

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

GCSE MATHEMATICS

F

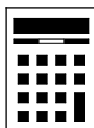
Foundation Tier Paper 3 Calculator

Wednesday 11 June 2025 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments
- the Formulae Sheet (enclosed).



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice

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

For Examiner's Use

Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
TOTAL	



Please note that these worked solutions have neither been provided nor approved by AQA and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

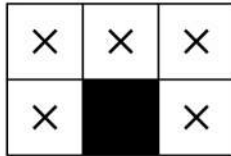
Any writing in blue should be written in the exam.

Anything written in green in a rectangle doesn't have to be written in the exam.

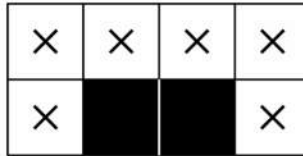
If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

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

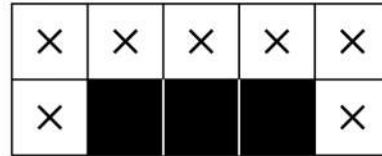
- 1** Here are the first three patterns in a sequence.



Pattern 1



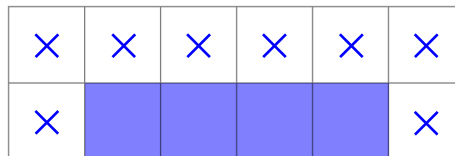
Pattern 2



Pattern 3

- 1 (a)** Draw Pattern 4 on the grid.

[1 mark]



The black squares go 1, 2, 3, 4... the crosses surround the black squares

- 1 (b)** How many squares in Pattern 6 would have a cross (X) in them?

[2 marks]

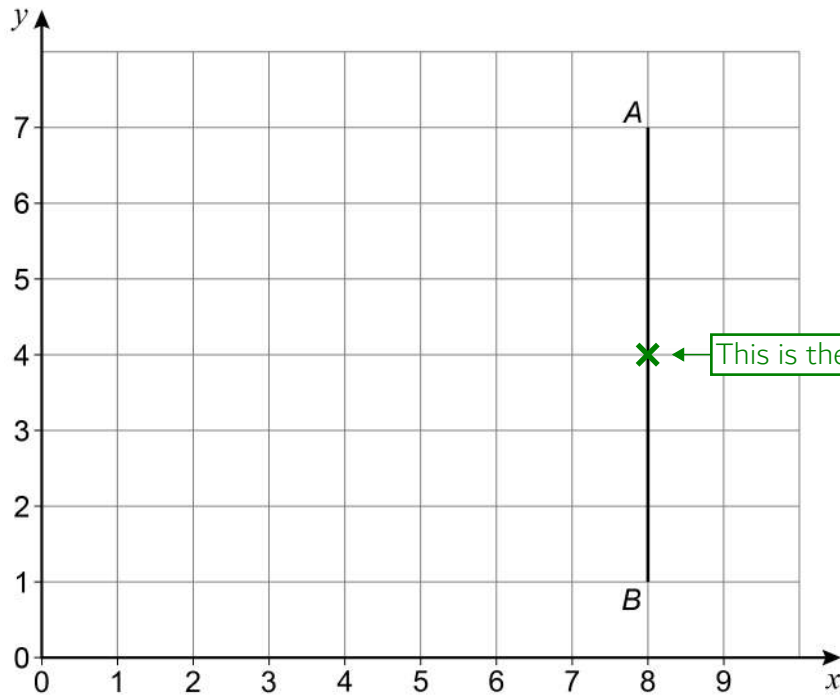
1 2 3 4 5 6

5, 6, 7, 8, 9, 10 ← Pattern 1 has 5 crosses. There is one more cross each time

Answer 10



- 2 Line AB is on a grid.



- 2 (a) Write down the coordinates of B .

[1 mark]

Answer (8 , 1)
↑ ↑
x-coordinate y-coordinate

- 2 (b) Write down the coordinates of the midpoint of the line AB .

