AQA

.CG Maths.
Worked Solutions

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

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Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE
MATHEMATICS

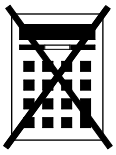
F

Foundation Tier Paper 1 Non-Calculator

Tuesday 1 November 2022 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- mathematical instruments
- the Formulae Sheet (enclosed).



You must **not** use a calculator.

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	
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 indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

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

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

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

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

Do not write outside the box

1 Circle the length of time between 4.00 pm and 5.05 pm

[1 mark]

55 min | (65 min) | 105 min | 125 min

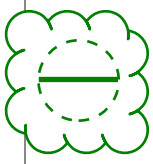
From 4pm to 5pm is an hour. Then it is another 5 minutes to 5.05pm. An hour is 60 minutes. 60 + 5 = 65

2 A circle has diameter 10 cm

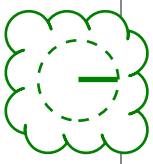
Circle the radius.

[1 mark]

(5 cm) | 10 cm | 20 cm | 100 cm



The diameter is a line across the circle going through the centre (shown on the left). The radius is a line going from the centre of the circle to the outside (shown on the right). The radius is half of the diameter. 10 ÷ 2 = 5



3 Circle the percentage that is between $\frac{1}{2}$ and $\frac{3}{4}$

[1 mark]

40% | (60%) | 80% | 90%

1/2 is 50%. 3/4 is 75%. It can only be 60% because this is the only one between these two percentages

Do not write outside the box

4 Circle the value of $3^2 + 4^2$

[1 mark]

14 17 (25) 49

$3^2 = 3 \times 3 = 9$. $4^2 = 4 \times 4 = 16$. $9 + 16 = 25$

5 Simplify fully $8a + 5b + 6a - 2b$

[2 marks]

Simplifying by collecting like terms. The like terms are in the same colours. 8a + 6a = 14a and 5b - 2b = 3b

Answer 14a+3b

Turn over for the next question

6

Do not write outside the box

6 200 students were each asked about the monthly cost of their phone contract.
Here are the results.

	Less than £25	**£25 or over**
School students	40	90
College students	32	38

6 (a) How many **more** school students than college students were asked?

[2 marks]

40 +90 130 — 32 +38 70

130 − 70 = 60

Adding the 40 and 90 school students works out that there were 130 school students asked in total. Adding the 32 and 38 college students works out that there were 70 college students in total. Subtracting the 70 college students from the 130 school students works out that there were 60 more school students than college students

Answer 60

6 (b) What percentage of the 200 students had a monthly cost **less than £25** ?

[2 marks]

40 +32 72

Adding the 40 school students and 32 college students who had a monthly cost less than £25 works out that that 72 students in total had a monthly cost less that £25

36 / 2 | 72

The fraction of the students who had a monthly cost less than £25 was 72/200. Percentage is out of 100. Dividing both the numerator and denominator by 2 makes the denominator 100

Answer 36 %

36/100 of the students had a monthly cost less than £25 so this must be 36%

Do not write outside the box

7 The only animals on a farm are 30 cows and 80 sheep.

$\frac{1}{5}$ of the 30 cows are sold

and

$\frac{5}{8}$ of the 80 sheep are sold.

Work out the **total** number of animals that are sold.

[3 marks]

30÷5=6 ← This works out that 1/5 of the 30 cows is 6

80÷8 ← This works out that 1/8 of the 80 sheep is 10

10×5 ← This works out that 5/8 of the 80 sheep is 50

50+6 ← Adding the 50 sheep and 6 cows that are sold works out that 56 was the total number of animals that are sold

Answer 56

8 Some gamers were asked which type of video game they preferred.

65% said Action.

19% said Role-playing.

The rest said Sports.

What percentage said Sports?

