.CG Maths.
Worked Solutions

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
MATHEMATICS

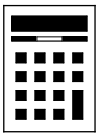
F

Foundation Tier Paper 2 Calculator

Monday 6 November 2017 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a calculator
- mathematical instruments.



Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- 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	
TOTAL	

N O V 1 7 8 3 0 0 2 F 0 1

IB/M/Nov17/E10

8300/2F

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

1 How many minutes are there in $2\frac{1}{4}$ hours?

Circle your answer.

[1 mark]

135 145 215 225

There are 60 minutes in an hour so multiplying the $2^1/_4$ hours by 60 converts it into 135 minutes

2 Which of these numbers is **half** of a square number?

Circle your answer.

[1 mark]

1 2 3 4

Multiplying each of the numbers by 2, as this is the opposite of halving, to see if it gives a square number. 2 x 2 = 4, which is a square number as it is 2^2

3 Circle the value of the digit 3 in the number 17.03

[1 mark]

$\frac{3}{10}$ $\frac{1}{30}$ $\frac{3}{100}$ $\frac{1}{300}$

The 3 is in the hundredths place

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4 The value of A is double the value of B.

Circle the correct formula.

[1 mark]

$A = B + 2$ $\quad$ $A = 2B$ $\quad$ $A = \frac{B}{2}$ $\quad$ $A = B^2$

Double means to multiply by 2. A = 2 x B

5 (a) Simplify $y \times y$

[1 mark]

Answer y^2

y is multiplied by itself so it is squared

5 (b) Simplify $5a + 2 - a + 9$

[2 marks]

Answer $4a + 11$

Collecting the like terms. 5a - a = 4a. 2 + 9 = 11

Turn over for the next question

7

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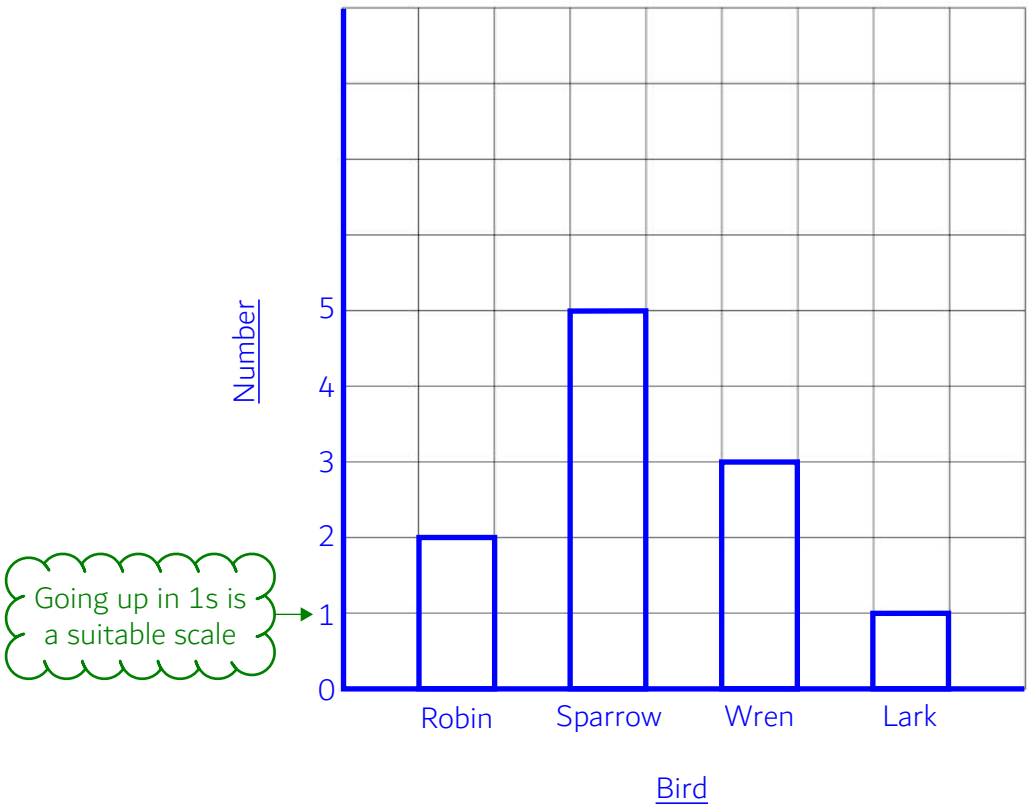
6 The table shows information about the birds in a garden.

