AQA

.CG Maths.
Worked Solutions

Please write clearly in block capitals.

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

Surname ____________________

Forename(s) ____________________

Candidate signature ____________________

GCSE MATHEMATICS

H

Higher Tier   Paper 1 Non-Calculator

Thursday 24 May 2018   Morning   Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- mathematical instruments

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.
- 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	
26–27	
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

Do not write outside the box

Answer **all** questions in the spaces provided

1 Work out $\sqrt[3]{64 \times 1000}$ $= \sqrt[3]{64} \times \sqrt[3]{1000}$

Circle your answer.

[1 mark]

40 80 400 4000

The numbers can be cube rooted separately. The cube root of 64 is 4 as $4^3 = 64$ and the cube root of 1000 is 10 as $10^3 = 1000$. Then multiplying the 4 and the 10 gives 40

2 The vector $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ translates A to B. The vector means 2 to the left and 3 up

Circle the vector that translates B to A.

[1 mark]

$\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$ $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$

The exact opposite is 2 to the right (which is 2 in the x-direction) and 3 down (which is -3 in the y-direction)

3 Circle the expression that is equivalent to $3a - a \times 4a + 2a$

[1 mark]

$8a^2 + 2a$ $12a^2$ $5a - 4a^2$ $3a - 6a^2$

The order of operations, BIDMAS, should be followed so multiplication is done first. $-a \times 4a = -4a^2$. Then the addition and subtraction can be done in any order so the like terms can be collected. $3a + 2a = 5a$. The $-4a^2$ has no other like terms so stays as it is

Do not write outside the box

4 Circle the number that is closest in value to $\dfrac{9.8}{0.0195}$

[1 mark]

5 50 500 5000

$\dfrac{10}{0.02} = \dfrac{1000}{2}$

Using estimation by rounding each number to 1 significant figure works out an estimation of the value. To eliminate the decimal on the denominator, the numerator and denominator of the fraction are multiplied by 100. 1000/2 = 500

5 Solve $5(x + 3) < 60$

[2 marks]

$x+3<12$

Dividing both sides by 5 eliminates the 5 on the left. The brackets are no longer needed

Answer $x<9$

Subtracting 3 from both sides gets x on its own

Turn over for the next question

6

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6 The height of Zak is 1.86 metres.

The height of Fred is 1.6 metres.

Write the height of Zak as a fraction of the height of Fred.

Give your answer in its simplest form.

[3 marks]

$\frac{1.86}{1.6} = \frac{186}{160}$

Putting the height of Zak over the height of Fred expresses the fraction. Multiplying the numerator and denominator by 100 eliminates the decimals and makes it simpler

$186 \div 2 = 093$

$160 \div 2 = 080$

Both the numerator and denominator are even so they can both be divided by 2 to get smaller whole numbers

Answer $\frac{93}{80}$

93 and 80 cannot be divided by the same amount to get smaller whole numbers so the fraction does not go any simpler

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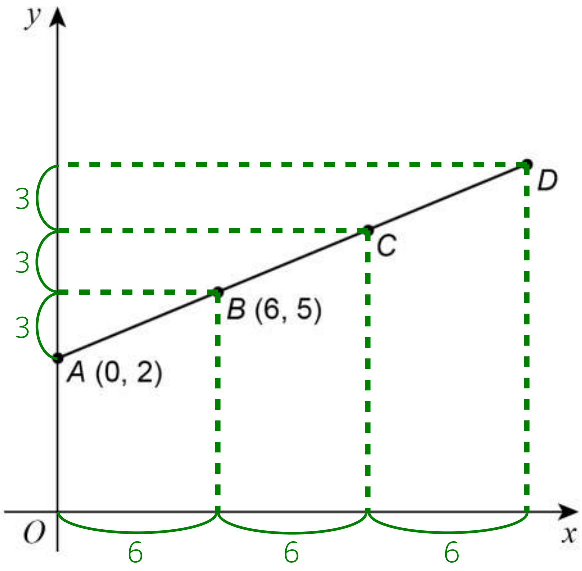
7 A (0, 2) and B (6, 5) are points on the straight line $ABCD$.

Not drawn accurately



$AB = BC = CD$

Therefore all of the points are equally spaced out

Work out the coordinates of D.

[3 marks]

6-0

Subtracting the x-coordinate of A from the x-coordinate of B works out that the difference is 6. This must be the distance in the x-direction between each point

6+6+6

Adding 2 lots of the 6 to the x-coordinate of B works out that the x-coordinate of D is 18

5-2

Subtracting the y-coordinate of A from the y-coordinate of B works out that the difference is 3. This must be the distance in they-direction between each point

5+3+3

Adding 2 lots of the 3 to the y-coordinate of B works out that the y-coordinate of D is 11

Answer (18 , 11)

Turn over for the next question

6

8 A coin is thrown 50 times.

It lands on heads 31 times.

8 (a) Write down the relative frequency it lands on heads.

[1 mark]

Answer $\frac{31}{50}$

31 out of the 50 throws were heads

8 (b) Raj says,

"The coin is biased towards heads."