[2 marks]

65 + 19 = 84 ← Adding the 65% who said Action and the 19% who said Role-playing works out that 84% did not say Sports

100 − 84 = 16 ← The total must be represented by 100%. Subtracting the 84% who did not say Sports leaves 16% who did say Sports

Answer 16 %

9

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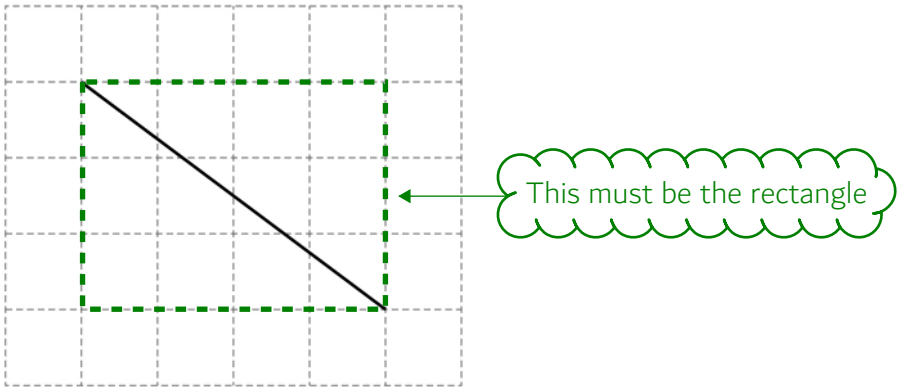
9 (a) A diagonal of a rectangle is drawn on a centimetre grid.
The sides of the rectangle are on the grid lines.



Work out the area of the rectangle.

[2 marks]

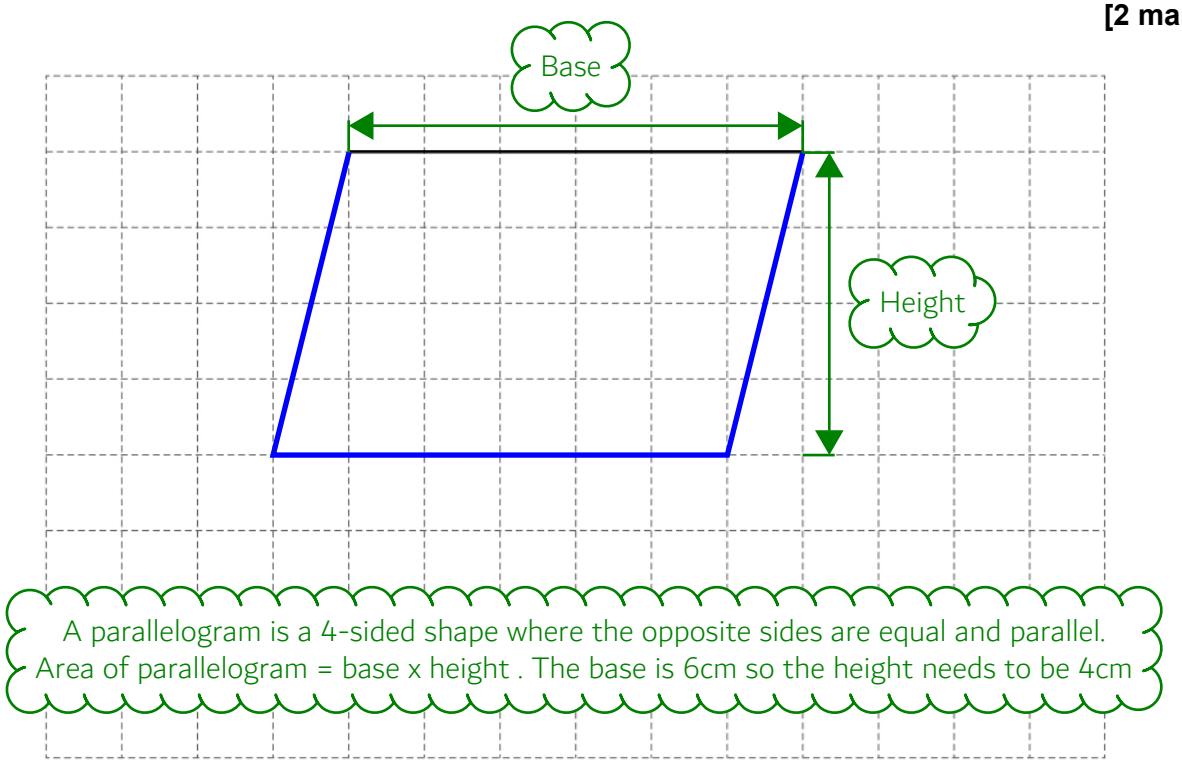
4X3 ← Area of rectangle = length x width. The length is 4cm and the width is 3cm

