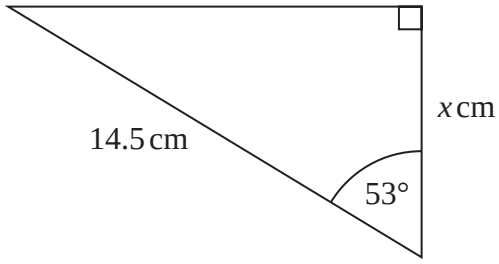
the number of counters Rick has : the number of counters Tony has = 1 : p

Work out the value of p.

p = ...

(Total for Question 3 is 5 marks)

5



Work out the value of x.
Give your answer correct to 3 significant figures.

x = ...

(Total for Question 5 is 2 marks)

23 A race is measured to have a distance of 10.6 km, correct to the nearest 0.1 km.
Sam runs the race in a time of 31 minutes 48 seconds, correct to the nearest second.

Sam's average speed in this race is V km/hour.

By considering bounds, calculate the value of V to a suitable degree of accuracy.
You must show all your working and give a reason for your answer.

(Total for Question 23 is 5 marks)

Question 132

12 Martin used his calculator to work out the value of a number P.
He wrote down the first two digits of the answer on his calculator.

He wrote down 1.2

Complete the error interval for P.

..... $\leqslant P <$ .....

(Total for Question 12 is 2 marks)

Question 133

19 The menu in a restaurant has starters, main courses and desserts.

There are 5 starters.
There are 12 main courses.
There are x desserts.

There are 420 different ways to choose one starter, one main course and one dessert.

Work out the value of x.

$x =$ .....

(Total for Question 19 is 2 marks)

20 For $x \geqslant 0$, the functions f and g are such that

$$f(x) = 3x + 4 \qquad g(x) = \frac{\sqrt{x} + 2}{5}$$

(a) Find $g^{-1}(x)$

$g^{-1}(x) =$ .....

(2)

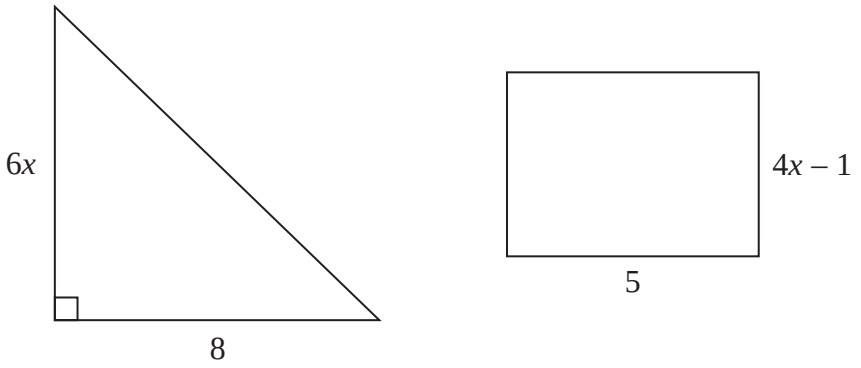
(b) Solve $gf(x) = 3$

$x =$ .....

(3)

(Total for Question 20 is 5 marks)

5 Here is a triangle and a rectangle.



All measurements are in centimetres.

The area of the triangle is $10\,cm^2$ greater than the area of the rectangle.

Work out the value of x.

$x =$ .....

(Total for Question 5 is 4 marks)

Question 136

21 Solve $\frac{1}{x+4} + \frac{3}{2-2x} = 1$

.....

(Total for Question 21 is 4 marks)

7 Mano has three shelves of books.

There are x books on shelf **A**.
There are $(3x + 1)$ books on shelf **B**.
There are $(2x - 5)$ books on shelf **C**.

There is a total of 44 books on the three shelves.

All the books have the same mass.

The books on shelf **B** have a total mass of 7500 g.

Work out the total mass of the books on shelf **A**.