Use the data to give a reason why he might be correct.

[1 mark]

It was heads for more than half of the throws

Biased towards heads means that the coin will be more likely to land on heads than tails. If it was not biased it would be expected to be heads roughly half of the time but the coin lands on heads more than half of the throws which gives evidence it might be biased

Do not write outside the box

9 The range of a set of numbers is $15\frac{1}{4}$

The smallest number is $-2\frac{7}{8}$

Work out the largest number.

[3 marks]

The range is the distance between the largest and smallest so adding the range to the smallest number works out the largest number. Converting both mixed fractions into improper fractions by multiplying the whole numbers by the denominators then adding the results to the numerators. -23/8 + 61/4 is the same as 61/4 - 23/8

$\frac{61}{4} - \frac{23}{8}$

$61 \times 2 = 122$

Multiplying the numerator and denominator of 61/4 by 2 to get the denominators the same. Once this is done the numerators can be subtracted

$\frac{122}{8} - \frac{23}{8}$

Answer $\frac{99}{8}$

10 y is inversely proportional to x.

Complete the table.

[2 marks]

x	12	6	3
y	2	4	8

x2 ÷2

÷2 x2

x doubled from 6 to 12 so y must half from 4 to 2.
y doubled from 4 to 8 so x must half from 6 to 3

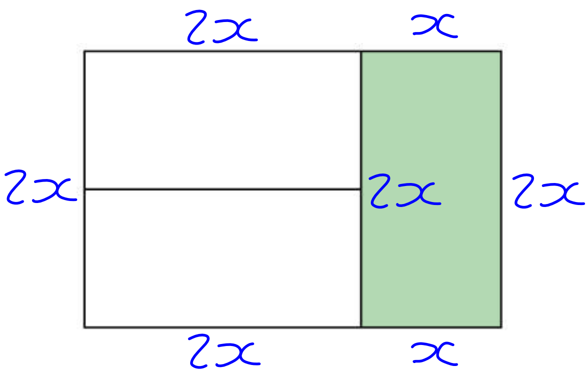
Turn over for the next question

7

Do not write outside the box

11 A large rectangle is made by joining three identical small rectangles as shown.

Let x be the shorter side of each small rectangle. The longer edge on each small rectangle must be 2x



Not drawn accurately

The perimeter of one small rectangle is 15 cm

Work out the perimeter of the large rectangle.

[4 marks]

$x+2x+x+2x$ ← Expressing the perimeter of one small rectangle in terms of x

$6x=15$ ← Simplifying the expression by collecting like terms. This must be equal to the actual perimeter of 15 cm

$6 \overline{\smash{)}\,1\,5.0}$ = 02.5 ← Dividing both sides by 6 finds that x = 2.5 cm

$2x+x+2x+x+2x+2x$ ← Expressing the perimeter of the large rectangle in terms of x

10×2.5 ← Simplifying the expression by collecting like terms gives 10x. Substituting 2.5 for x finds that the perimeter of the large rectangle is 25 cm

Answer 25 cm

Do not write outside the box

12 Put these numbers in order from smallest to largest.

8×10^{-4} 4×10^{-2} 6×10^{-4} 0.07

[2 marks]

0.0008 0.04 0.0006

x 10^{-n} means to divide by 10 n times. Converting the standard form into ordinary form can make the numbers more easy to compare in this case

Smallest 6×10^{-4}

8×10^{-4}

4×10^{-2}

Largest 0.07

13 Circle the volume that is the same as 15 cm^3

[1 mark]

15 000 mm^3 1.5 mm^3 0.0015 mm^3 150 mm^3

There are 10 mm in 1 cm so multiplying by 10 converts centimetres to millimetres. But as the unit is cubed the 15 should be multiplied by 10^3

Turn over for the next question

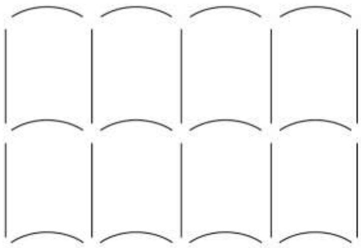
7

14 Patterns are made using straight lines and arcs.

14 (a)

Pattern A (one row)

Pattern B (two rows)



More rows are added to **Pattern B** so that

number of straight lines : number of arcs = 10 : 9

How many rows are added?

[2 marks]

15 : 16 ← Pattern C (three rows)

20 : 20 ← Pattern D (four rows)

25 : 24 ← Pattern E (five rows)

30 : 28 ← Pattern F (six rows)

35 : 32 ← Pattern G (seven rows)

40 : 36 ← Pattern H (eight rows)

5 more straight lines and 4 more arcs are added each time to get the next pattern in the sequence. Expressing the ratio of the number of straight lines : number of arcs in each pattern until the ratio simplifies to 10 : 9. Both sides of 40 : 36 can be divided by 4 to get 10 : 9

Answer 6

The pattern with eight rows is 6 after the pattern with two rows. So 6 rows are added

Do not write outside the box

14 (b) A different pattern is made using 20 straight lines and 16 arcs.