Answer 12 cm^2

9 (b) One side of a parallelogram is drawn on this centimetre grid.
The parallelogram does **not** have any right angles.

Complete the parallelogram so that it has area 24 cm^2

[2 marks]



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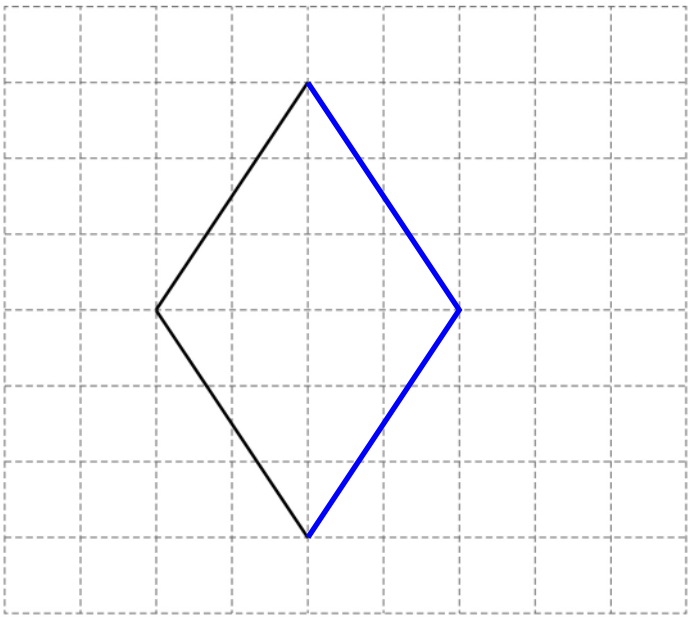
9 (c) Two sides of a rhombus are drawn on this grid.

Complete the rhombus.

[1 mark]



All four sides of a rhombus are equal but it has no right-angles

10 Here is a calculation.

$$428 \times 30 = 12\,840$$

Use the calculation to help answer the following questions.

10 (a) Write down the answer to $12\,840 \div 428$

[1 mark]

Answer 30

Dividing both sides of the equation by 428 finds that it is equal to 30

10 (b) Circle the answer to 214×30

[1 mark]

1284 3210 **(6420)** 25 680

214 is half of 428 so the answer must be half of 12840

7

Do not write outside the box

11 A shop sells notebooks and pencils.

Notebooks	**Pencils**
Pack of 8 for £12	56p each or Pack of 6 for £2.70

11 (a) Marek buys some **packs** of notebooks.

The cost is £60

In total, how many **notebooks** does he buy?

[2 marks]

60÷12 ← Dividing the £60 by the £12 works out that 5 packs of 8 were bought

5×8 ← Each pack is 8 notebooks so multiplying the 5 packs by the 8 in each one works out that 40 notebooks were bought

Answer 40

11 (b) Work out the cheapest cost of 10 pencils.