..... g

(Total for Question 7 is 5 marks)

Question 138

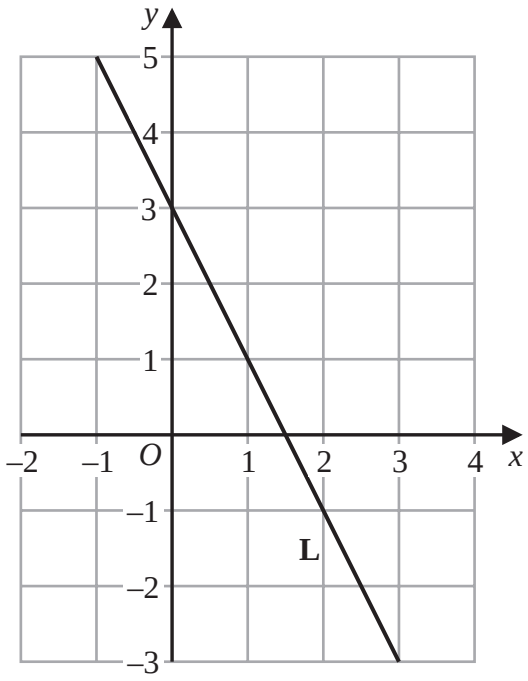
November 2023 | 1MA1/2H | Original Q4

4 Solve $5x - 14 = 52 - x$

$x =$ .....

(Total for Question 4 is 3 marks)

9 The line **L** is shown on the grid.



Find an equation for **L**.

.....

(Total for Question 9 is 3 marks)

Question 140

June 2024 | 1MA1/1H | Original Q9

9 In a sale, the normal price of a coat is reduced by R%

Given that

sale price = 0.7 × normal price

find the value of R.

R = ...

(Total for Question 9 is 1 mark)

Question 141

20 $2^x = \dfrac{2^n}{\sqrt[3]{2}}$ $\quad 2^y = \left(\sqrt{2}\right)^5$

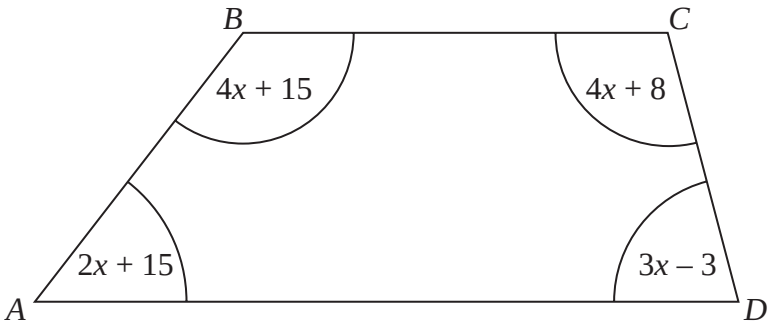
Given that $x + y = 8$

work out the value of n.

$n =$ .....

(Total for Question 20 is 3 marks)

7 *ABCD* is a quadrilateral.

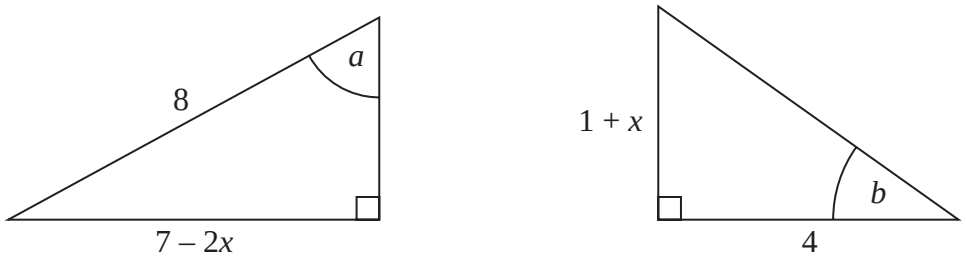


All angles are measured in degrees.

Show that *ABCD* is a trapezium.

(Total for Question 7 is 4 marks)

10 The diagram shows two right-angled triangles.



All lengths are measured in centimetres.

Given that

$$\sin a = \tan b$$

work out the value of x.

$x =$ .....

(Total for Question 10 is 3 marks)

Question 144

June 2024 | 1MA1/2H | Original Q16

16 Solve $(4x - 3)(x + 5) < 0$

.....

(Total for Question 16 is 2 marks)

20 $x - 4$, $x + 2$ and $3x + 1$ are three consecutive terms of an arithmetic sequence.