[1 mark]

Answer (8 , 4)
↑ ↑
x-coordinate y-coordinate



- 3 (a) Jodie makes a sandwich using one type of bread and one filling.

Bread	Filling
White (W) or Brown (B)	Cheese (C) or Ham (H) or Tuna (T)

Complete the table of the 6 possible sandwiches they could make.
One has been done for you.

[2 marks]

WC
WH
WT
BC
BH
BT

Using systematic listing

- 3 (b) What **fraction** of the possible sandwiches use Cheese?

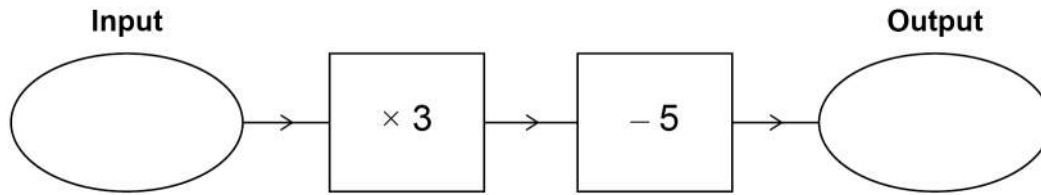
[1 mark]

Answer $\frac{2}{6}$

2 out of the 6 possible sandwiches use cheese



4 Here is a number machine.



4 (a) Work out the **output** when the input is 4

[1 mark]

4×3 ← Taking the input of 4 and multiplying it by 3 gives 12

$12 - 5$ ← Taking the 12 and subtracting 5 gives 7

Answer 7

4 (b) Work out the **input** when the output is 19

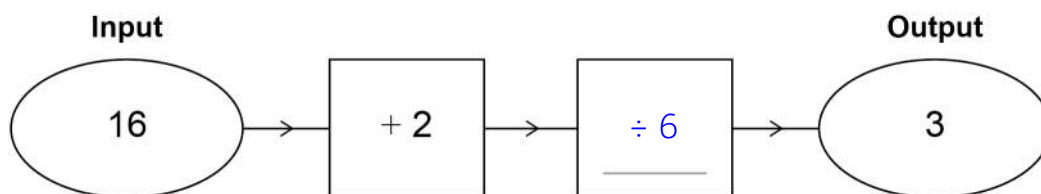
[2 marks]

$19 + 5$ $24 \div 3$ $\leftarrow$ Doing the opposite operations in the opposite order

Answer 8

4 (c) Complete this number machine.

[1 mark]



$16 + 2 = 18$, which could be divided by 6 to get the output of 3

- 5 (a) Complete the table to show equivalent fractions, decimals and percentages.

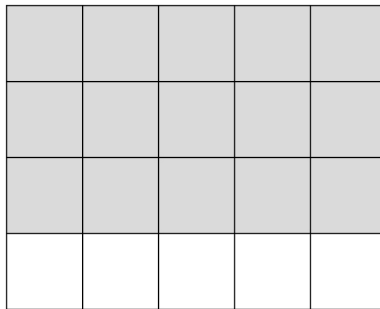
[3 marks]

Fraction	Decimal	Percentage
$\frac{1}{2}$ [A]	0.5	50%
$\frac{1}{10}$	0.1 [B]	10%
$\frac{2}{5}$	0.4	40% [C]

A: The calculator can be used to convert 0.5 to a fraction.
 B: The calculator can be used to convert $1/10$ to a decimal.
 C: Multiplying 0.4 by 100 converts it to a percentage

- 5 (b) What **percentage** of this grid is shaded?

[1 mark]



$\frac{3}{4} \times 100 \leftarrow$ 3 out of the 4 rows are shaded. Multiplying $3/4$ by 100 converts it to a percentage

Answer 75 %



6

Which metric unit would be **most** suitable for each measurement?Tick **one** box for each.

[3 marks]

	centimetres (cm)	metres (m)	kilometres (km)
Distance between two villages	☐	☐	☒ A
Length of a pencil	☒ B	☐	☐
Height of a building	☐	☒ C	☐

A: cm and m are too small so there would be a very large number of them.