[3 marks]

0.56
× 4
2.24
+2.70
4.94

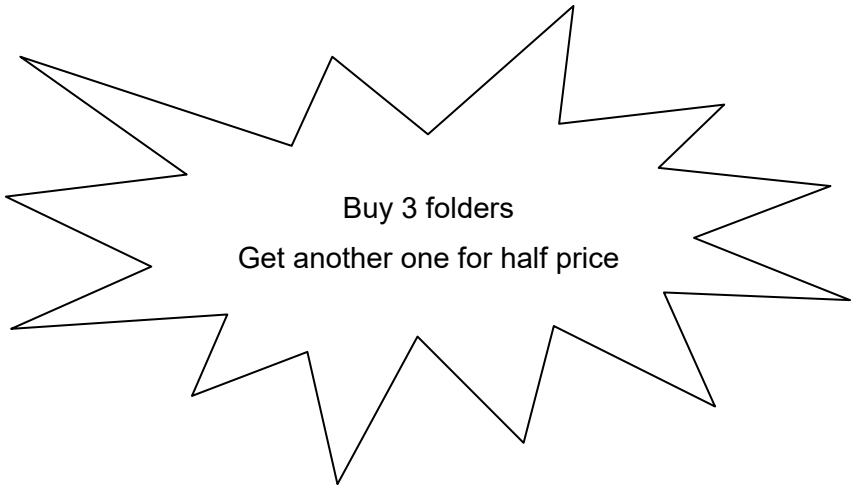
Buying two packs of 6 will get 12 pencils and this is too many. Buying 10 pencils for 56p each would cost £0.56 x 10 = £5.60. The other way is buying a pack of 6 and 4 pencils for 56p each. The cost of the 4 pencils is £2.24 then adding the £2.70 for the pack of 6 costs £4.94. This is the cheapest option

Answer £ 4.94

Do not write outside the box

11 (c) The shop also sells folders for £3.20 each.

The shop has this offer.



Work out the cost of 4 folders using the offer.

[3 marks]

3.20
× 3
9.60
← This works out that the cost of the first 3 folders is £9.60

1.60
2 ⟌ 3.20
← This works out that the cost of the fourth folder is £1.60. Dividing by 2 works out half the price

9.60
+1.60
11.20
← Adding the cost of the first 3 folders and the fourth works out the cost of 4 folders

Answer £ 11.20

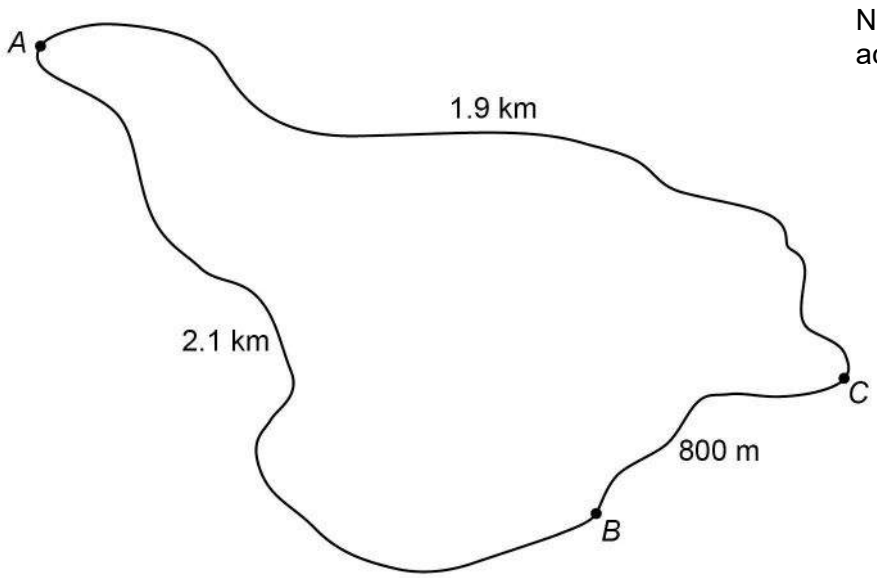
8

Turn over ►

Do not write outside the box

12 (a) *A*, *B* and *C* are connected by paths.

The length of each path is shown.



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Nathan and Sue each walk from *A* to *B*.