Bird	Number
Robin	2
Sparrow	5
Wren	3
Lark	1

Draw a bar chart to show the information.

[3 marks]



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7 Eve has these coins.

Ola has these coins.

Eve gives **three** of her coins to Ola.

Now, Ola has the same amount of money as Eve.

Which coins does Eve give to Ola?

[3 marks]

2+1+0.50+0.20+0.20+0.05+0.02=3.97 ← Adding all the coins Eve has works out that Eve has £3.97. Writing the pence in pounds. For example, 20p is £0.20

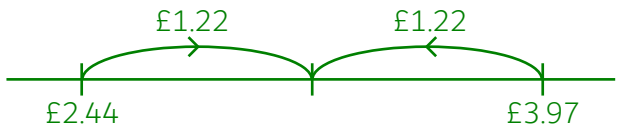
1+0.50+0.02+0.01 ← Adding all the coins Ola has works out that Ola has £1.53. Writing the pence in pounds. For example, 2p is £0.02

3.97−1.53 ← Subtracting the £1.53 Ola has from the £3.97 Eve has works out that the difference in the amount of money they have is £2.44

2.44÷2 ← Dividing the difference of £2.44 by 2 halves the difference and so works that Eve gives Ola £1.22

To make the £1.22 which Eve gives Ola, the £1, 20p and 2p must be given

Answer £1 , 20p , 2p



Eve losing £1.22 and Ola gaining £1.22 means that they will meet halfway so will have the same amount

6

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8 A dry cleaning shop has the following offers.

Suit

Normal price £12.50
1st suit normal price
2nd suit half price

Dress

Normal price £9.75
Three for the price of two

Work out the **total** price for 2 suits and 6 dresses.

[4 marks]

12.50÷2 ← Dividing the £12.50 normal price of a suit by 2 works out that the 2nd suit at half price is £6.25

12.50+6.25=18.75 ← Adding the price of the 1st suit and the price of the second suit works out that the price for 2 suits is £18.75

9.75×4 ← 6 dresses is 2 lots of 3. So the offer for the dresses can be used 2 times. 2 x 2 = 4 so 4 dresses are paid for. Multiplying the £9.75 normal price of a dress by 4 works out that the price of 6 dresses is £39

18.75+39 ← Adding the £18.75 price of 2 suits and the £39 price of 6 dresses works out that the total price for 2 suits and 6 dresses is £52.75

Answer £ 57.75

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9 Karl has twin sisters.

The sum of the ages of Karl and his twin sisters is 39

In 4 years' time the twins will be 18

How old will Karl be in 4 years' time?

[3 marks]

18-4 ← Subtracting 4 years from the 18 years of age the twins will be in 4 years' time works out that the twins are currently 14 years old

14x2 ← Multiplying the each of each twin by 2 works out that the total age of both twins is 28 years

39-28 ← Subtracting the total age of both twins from the sum of the ages of Karl and his twin sisters works out that Karl is currently 11 years old

11+4 ← Adding 4 years to Karl's current age works out that Karl will be 15 years old in 4 years' time

Answer 15

Turn over for the next question

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10 One of the angles in a triangle is 60°

Tick a box for each statement.

	Must be true	Cannot be true	Might be true
The triangle is equilateral			✓
The triangle has at least one other acute angle	✓		
The triangle is right-angled			✓
The other two angles are each less than 60°		✓	

[4 marks]

The triangle could be equilateral (all angles and sides are the same) as there are 180 degrees in total in a triangle and 180 ÷ 3 = 60, so each angle would need to be 60 degrees. One of the angles is 60 degrees and the other two angles could be 60 degrees as well. It is not certain as the other angles might not be 60 degrees.

The triangle must have at least one other acute angle as if the other two angles were not less than 90 degrees there would be more than 180 degrees in total and triangles only have 180 degrees in total.

The triangle could be right-angled as if one angle is 60 degrees and another is 90 degrees (a right-angle), the other would be 30 degrees as there are 180 degrees in total in a triangle and 180 - 60 - 90 = 30. It is not certain as none of the angles have to be 90 degrees.

The other two angles cannot be both less than 60 degrees as there wouldn't be 180 degrees in total in the triangle. For example, 60 + 59 + 59 = 178, which is less than 180

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11 Which of these numbers has **exactly** two factors?

Circle your answer.

[1 mark]

6 (7) 8 9

The factors of 7 (the whole numbers 7 is divisible by) are 1 and 7. So 7 has exactly two factors

12 Work out $\sqrt{7.5^2 + 18^2}$

Circle your answer.