The straight lines and arcs are made from metal.

20 straight lines cost £12

cost of one straight line : cost of one arc = 2 : 3

Work out the **total** cost of the metal in the pattern.

[3 marks]

$20 \overline{)12.0}$ = 0.6

Dividing the £12 by the 20 straight lines works out that the cost of 1 straight line is £0.60

$2 \overline{)0.6}$ = 0.3

2 parts of the ratio represent the cost of 1 straight line. Dividing the cost of 1 straight line by 2 works out that 1 part of the ratio is worth £0.30

$0.3 \times 3 = 0.9$

Multiplying the value of 1 part of the ratio by 3 works out that the 3 parts which represent the cost of 1 arc are worth £0.90

$16 \times 0.9 = 14.4$

Multiplying the cost of 1 arc by the 16 arcs works out that the cost of the 16 arcs is £14.40

$14.4 + 12 = 26.4$

Adding the £12 cost of the straight lines works out that the total cost of the metal in the pattern is £26.40

Answer £ 26.40

Turn over for the next question

5

Do not write outside the box

15 A biased dice is thrown.

Here are the probabilities of each score.

Score	1	2	3	4	5	6
Probability	0.25	0.05	0.15	0.05	0.3	0.2

The dice is thrown 200 times.

Work out the expected number of times the score will be odd.

[3 marks]

$$\begin{array}{r} 0.25 \\ +0.15 \\ +0.3 \\ \hline 0.70 \\ \times 200 \\ \hline 140.00 \end{array}$$

1 OR 3 OR 5. OR means to add the probabilities.
So 0.7 is the probability of getting an odd number

Multiplying the probability of an odd number by the 200 times works out that the expected number of times the score will be odd is 140

Answer 140

Do not write outside the box

16 The value of y is 20% more than the value of x.

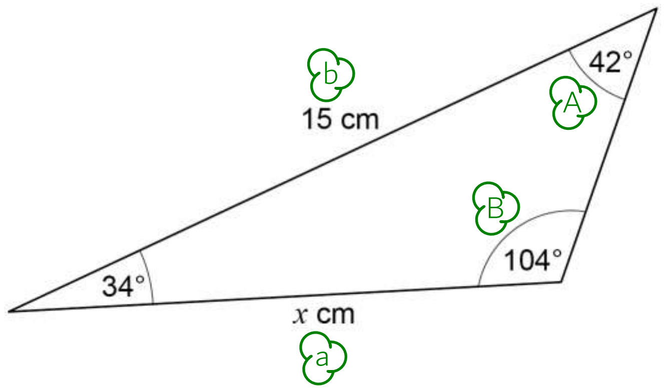
Circle the ratio $x : y$

[1 mark]

5 : 6 6 : 5 4 : 5 5 : 4

6 is 20% more than 5. 10% of 5 is 0.5 then multiplying this by 2 finds that 20% of 5 is 1. Adding this to the 5 gives 6

17 Here is a triangle.



Not drawn accurately

Circle the correct equation.

[1 mark]

$$\frac{\sin x}{42} = \frac{\sin 15°}{104} \qquad \frac{x}{\sin 42°} = \frac{15}{\sin 104°}$$

$$\frac{\sin x}{34} = \frac{\sin 15°}{104} \qquad \frac{x}{\sin 42°} = \frac{15}{\sin 34°}$$

The sine rule is a/sinA = b/sinB

5

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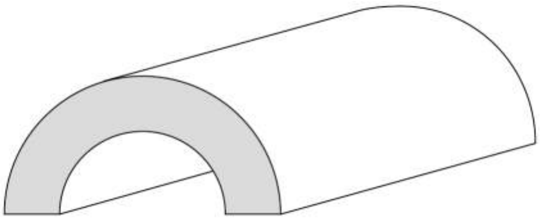
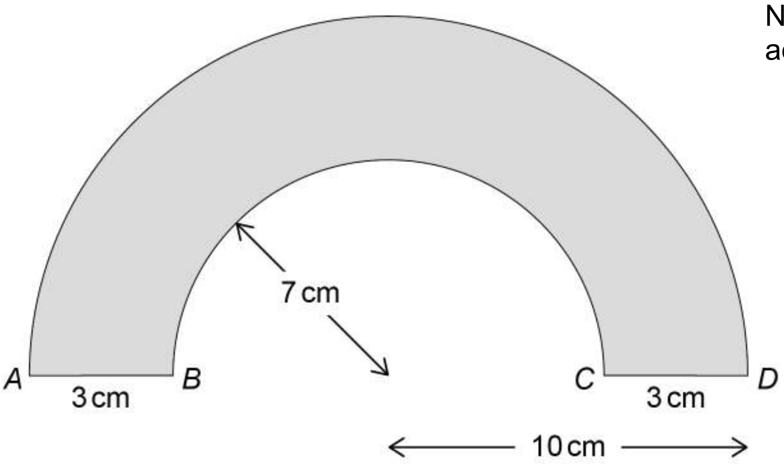
18 Here is a tunnel for a toy train.