Nathan walks along the path $A \rightarrow B$

Sue walks along the paths $A \rightarrow C \rightarrow B$

How much **further** does Sue walk than Nathan?

Give your answer in kilometres.

[3 marks]

800÷1000 ← The answer needs to be in kilometres so converting the metres into kilometres. There are 1000 metres in a kilometre so dividing the 800m by 1000 converts it into 0.8km

1.9
+0.8
2.7
−2.1
0.6

← Adding the distance from A to C and the distance from C to B works out that the distance Sue walks is 2.7km. Subtracting the 2.1km Nathan walks works out that Sue walks 0.6km further

Answer 0.6 km

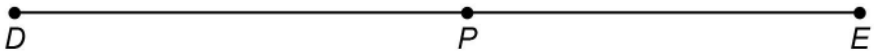
Do not write outside the box

12 (b) A straight path between *D* and *E* passes through *P*.

DE = 200 metres

P is 60 metres **closer** to *E* than to *D*.

Not drawn accurately



Work out the ratio *DP* : *PE*

Give your answer in its simplest form.

[3 marks]

$x + x - 60 = 200$ ← Let x be the distance DP. PE must be x - 60 as P is 60m closer to E than to D so PE is 60m less than DP. Adding the distance DP to PE must be equal to 200m

$2x = 260$ ← x + x = 2x. Adding 60 to both sides to get the x term on its own

$260 \div 2 = 130$ ← Dividing both sides by 2 finds that x is 130, so distance DP is 130m

$130 - 60 = 70$ ← PE must be 70m

$130 : 70$ ← Writing the ratio of DP : PE

Answer 13 : 7 ← The ratio is simplified by dividing both sides by 10. It does not go any simpler as 13 and 7 cannot be divided by the same amount to get smaller whole numbers

13 Emma tries to simplify $cd \times 2$

Here is her method.

$$c \times 2 = 2c$$
$$d \times 2 = 2d$$
$$2c \times 2d = 4cd$$

What is wrong with her method?

[1 mark]

Multiplied by 2 twice

She has multiplied the c by 2 then the d by 2. This is multiplying by 2 twice. It only needs to be multiplied by 2 once. The answer should be 2cd

7

Do not write outside the box

14 Work out 0.37×0.26

Give your answer as a decimal.

[4 marks]

$$\begin{array}{r} 37 \\ \times 26 \\ \hline 222 \\ 740 \\ \hline 962 \end{array}$$

Ignoring the decimal points and 0s which are not significant figures. Multiplying 37 and 26 then as there are 4 decimal places in total in 0.36 and 0.26, dividing by ten 4 times

Answer 0.0962

Do not write outside the box

15 (a) Solve $11x - 3 = 6x + 1$

[3 marks]

$5x - 3 = 1$ ← Subtracting 6x from both sides to get the x terms on the same side

$5x = 4$ ← Adding 3 to both sides to eliminate the -3 and get the x term on its own

$x =$ $\frac{4}{5}$

Dividing both sides by 5 to eliminate the 5 on the left and get x on its own. This can be given as a fraction and does not need to be converted into a decimal

15 (b) Solve $\frac{2x}{5} = 14$

[2 marks]

$\frac{x}{5} = 7$ ← Dividing both sides by 2 to get rid of the 2 on the left

$x =$ 35

Multiplying both sides by 5 to get rid of the 5 on the left and get x on its own

9

Do not write outside the box

16 Bag A and bag B each contain only red discs and green discs.

Bag A	Contains 28 red discs There are twice as many red discs as green discs
Bag B	Contains 20 green discs There are 3 red discs for every 5 green discs

16 (a) Work out the **total** number of discs.