(a) Find the value of x.

$x =$ .....

(2)

$y - 4$, $y + 2$ and $3y + 1$ are three consecutive terms of a geometric sequence.

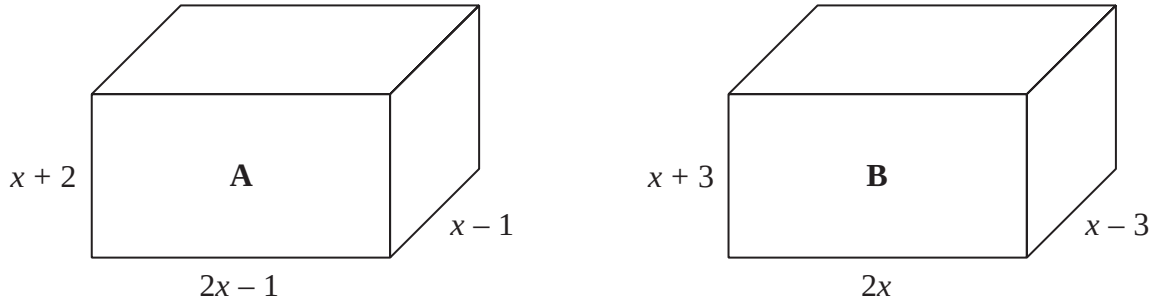
(b) Find the possible values of y.

.....

(5)

(Total for Question 20 is 7 marks)

13 Here are two cuboids.



All lengths are measured in centimetres.

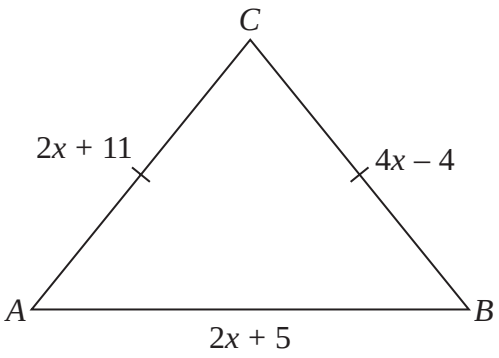
The volume of cuboid **A** is 142 cm^3 greater than the volume of cuboid **B**.

Work out the value of x.

$x =$ .....

(Total for Question 13 is 5 marks)

7 The diagram shows triangle *ABC*.



In the diagram, all measurements are in centimetres.

$AC = BC$

The perimeter of the triangle is 72 cm.

Work out the area of the triangle.

..... cm^2

(Total for Question 7 is 5 marks)

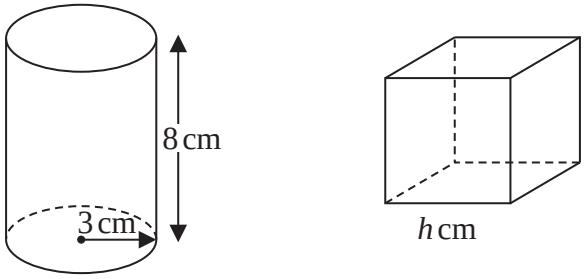
8 $1.25 \times 10^{-12} = k \times (4 \times 10^{-20})$

Work out the value of k.
Give your answer in standard form.

$k =$ .....

(Total for Question 8 is 2 marks)

12 The diagram shows a solid cylinder with base radius 3 cm and height 8 cm.
It also shows a solid cube with side length h cm.



The cylinder is made from steel with a density of 7.86 g/cm^3
The cube is made from brass with a density of 8.5 g/cm^3

The mass of the cylinder is equal to the mass of the cube.

Work out the value of h.
Give your answer correct to 1 decimal place.

h = ...

(Total for Question 12 is 5 marks)

19 $T = \dfrac{w}{a - c}$

w = 435 correct to the nearest 5
a = 9.8 correct to 2 significant figures.
c = 2.5 correct to 2 significant figures.

By considering bounds, calculate the value of T to a suitable degree of accuracy.
You must show all your working and give a reason for your final answer.

.....

(Total for Question 19 is 5 marks)

Question 151

November 2024 | 1MA1/3H | Original Q7

7 Jana used her calculator to find the value of a number t.
The answer on her calculator began 10.2

Complete the error interval for t.