The diagram below shows the cross section of the tunnel.



AD is a semicircular arc of radius 10 cm
BC is a semicircular arc of radius 7 cm
The length of the tunnel is 30 cm

Work out the total area of all **six** faces of the tunnel.

Give your answer in terms of π.

[5 marks]

Do not write outside the box

30×3 — The area of one of the rectangular bottom faces. Area of rectangle = length x width

$90 \times 2 = 180$ — Finding that the area of both of the rectangular bottom faces is 180 cm^2

$\pi \times 10^2$ — Area of circle = π x radius^2. The radius of the cross section is 10 cm so π x 10^2 expresses the area of the whole circle with diameter AD

$100\pi \div 2 = 50\pi$ — Dividing the area of the whole circle with diameter AD by 2 as the cross section is a semicircle. This works out that the area of the semicircle from A to D is 50π cm^2

$\pi \times 7^2$ — Area of circle = π x radius^2. The radius of the semicircle from B to C is 7 cm so π x 7^2 expresses the area of the whole circle with diameter BC

$\frac{100}{2}\pi - \frac{49}{2}\pi$ — Dividing the area of the whole circle with diameter BC to find that the area of the semicircle from B to C is 49/2 π cm^2. Subtracting the area of the semicircle from B to C from the semicircle from A to D gives the area of the cross section. Converting 50 to 50/1 then multiplying both the numerator and denominator by 2 converts 50π to 100/2 π, so that the 49/2 π can be subtracted from it now the denominators are the same

$\frac{51}{2}\pi \times 2 = 51\pi$ — The area of the cross section is 51/2 π cm^2. Multiplying this by 2 as there are 2 faces which are the cross section. So the area of both of the cross section faces is 51π cm^2

$\pi \times 10 \times 2$ — This expresses the circumference of the circle with diameter AD. Circumference = π x diameter. Diameter is double the radius

$20\pi \div 2$ — Dividing the circumference of the circle with diameter AD by 2 works out that the length of the semicircular arc AD is 10π cm

$10\pi \times 30 = 300\pi$ — Multiplying the length of the semicircular arc AD by the length of the tunnel works out that the area of the top curved face is 300π cm^2. The top curved face is basically a curved rectangle and area of rectangle = length x width

$\pi \times 7 \times 2$ — This expresses the circumference of the circle with diameter BC. Circumference = π x diameter. Diameter is double the radius

$14\pi \div 2$ — Dividing the circumference of the circle with diameter BC by 2 works out that the length of the semicircular arc BC is 7π cm

$7\pi \times 30 = 210\pi$ — Multiplying the length of the semicircular arc BC by the length of the tunnel works out that the area of the bottom curved face is 210π cm^2. The bottom curved face is basically a curved rectangle and area of rectangle = length x width

$$\begin{array}{r} 51 \\ +300 \\ +210 \\ \hline 561 \end{array}$$

Ignoring π and adding the area of the 2 faces which are cross sections, the top curved face and the bottom curved face

Answer $561\pi + 180$ cm^2

Putting π back in the answer and adding the area of both the rectangular bottom faces

5

Turn over ►

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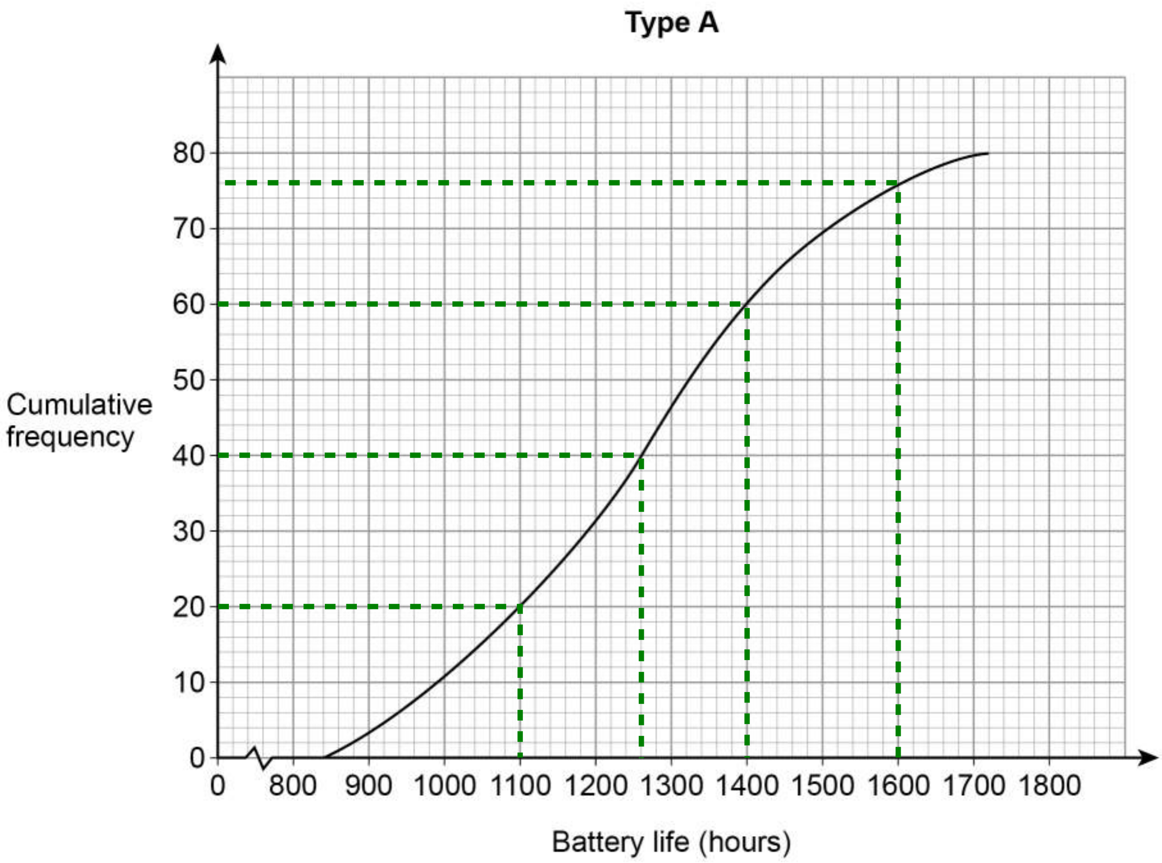
19 Type A batteries and type B batteries were tested.