[3 marks]

28÷2=14 ← This works out that there are 14 green discs in bag A. In bag A, there are twice as many red discs as green discs, so there must be half as many green discs as red discs

20÷5 ← This works out that there are 4 lots of 5 green discs in bag B

4×3=12 ← This works out that there are 12 red discs in bag B. There are 4 lots of 5 green discs so there must be 4 lots of 3 red discs in bag B

28+14+12+20

Answer 74

Adding together all the red and green discs in bag A and the red and green discs in bag B works out the total number of discs

Do not write outside the box

16 (b) A different bag, C, is empty.

The 28 red discs from A are put into C.

The 20 green discs from B are also put into C.

One disc is now picked at random from each bag.

Complete each statement.

[3 marks]

There are now no red discs in bag A so there is no chance of getting a red disc.

There are now only red discs in bag B so it is certain to get a red disc.

28 + 20 = 48 so there are 48 discs in total in bag C. Out of these, 28 are red

The probability of red from A is 0

The probability of red from B is 1

The probability of red from C is $\frac{28}{48}$

17 What is $\frac{1}{20}$ as a decimal?

Circle your answer.

[1 mark]

0.2 (0.05) 0.02 0.005

1/2 = 0.5. Dividing this by 10 gives 1/20, so it must be 0.05

7

Do not write outside the box

18 Divide 62 in the ratio 3 : 7

[3 marks]

3+7 ← There is 62 in total. This is represented by a total of 10 parts in the ratio

62 ÷ 10 ← Dividing the 62 by the 10 parts which represent it works out that 1 part of the ratio is worth 6.2

6.2 × 3 = 18.6 ← Multiplying the value of 1 part of the ratio by the 3 parts and 7 parts works out the value of the 3 parts and 7 parts

6.2 × 7 = 43.4

Answer 18.6 and 43.4

19 n is an odd number.

Why is $n(n + 1)$ always an even number?

[2 marks]

n + 1 is even ← As it is 1 more than an odd number

Odd x even = even

Do not write outside the box

20 Here is some information about the time spent on social media by 40 women and 40 men last week.

Time spent, t (hours)	Number of women	Number of men
$2 < t \leqslant 5$	12	10
$5 < t \leqslant 8$	11	17
$8 < t \leqslant 11$	14	9
$11 < t \leqslant 14$	2	4
$14 < t \leqslant 17$	1	0

Tick **one** box for each statement.

[3 marks]

	Definitely true	Might be true	Cannot be true
Three of the **women** spent more than 11 hours on social media.	✓		
The range for the **men** is 15 hours.			✓
The women have a higher median than the men.		✓	

$\frac{40+1}{2}$ Using the formula (n + 1)/2, where n is the number of women or men, works out that the median value is halfway between the 20th and 21st value

20 − 12 = 8
20 − 10 = 10
Counting to the 20th for each the men and women. Subtracting the frequency of the first category works out that both medians are in the second category as the frequency of the second categories is more than is left to be counted

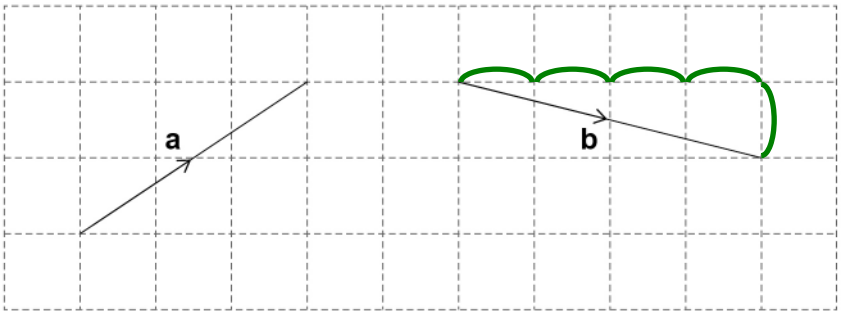
The women in 11 < t ⩽ 14 and 14 < t ⩽ 17 spent more than 11 hours. Adding the frequencies for these works out that there are three women who spent more than 11 hours so the first statement must be true. The range for the men must be less than 12 as the greatest possible time is 14 hours, the lowest possible time must be more than 2 hours and 14 - 2 = 12, so the second statement cannot be true. The medians for both the men and women are both in 5 < t ⩽ 8 so the third statement might be true

8

Do not write outside the box

21 The diagram shows the vectors **a** and **b**.

As a column vector $\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$



21 (a) What is **b** as a column vector?