..... $\leqslant t <$ .....

(Total for Question 7 is 2 marks)

12 Rudi invests £4500 in a savings account.

He gets compound interest at a rate of

2.4% for the first year
1.8% for each extra year.

(a) Work out the value of Rudi's investment at the end of 3 years.

£.....

(3)

Bruna buys a car for £7500

The value of the car depreciates by x% each year.
At the end of 2 years the value of the car is £4107

(b) Work out the value of x.

x = ...

(3)

(Total for Question 12 is 6 marks)

4 There are 280 chocolates in a box.
There are only dark chocolates, milk chocolates and white chocolates.

$\frac{1}{7}$ of the 280 chocolates are dark chocolates.

The number of milk chocolates : the number of white chocolates = 1 : 3

The number of white chocolates : the number of dark chocolates = n : 1

(a) Work out the value of n.
You must show all your working.

n = ...

(5)

10 milk chocolates from the box are eaten.

(b) Does this affect your answer to part (a)?
Give a reason for your answer.

.....

.....

.....

(1)

(Total for Question 4 is 6 marks)

7 (a) Simplify $\dfrac{3(2-m)^2}{2-m}$

.....

(1)

(b) Solve $7 + x \leqslant \dfrac{5x}{2} - 8$

.....

(3)

(c) Solve $9 < 2y + 4 < 12$

.....

(2)

(Total for Question 7 is 6 marks)

6 Here are two lists of numbers.

List **A**	276	400	157	139		
List **B**	530	500	270	x	440	320

mean of list **A** : mean of list **B** = 3 : 5

Work out the value of x.

x = ...

(Total for Question 6 is 5 marks)

Question 156

9 $3x^{-1}\left(4x - x^3\right) = a + bx^n$ for all the values of x that are not zero.

Find the value of a, the value of b and the value of n.

$a =$ .....

$b =$ .....

$n =$ .....

(Total for Question 9 is 2 marks)

Question 157

June 2025 | 1MA1/2H | Original Q10

10 Solve $\frac{14 - x}{3} = 3x$

$x =$ .....

(Total for Question 10 is 2 marks)

Question 158

21 Solve $(3x - 1)(5x + 2) < 0$

.....

(Total for Question 21 is 2 marks)

Question 159

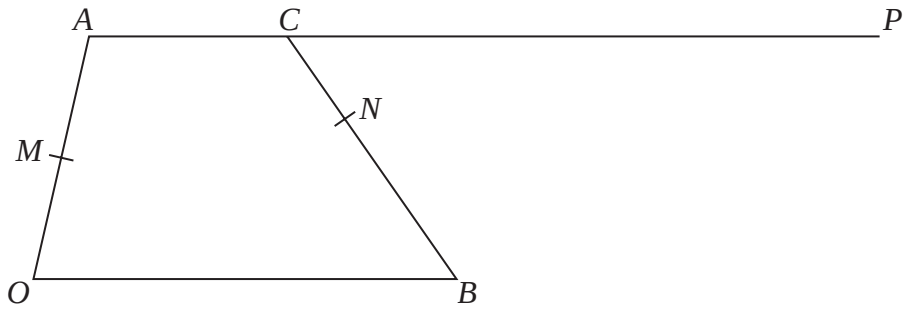
June 2025 | 1MA1/3H | Original Q17

17 Solve $\dfrac{5x}{3x-1} - \dfrac{2x}{3x+1} = 1$

$x =$ .....

(Total for Question 17 is 3 marks)

23 $OACB$ is a quadrilateral.
ACP is a straight line.



M is the midpoint of OA.
N is the point on BC such that $BN : NC = 5 : 3$

$\overrightarrow{OA} = \mathbf{a}$ $\overrightarrow{OB} = 3\mathbf{b}$ $\overrightarrow{AC} = 2\mathbf{b}$

$\overrightarrow{CP} = k \times \overrightarrow{AC}$ where k is a scalar.

Given that MNP is a straight line, find the value of k.
You must show all your working.

$k =$ .....

(Total for Question 23 is 5 marks)