The cumulative frequency diagram shows information about the battery life of type A.



19 (a) Estimate the interquartile range for type A.

[2 marks]

Answer 300 hours

There were 80 type A batteries. The lower quartile is 1/4 of the way through these so is about the 20th. Drawing a line from the cumulative frequency of 20 to the line then down works out an estimate of the lower quartile, which is 1100. The upper quartile is 3/4 of the way through the 80 so is about the 60th. Drawing a line from the cumulative frequency of 60 to the line then down works out an estimate of the upper quartile, which is 1400. Interquartile range = upper quartile - lower quartile. 1400 - 1100 = 300

Do not write outside the box

19 (b) Estimate the number of type A batteries that had a battery life of more than 1600 hours.

[1 mark]

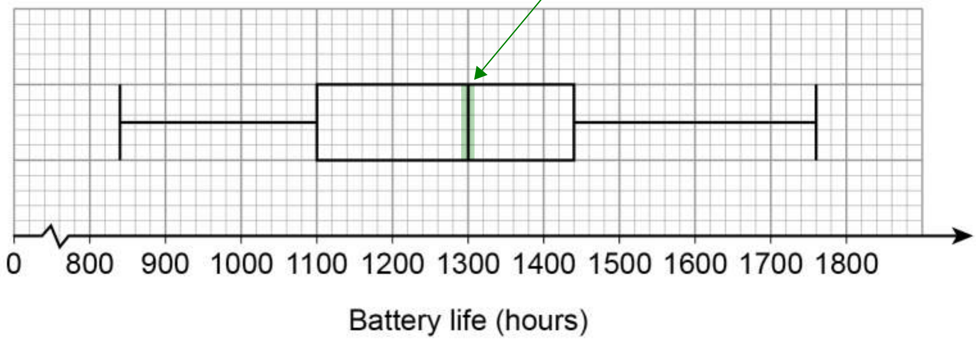
Drawing a line up from 1600 to the line and across works out an estimate of how many had a battery life of 1600 hours or less. This is 76 so the rest of the 80 batteries must have had more than 1600. 80 - 76 = 4

Answer 4

19 (c) The box plot shows information about the battery life of type B.

Type B

The median of type B



On average, which type had the greater battery life?

Tick a box.

☐ type A ☑ type B

Using data from **both** diagrams, state how you chose your answer.

[2 marks]

The median of type B is 1300. The median of type A is 1260

The median for type A is halfway through the 80 batteries so is about the 40th. Drawing a line across from 40 on the cumulative frequency to the line then down works out an estimate of the median of type A

5

Do not write outside the box

20 A linear sequence starts

$a + 2b$ $a + 6b$ $a + 10b$ …….. ……..

The 2nd term has value 8

The 5th term has value 44

Work out the values of a and b.

[4 marks]

$a+6b=8$ ← The 2nd term has value 8. This forms the first equation

$a+18b=44$ ← The sequence increases by 4b between each term. 10b + 4b + 4b = 18b so the 5th term is a + 18b, which has a value of 44. This forms the second equation

$12b=36$ ← Solving the equations simultaneously. Subtracting the first equation from the second equation eliminates the a terms. 18b - 6b = 12b. 44 - 8 = 36