B: m and km are too large so there would be a very small number of them.

C: cm are too small so there would be a very large number of them. km are too large so there would be a very small number of them.

Turn over for the next question

Turn over ►



- 7 A mobile phone company has two different plans.

Plan A
Phone £500
plus
£11 per month for 24 months

Plan B
Phone is free
plus
£35 per month for 24 months

- 7 (a) Show that the **total** cost of Plan A for 24 months is £764

[2 marks]

$$11 \times 24$$

Multiplying the £11 per month by the 24 months finds that the cost excluding the phone is £264 for Plan A

$$264 + 500 = 764$$

Adding the £500 cost of the phone to the £264 shows that the total cost of Plan A for 24 months is £764

- 7 (b) During a sale, the **total** cost of Plan B is reduced by 10%

Which plan is cheaper for 24 months during the sale?

Tick a box.

☐

Plan A

☒

Plan B

Show working to support your answer.

[3 marks]

$$35 \times 24 = 840$$

Multiplying the £35 per month by the 24 months finds that the normal cost is £840 for Plan B

$$840 \div 10$$

10% is $\frac{1}{10}$ as a fraction, so dividing the £840 by 10 finds that 10% of the total cost of Plan B is £84

$$840 - 84 = 756$$

Reducing the normal total cost of Plan B by the value of 10% finds that the total sale cost of Plan B is £756

£756 is less than £764 so Plan B is cheaper



8

One burger costs £3.80

Two burgers and **three** hotdogs cost £15.85Work out the cost of **one** hot dog.**[3 marks]**
 3.80×2 ← Multiplying the cost of one burger by 2 finds that the cost of two burgers is £7.60

 $15.85 - 7.60$ ← Subtracting the cost of two burgers from the £15.85 finds that the cost of the three hotdogs is £8.25

 $8.25 \div 3$ ← Dividing the cost of three hotdogs by 3 finds that the cost of one hot dog is £2.75
Answer £ 2.75

Turn over for the next question

8

Turn over ►



- 9 (a) The square of a **whole** number is a two-digit number.

Work out

the **smallest** number that could have been squared
and
the **largest** number that could have been squared.

[3 marks]

1, 4, 9, 16, 25, 36, 49, 64, 81, 100

Listing the square numbers ($1^2, 2^2, 3^2, 4^2, \dots$) until the first three-digit square number is found. 16 is the smallest two-digit square number, which is the result of squaring 4. 81 is the largest two-digit square number, which is the result of squaring 9

smallest 4

largest 9

- 9 (b) Which has the **larger** value 0.8^2 or 0.8^3 ?

Tick a box.

0.8^2

☒

0.8^3

☐

Give a reason for your answer.

[1 mark]

$0.8^2 = 0.640$

$0.8^3 = 0.512$

Using the calculator to give both answers and giving them both to the same number of decimal places so that they can be easily compared



- 10 (a) £4.56 is paid using the smallest possible number of coins.

What is the **modal value** of the coins used?

You **must** show your working.

[2 marks]

£2, £2, 50p, 5p, 1p

Listing out the coins needed. Starting with the largest coins so that the smallest number of coins is found. Possible coins are 1p, 2p, 5p, 10p, 20p, 50p, £1, £2

Answer _____ £2

The £2 coin appeared more often than the others

- 10 (b) Here is a list of five numbers.

5 9 4 16 8

An extra number is put into the list.

The **median** of the numbers is now 7

Work out the extra number.

[2 marks]

↓
4, 5, 8, 9, 16

Writing the known numbers in order. The median is the middle number when put in order. So the median must be where the green arrow is pointing

4, 5, 7, 8, 9, 16

Adding a 7 does not work as both 7 and 8 are in the middle. Halfway between 7 and 8 is 7.5, not 7

4, 5, 6, 8, 9, 16

8 is 1 more than the median of 7. So the number before must be 1 less than the median of 7. So 6 must be added. This works as both 6 and 8 are in the middle. Halfway between 6 and 8 is 7

Answer _____ 6



11

Paul buys plates for his cafe.