[2 marks]

b is 4 to the right and 1 down so is 4 in the x-direction and -1 in the y-direction

Answer $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$

21 (b) Work out 4**a** as a column vector.

[1 mark]

Multiplying the x and y-components of a by 4. 4 x 3 = 12. 4 x 2 = 8

Answer $\begin{pmatrix} 12 \\ 8 \end{pmatrix}$

21 (c) $\mathbf{a} + \mathbf{c} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}$

Work out **c** as a column vector.

Circle your answer.

[1 mark]

$\begin{pmatrix} 2 \\ 0 \end{pmatrix}$ $\begin{pmatrix} 0 \\ 2 \end{pmatrix}$ $\begin{pmatrix} -2 \\ 0 \end{pmatrix}$ $\begin{pmatrix} 0 \\ -2 \end{pmatrix}$

Adding the x-components of a and the circled vector: 3 + 0 = 3. Adding the y-components of a and the circled vector: 2 + -2 = 0. So it must be the circled vector as adding it to a gives the desired vector

Do not write outside the box

22 Work out $\left(\frac{7}{10} - \frac{4}{15}\right) \div \frac{2}{3}$

Give your answer as a fraction.

[3 marks]

$\frac{21}{30} - \frac{8}{30}$ ← First dealing with the (7/10 - 4/15). The denominators of both fractions need to be the same so that the fractions can be subtracted. 30 is a common multiple of 10 and 15 so multiplying both the numerator and denominator of the first fraction by 3 and both the numerator and denominator of the second fraction by 2 to get 30 as a common denominator

$\frac{13}{30} \times \frac{3}{2}$ ← The numerators of both fractions can be subtracted and the denominator stays the same so 21/30 - 8/30 = 13/30. To divide this by 2/3, the division is changed to a multiply and the 2/3 is flipped

To multiply fractions, the numerators can be multiplied and the denominators can be multiplied. 13 x 3 = 39 and 30 x 2 = 60. There is no need to simplify the fraction

Answer $\frac{39}{60}$

23 Work out all the **integer** values of x for which $12 \leqslant 4x < 25$

[2 marks]

$4\overline{)25}$ $0\ 6\ r1$ ← Dividing all sides of the inequality by 4 gets x on its own in the middle

$3 \leq x < 6\frac{1}{4}$ ← 12 ÷ 4 = 3. The remainder of 1 when dividing 25 by 6 is left as a fraction

The smallest integer (not decimal or fraction) x can be is 3 and the largest integer it can be is 6. It can also be anything between these

Answer 3, 4, 5, 6

9

Do not write outside the box

24 Here is some information about 120 people who visit a shop.

$\frac{3}{4}$ of the people buy neither a coat nor a dress.

19 people buy a coat.

14 people buy a dress.