Dividing both sides of 12b = 36 by 12 works out that b = 3

$a=8-6\times3$ ← Subtracting 6b from both sides in the first equation makes a the subject and gives a = 8 - 6b. Substituting 3 for b

a = 8 - 18 = -10

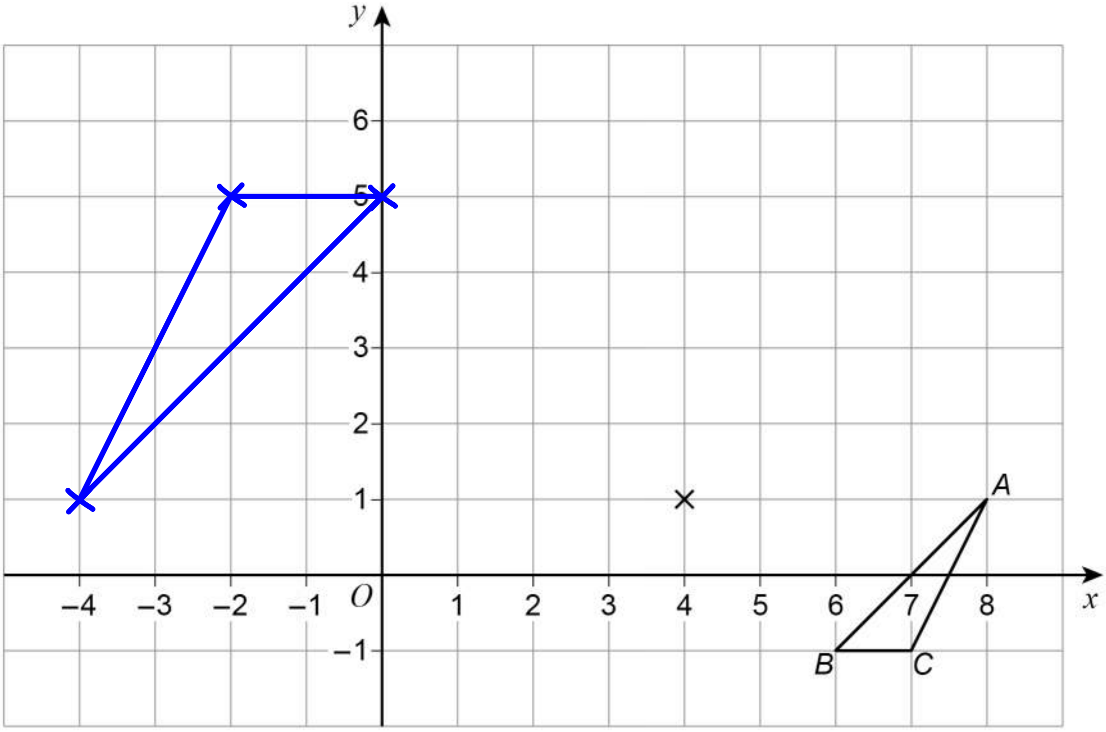
$a =$ -10

$b =$ 3

21 Enlarge triangle *ABC* by scale factor –2, centre (4, 1)

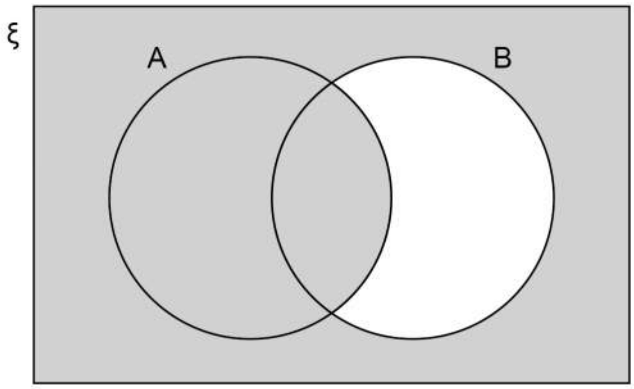
[2 marks]

$\begin{pmatrix}4\\0\end{pmatrix} \times -2 = \begin{pmatrix}-8\\0\end{pmatrix}$ $\begin{pmatrix}2\\-2\end{pmatrix} \times -2 = \begin{pmatrix}-4\\4\end{pmatrix}$ $\begin{pmatrix}3\\-2\end{pmatrix} \times -2 = \begin{pmatrix}-6\\4\end{pmatrix}$



Expressing the vectors from the centre of enlargement to points A, B and C then multiplying each of them by -2 works out the new vectors from the centre of enlargement

22

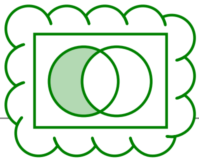
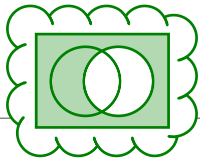
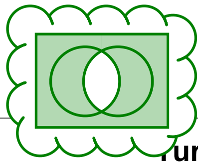


Which of these represents the shaded region?

Circle your answer.

[1 mark]

A ∩ B′ B′ A U B′ A′ U B′

7

Do not write outside the box

23 A shopkeeper compares the income from sales of a laptop in March and April.

April

Price	$\frac{1}{5}$ more than March
Number sold	$\frac{1}{4}$ less than March

By what fraction does the income from these sales decrease in April?