The cafe has 20 tables.

He buys 6 plates for each table plus an extra 70% for spares.

Work out how many plates Paul buys in **total**.**[3 marks]**

$$20 \times 6$$

← Multiplying the 20 tables by the 6 plates for each table finds that 120 plates are needed without the spares

$$\frac{70}{100} \times 120$$

← Putting 70% over 100 converts it to a fraction. Multiplying this fraction by 120 finds that 70% of 120 is 84

$$120 + 84$$

← Adding the value of 70% to the 120 plates finds that Paul buys 204 plates in total

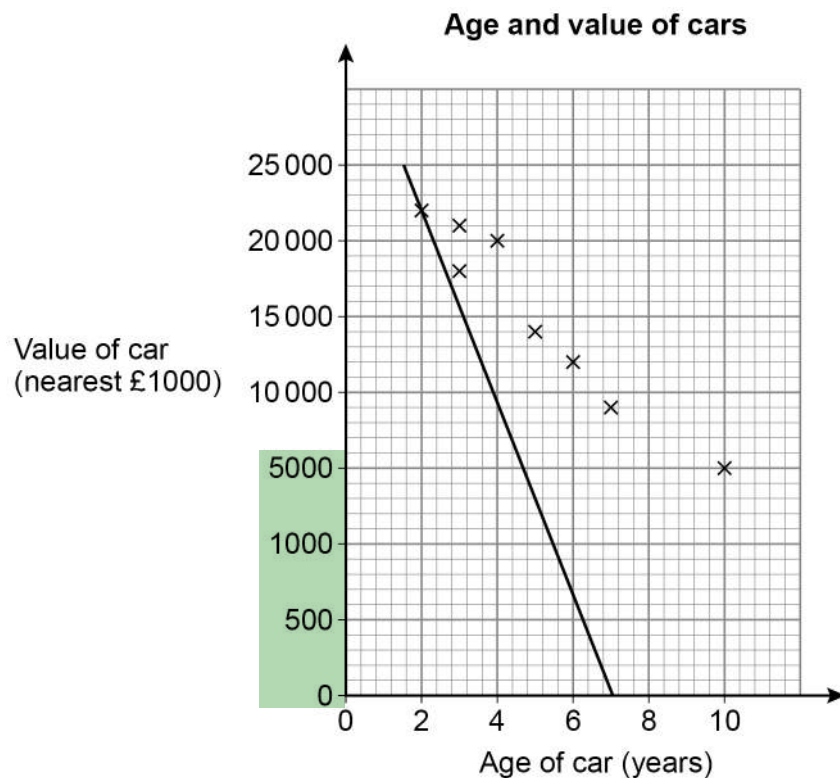
Answer 204



12 The table shows the age and value of some cars.

Age of car (years)	2	3	3	4	5	6	7	10
Value of car (nearest £1000)	22 000	21 000	18 000	19 000	14 000	12 000	9 000	5 000

Anil draws this scatter diagram and line of best fit for the data.



Write down **two** mistakes he has made.

[2 marks]