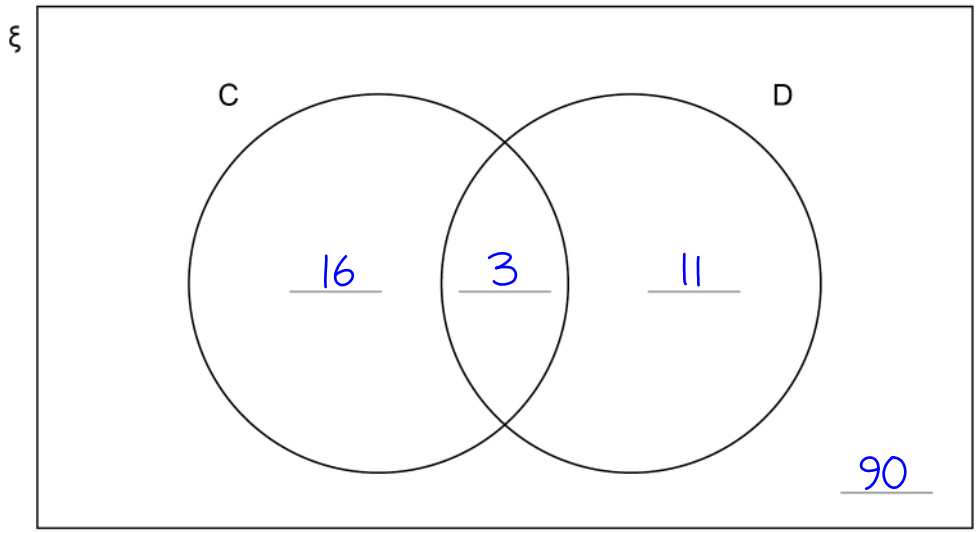
Complete this Venn diagram to represent the information.

[3 marks]

ξ = 120 people who visit the shop

C = people who buy a coat

D = people who buy a dress



$4\overline{)120} = 030$ ← This works out that 1/4 of 120 is 30

30×3 ← Multiplying the 30 by 3 works out that 3/4 of the 120 is 90, so this many buy neither a coat nor a dress

$90 + 19 + 14 = 123$, $123 - 120 = 3$ ← Adding the 90, 19 and 14 works out that there would be 123 people in total if there was nobody bought both a coat and a dress. This is 3 more than the 120 people who visit the shop. Therefore 3 must buy both a coat and a dress as every 1 put in the centre reduces the total by 1

19 - 3 = 16 so this many must buy only a coat.
14 - 3 = 11 so this many must buy only a dress

Do not write outside the box

25 Write $(3^6 \times 3^5) : 3^7$ in the form $n : 1$ where n is an integer.

[3 marks]

$3^{11} : 3^7$ ← $a^x \times a^y = a^{x+y}$ so $3^6 \times 3^5 = 3^{6+5} = 3^{11}$

$3^{11} \div 3^7 = 3^4$ ← Dividing both sides by 3^7 gets 1 on the right side of the ratio. $a^x \div a^y = a^{x-y}$ so $3^{11} \div 3^7 = 3^{11-7} = 3^4$

3, 9, 27

$27 \times 3 = 81$

Listing out the powers of 3 by keep multiplying by 3 until it reaches the fourth one

Answer 81 : 1

26 a is 10% more than b.

Circle the ratio $a : b$

[1 mark]

10 : 11 10 : 1 **(11 : 10)** 1 : 10

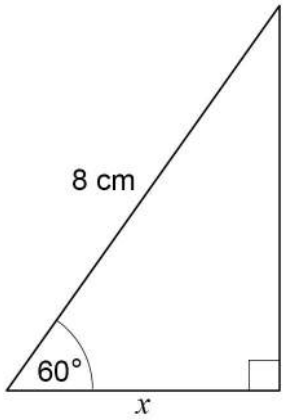
11 is 10% more than 10. a could by 11 and b could be 10

Turn over for the next question

7

Do not write outside the box

27 Use trigonometry to work out the value of x.



Not drawn accurately

[3 marks]

SOH CAH TOA

Writing SOH CAH TOA as formula triangles. 8cm is the hypotenuse so H is ticked and x is the adjacent so A is ticked. There are two ticks on CAH so this formula triangle can be used

cos60 × 8

From the formula triangle, adjacent = (cos of the angle) x hypotenuse

0 30 45 60 90
4 3 2 1 0

Writing the angles we need to remember the trig values for. Writing 4, 3, 2, 1, 0 under these for the cos values

$\frac{1}{2} \times 8$

$x =$ 4 cm

Square rooting the 1 and putting it over 2 finds that cos60 = 1/2

END OF QUESTIONS

3