[3 marks]

$\frac{6}{5} \times \frac{3}{4} = \frac{18}{20}$

Multiplying the price by the number sold works out the income. The price increases to 6/5 of the price in March and the number sold decreases to 3/4 of the number sold in March. So multiplying these fractions by multiplying the numerators and denominators works out that the income reduces to 18/20 of March

Answer $\frac{2}{20}$

18/20 is 2/20 less than 20/20 (which is 1 and represents the whole amount of the income in March)

Do not write outside the box

24 (a) Work out the value of $2^{14} \div \left(2^9\right)^2$

Give your answer as a fraction in its simplest form.

[3 marks]

$2^{14} \div 2^{18}$ ← $(2^9)^2 = 2^{9 \times 2} = 2^{18}$

2^{-4} ← $2^{14} \div 2^{18} = 2^{14-18} = 2^{-4}$

Answer $\frac{1}{16}$

24 = 16. The negative power means to do the reciprocal

24 (b) Work out the value of $25^{\frac{3}{2}}$

[2 marks]

5^3 ← The denominator of 2 as a power means to do the square root

Answer 125

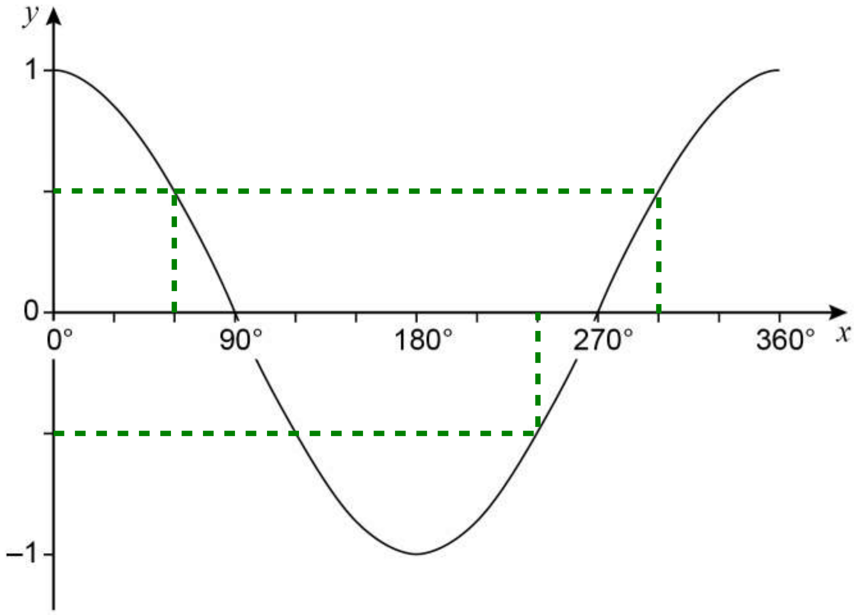
The numerator of 3 as a power means to cube

Turn over for the next question

8

Do not write outside the box

25 Here is a sketch of the graph of $y = \cos x$ for values of x from 0° to 360°



25 (a) $\cos x = \cos 60°$

Work out the value of x when $90° \leqslant x \leqslant 360°$

[1 mark]

Answer 300 degrees

From the graph, cos60 = 1/2. cos300 is also equal to 1/2

25 (b) $\cos x = -\cos 60°$

Work out the value of x when $180° \leqslant x \leqslant 360°$

[1 mark]

Answer 240 degrees

cos60 = 1/2 so -cos60 = -1/2. cos240 is also equal to -1/2 and is within 180° ⩽ x ⩽ 360°

Do not write outside the box

26 b is two thirds of c.

$5a = 4c$

Work out the ratio $a : b : c$

Give your answer in its simplest form where a, b and c are integers.

[3 marks]

$4 : \frac{10}{3} : 5$

Writing the ratio a : b : c. From the equation 5a = 4c, a could be 4 and c could be 5. If c is 5, b is 2/3 x 5 = 10/3

Answer 12 : 10 : 15

Multiplying all sides of the ratio by 3 eliminates the denominator to get integers. They cannot be divided by the same amount to get smaller whole numbers so this is the simplest form

Turn over for the next question

5

Do not write outside the box

27 (a) Jo wants to work out the solutions of $x^2 + 3x - 5 = 0$

She says,

"The solutions **cannot** be worked out because
$x^2 + 3x - 5$ does **not** factorise to $(x + a)(x + b)$ where a and b are integers."

Is Jo correct?

Tick a box.

☐ Yes ☑ No

Give a reason for your answer.

[1 mark]

Could use the quadratic formula ← $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

27 (b) **Without** expanding any brackets,

show how to work out the **exact** solutions of $9(x + 3)^2 = 4$

Give the solutions.

[3 marks]

$(x+3)^2 = \frac{4}{9}$ ← Dividing both sides by 9 to eliminate the 9 on the left

$x+3 = \pm\frac{2}{3}$ ← Square rooting both sides eliminates the power of 2 on the left. Doing the positive and negative square root on the right

$x = \pm\frac{2}{3} - \frac{9}{3}$ ← Subtracting 3 from both sides to eliminate the 3 from the left and make x the subject. Converting the 3 into 9/3 so that it can be subtracted from the other fraction

$x = -\frac{7}{3}$

$x = -\frac{11}{3}$

These are the solutions of x

Do not write outside the box

28 Simplify $\sqrt{80} + \sqrt{2\frac{2}{9}}$

Give your answer in the form $\dfrac{a\sqrt{5}}{b}$ where a and b are integers.