Mistake 1 The line of best fit does not go through the points well

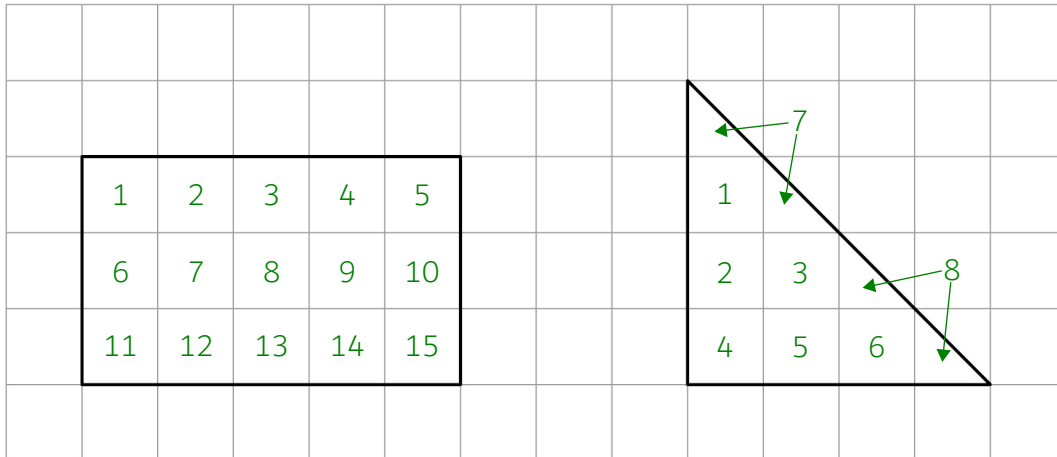
Mistake 2 The vertical scale doesn't keep going up by the same amount

From 0 to 500 it increases by 500. From 500 to 1000 it increases by 500.
But then from 1000 to 5000 it increases by 4000. It then goes up in 5000s



13

A rectangle and a triangle are drawn on a square grid.



The areas can be found by counting the squares

Work out the ratio area of rectangle : area of triangle

[3 marks]

Answer 15 : 8

The area of the rectangle is 15 squares. The area of the triangle is 8 squares. Writing this as a ratio



- 14** A box contains cards that are either red, blue, green or yellow.

Colour	Red	Blue	Green	Yellow
Probability	0.1	0.24	0.33	0.33

- 14 (a)** $P(\text{green}) = P(\text{yellow})$

Complete the table.

[2 marks]

- $0.1 + 0.24$ ← Adding the probability of red and the probability of blue finds that their combined probability is 0.34
 $1 - 0.34$ ← It is certain to get one of the colours so the probabilities must add to 1. Subtracting the combined probability of red and blue from 1 finds that the combined probability of green and yellow is 0.66
 $0.66 \div 2$ ← As the probability of green is equal to the probability of yellow, dividing the combined probability of green and yellow by 2 finds that they are both 0.33

- 14 (b)** There are 600 cards in the box.

How many cards are **not** blue?

[3 marks]

- $1 - 0.24$ ← It is certain to get one of the colours so the probabilities must add to 1. Subtracting the probability of blue from 1 finds that the probability of not blue is 0.76
 0.76×600 ← Multiplying the probability of not blue by the 600 cards finds that 456 cards are not blue

Answer 456



15

A and B are triangles.

For each statement, tick the correct box to describe A and B.

[3 marks]

	Always congruent	Sometimes congruent	Never congruent
A's sides are the same lengths as B's sides	☒	☐	☐
A's angles are the same as B's angles	☐	☒	☐
A is an enlargement of B with scale factor 2	☐	☐	☒

Congruent means the same shape and size.

If all three sides are the same length, they must be congruent.

If the angles are the same, they are the same shape but do not have to be the same size.

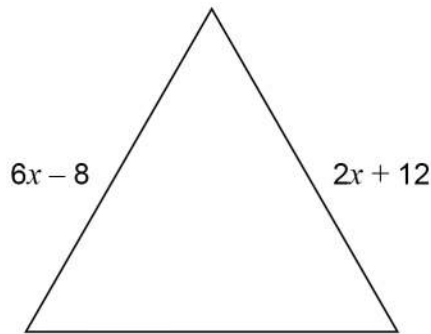
If one is an enlargement scale factor 2, this means that it is twice the size so cannot be congruent if they are not the same size



16

Here is an equilateral triangle.

All measurements are in centimetres.

Not drawn
accurately

Work out the value of the perimeter of the triangle.

[4 marks]

$$6x - 8 = 2x + 12$$

As it is equilateral, all the sides are equal. So the $6x - 8$ can be set equal to the $2x + 12$

$$4x - 8 = 12$$

Subtracting $2x$ from both sides to get all the x on the same side

$$4x = 20$$

Adding 8 to both sides to get the x term on its own

$$x = 5$$

Dividing both sides by 4 to get x on its own

$$2 \times 5 + 12$$

Substituting 5 for x in $2x + 12$ finds that each side is 22 cm

$$22 \times 3$$

All three sides are equal so multiplying the side length by 3 finds the perimeter, which is the total of all of the outside sides

Answer 66 cm



- 17** Sid and Zak each throw the same biased coin.
Here is some information about their throws.

Sid	80 throws	Relative frequency of Heads is 0.75
Zak	120 throws	72 are Heads

- 17 (a)** Work out the relative frequency of Heads for the **200** throws.

[2 marks]

0.75×80 ← Multiplying the relative frequency of heads by the 80 throws finds that 60 of these throws were heads

$60 + 72$ ← Adding the 72 heads to the 60 heads finds that there were 132 heads in total

Answer $\frac{132}{200}$

132 out of the 200 throws were heads. This can be left as a fraction

- 17 (b)** Which results would give the **best** estimate of the probability of Heads?

Tick **one** box.

☐

Sid's 80
throws

☐

Zak's 120
throws

☒

All 200 throws

Give a reason for your answer.

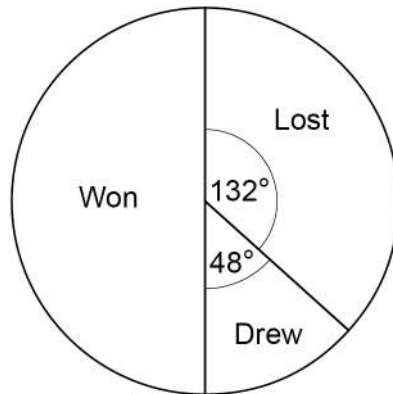
[1 mark]

More throws ← Throwing it more times should give a more accurate estimate of the probability



18

The pie chart represents the results of matches played by a team.



30 matches were **won**.

How many matches were lost?

[3 marks]

$$360 - 132 - 48$$

Subtracting the angle for lost and the angle for drew from the total 360° finds that the angle for won is 180°

$$30 \div 180$$

Dividing the 30 matches won by the 180° representing them finds that 1° represents 0.16... matches

$$0.16... \times 132$$

Multiplying what 1° represents by the 132° for lost finds that 22 matches were lost