[3 marks]

$\sqrt{4} \times \sqrt{20} = \sqrt{4} \times \sqrt{4} \times \sqrt{5} = 4\sqrt{5}$

Simplifying $\sqrt{80}$ by using $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$ in reverse. $\sqrt{4} \times \sqrt{4} = 4$

$\sqrt{\dfrac{20}{9}} = \dfrac{2\sqrt{5}}{3}$

Expressing the mixed number as an improper fraction then square rooting the numerator and denominator. Simplifying $\sqrt{20}$

$\dfrac{12\sqrt{5}}{3} + \dfrac{2\sqrt{5}}{3}$

Multiplying $4\sqrt{5}$ by 3 and putting it over 3 to convert it into a fraction with the same denominator so they can be added

Answer $\dfrac{14\sqrt{5}}{3}$

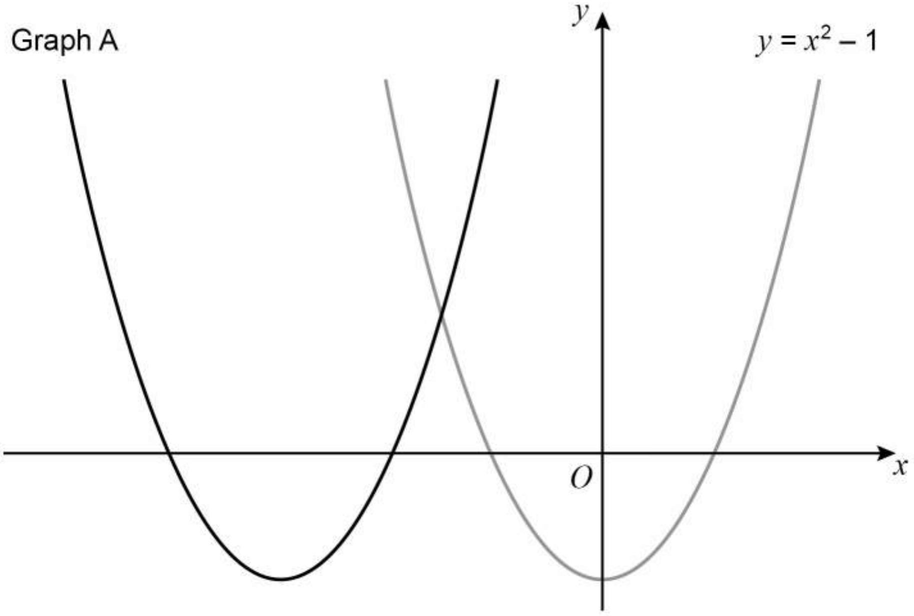
Adding the numerators and the denominator stays the same. $12\sqrt{5} + 2\sqrt{5} = 14\sqrt{5}$

Turn over for the next question

7

Do not write outside the box

29 Here are sketches of two graphs.



The graph of $y = x^2 - 1$ is translated 3 units to the left to give graph A.

29 (a) The equation of graph A can be written in the form $y = x^2 + bx + c$

Work out the values of b and c.

[3 marks]

$(x+3)^2-1$ ← Adding 3 to x translates the graph 3 units to the left

$x^2+6x+9-1$ ← Expanding the square bracket by squaring the first term, doubling the product of the two terms and squaring the last term

$b =$ 6

$c =$ 8

The equation is $y = x^2 + 6x + 8$

Do not write outside the box

29 (b) The graph of $y = x^2 - 1$ is reflected in the x-axis to give graph B.

Work out the equation of graph B.

[1 mark]

Answer $y = -x^2 + 1$

Changing the sign of all of the terms on the right reflects the graph in the x-axis

30 Show that the value of $\cos 30° \times \tan 60° + \sin 30°$ is an integer.

[3 marks]

0	30	45	60	90
0	1	2	3	4
4	3	2	1	0

Working out the trig values needed by writing out 0, 30, 45, 60, 90 degrees and writing 0, 1, 2, 3, 4 under these for the sin values and 4, 3, 2, 1, 0 for the cos values. Square rooting them and putting them over 2 works out the trig values for the sin and cos. So cos30 =√3/2, sin30 = 1/2, sin60 =√3/2 and cos 60 = 1/2

$\frac{\sqrt{3}}{2} \div \frac{1}{2}$ Dividing sin60 by cos60 works out tan60

$\frac{\sqrt{3}}{2} \times \frac{2}{1}$ To divide by a fraction: keep the first number, change the division to a multiply, flip the fraction. So tan60 =√3

$\frac{\sqrt{3}}{2} \times \sqrt{3} + \frac{1}{2}$ Substituting in the values of cos30 tan60 and sin30

$\frac{3}{2} + \frac{1}{2}$ √3 x √3 = 3

$\frac{4}{2}$ Adding the numerators and the denominator stays the same

2 4/2 = 2, which is an integer

END OF QUESTIONS

7