Answer 22

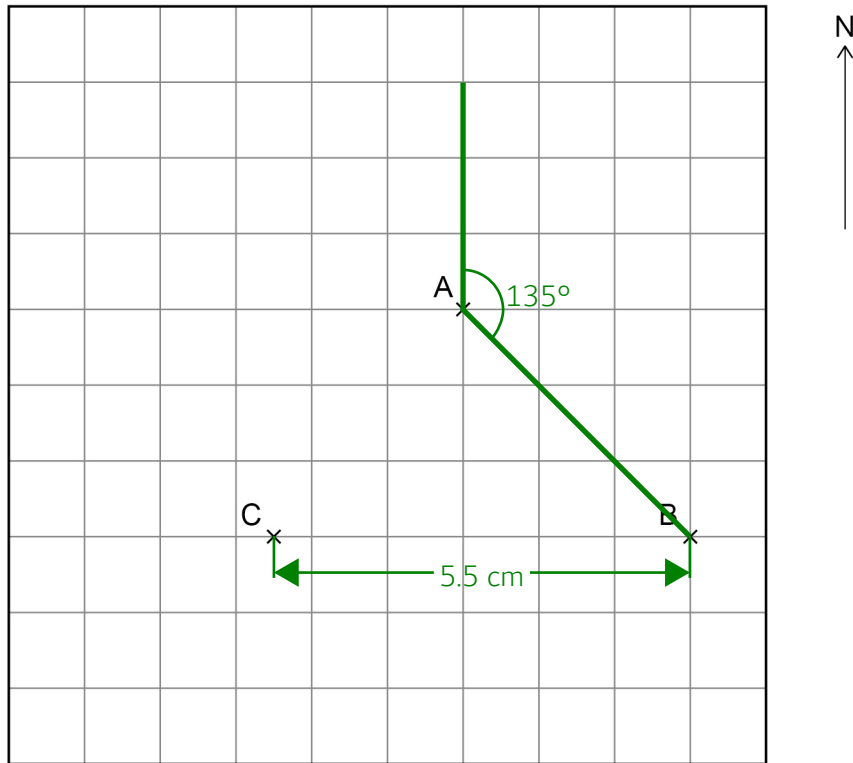
Turn over for the next question

Turn over ►



- 19 Here is a scale diagram showing towns A, B and C on a centimetre grid.

Scale 1 : 200 000



- 19 (a) Work out the **actual** distance from B to C.
Give your answer in kilometres.

[4 marks]

$$5.5 \times 200000$$

The 200000 is 200000 times greater than the 1. So multiplying the measured 5.5 cm by 200000 finds that the actual distance is 1100000 cm

$$1100000 \div 100$$

There are 100 cm in 1 m. So dividing the 1100000 cm by 100 converts it to 11000 m

$$11000 \div 1000$$

There are 1000 m in 1 km. So dividing the 11000 m by 1000 converts it to 11 km

Answer 11 km



19 (b) B is South East of A.

Write down the bearing of B from A.

[1 mark]

$90 + 45$

The bearing is the degrees turned clockwise from North at A to face B. It is 90° from North to East then half a right angle (45°) from East to South East. Adding these finds the bearing

Answer 135°

20 A linear sequence has

- 2nd term = 6
- 5th term = 18

Work out the n th term of the sequence.

[3 marks]

$18 - 6$

Subtracting the 2nd term from the 5th term finds that the difference between them is 12

$12 \div 3$

Dividing the difference of 12 by the 3 jumps from the 2nd term to the 5th term finds that each jump is 4

$6 - 4 - 4$

Subtracting 4 from the 2nd term expresses the 1st term. Subtracting another 4 expresses the 0th term

Answer $4n - 2$

The sequence increases in 4s so must involve $4n$.
The 0th term is -2 so the n th term must be $4n - 2$

Turn over for the next question



21 Ary, Bea and Cat each have an amount of money.

Cat has £280

- Cat's amount is $\frac{2}{3}$ of Bea's amount.
- Ary's amount : Bea's amount = 5 : 12

Work out how much money Ary has.

[3 marks]

$280 \div 2$ ← Dividing $\frac{2}{3}$ of Bea's amount by 2 finds that $\frac{1}{3}$ of Bea's amount is £140

140×3 ← Multiplying $\frac{1}{3}$ of Bea's amount by 3 finds that the whole of Bea's amount is £420

$420 \div 12$ ← Dividing Bea's amount by the 12 parts of the ratio which represent it finds that 1 part of the ratio is worth £35

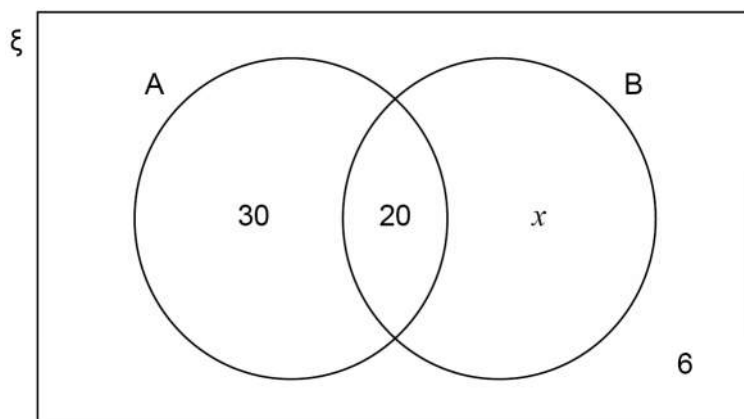
35×5 ← Multiplying the value of 1 part of the ratio by 5 finds that the 5 parts representing Ary's amount are worth £175

Answer £ 175



22

The Venn diagram shows some of the **numbers** of items in each set.



$$P(A) = \frac{1}{2}$$

Work out the value of x .

[2 marks]

$30 + 20$ ← Adding the 30 and 20 in A finds that there are 50 items in A

50×2 ← The probability of A is $\frac{1}{2}$ so multiplying the 50 items by 2 finds that there are 100 items in total

$100 - 30 - 20 - 6$ ← Subtracting all the known numbers from the total 100 finds that x is 44

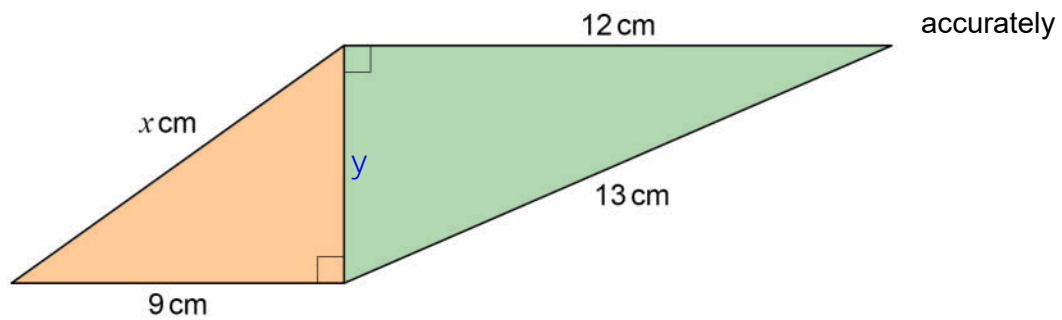
$$x = \underline{\hspace{2cm} 44 \hspace{2cm}}$$

Turn over for the next question

Turn over ►



23



Use Pythagoras' theorem to show that the value of x is between 10 and 11

[4 marks]

$$y^2 + 12^2 = 13^2$$

Pythagoras' Theorem is $a^2 + b^2 = c^2$, where a and b are the shorter sides and c is the longest side. Substituting in the values from the green right-angled triangle

$$y^2 = 25$$

Subtracting 12^2 from both sides gets y^2 on its own

$$y = 5$$

Square rooting both sides finds that y is 5 cm

$$9^2 + 5^2 = x^2$$

Pythagoras' Theorem is $a^2 + b^2 = c^2$, where a and b are the shorter sides and c is the longest side. Substituting in the values from the orange right-angled triangle

$$x = \sqrt{106}$$

Square rooting both sides gets x on its own

$$= 10.2...$$

Giving x as a decimal to show that it is between 10 and 11



24 (a) Write down the equation of a straight line parallel to $y - 2x = 9$

[1 mark]

$$y = 2x + 9$$

Adding $2x$ to both sides to put in the form $y = mx + c$, where m is the gradient and c is the y -intercept. So the gradient is 2

Answer $y = 2x + 8$

Parallel lines have the same gradient but cannot be the same line. Giving it a gradient of 2 but a different y -intercept

24 (b) A straight line

- has gradient 5
- passes through the point (3, 7)

Circle the equation of the line.

[1 mark]

$$7 = 5(3) + c$$

$y = mx + c$, where m is the gradient and c is the y -intercept. Substituting the y coordinate of 7 for y , the x -coordinate of 3 for x and 5 for m

$$c = -8$$

Subtracting $5(3)$ from both sides finds that $c = -8$

$$y = 3x - 2$$

$$y = 3x + 7$$

$$y = 5x$$

$$y = 5x - 8$$

$y = mx + c$, where m is the gradient and c is the y -intercept. m is 5 and c is -8

END OF QUESTIONS