[1 mark]

(19.5) 25.5 331.5 380.25

Putting it into the calculator exactly as it is and formatting the result as a decimal gives 19.5

13 (a) Use your calculator to work out the exact value of $\frac{18\,953 \times 437}{11}$

[1 mark]

Answer 752951

Putting it into the calculator exactly as it is gives 752951

13 (b) Use approximations to 1 significant figure to check if your answer to part (a) is sensible.

[3 marks]

$\frac{20000 \times 400}{10}$ ← 18953 to 1 significant figure is 20000. 437 to 1 significant figure is 400. 11 to 1 significant figure is 10

800000 ← Putting it into the calculator exactly as it is gives 800000

Yes ← 752951 is relatively close to 800000 so it is sensible

10

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14 Chris sells lawnmowers.

The table shows the number he sold each quarter for three years.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
2016	17	64	50	5	= 136
2015	9	72	61	1	= 143
2014	19	58	53	2	= 132
	45	194	164	8	

14 (a) In which year did he sell the most lawnmowers?

You **must** show your working.

[2 marks]

136 were sold in 2016.
143 were sold in 2015.
132 were sold in 2014

Answer 2015

143 was the most, which was in 2015

14 (b) He uses the table to decide the number of lawnmowers to stock each quarter.

At the **start** of which quarter should Chris stock the most lawnmowers?
Circle your answer.

[1 mark]

Quarter 1 (Quarter 2) Quarter 3 Quarter 4

45 were sold in total for quarter 1.
194 were sold in total for quarter 2.
164 were sold in total for quarter 3.
8 were sold in total for quarter 4.
194 was the most, which was quarter 2, so Chris should stock the most lawnmowers at the start of quarter 2

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15 In a test,

Section A has 80 marks

Section B has 120 marks.

Riya scores

55% in Section A

70% in Section B.

To pass, Riya needs to score 65% of the **total** marks.

Does she pass?

You **must** show your working.

[4 marks]

$\frac{55}{100} \times 80 = 44$ ← Putting the 55% over 100 converts it to a fraction, which finds that 55% of the 80 marks in Section A is 44 when multiplied by the total 80 marks in Section A

$\frac{70}{100} \times 120$ ← Putting the 70% over 100 converts it to a fraction, which finds that 70% of the 120 marks in Section B is 84 when multiplied by the total 120 marks in Section B

$44 + 84 = 128$ ← Adding the 44 marks Riya got in Section A and the 84 marks which Riya got in Section B works out that she got 128 marks in total

$80 + 120$ ← Adding the 80 marks in Section A and the 120 marks in Section B works out that the total marks is 200

$\frac{65}{100} \times 200 = 130$ ← Putting the 65% over 100 converts it to a fraction, which finds that 65% of the 200 marks in total is 130 when multiplied by the total 200 marks

Answer No

Riya needed 130 marks to pass and only got 128 marks so she did not pass

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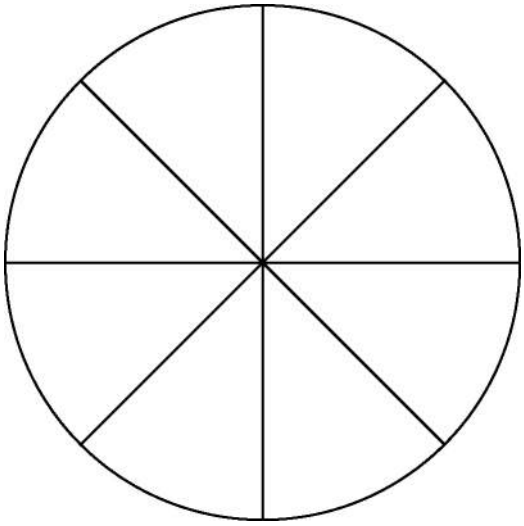
16 A wheel is made of a circular rim and 8 spokes as shown.



Not drawn accurately

The length of each spoke is 37 cm

Work out the **total** length of the rim and spokes.

[3 marks]

37×8=296 ← Multiplying the 37 cm length of each spoke by the 8 spokes works out that the total length of the spokes is 296 cm

37×2 ← The length of a spoke is the radius as each spoke goes from the centre to the outside of the circle. Multiplying the 37 cm by 2 works out that the diameter of the circle is 74 cm

π×74 ← The length of the rim is the circumference of the circle. Circumference = π x diameter. So the length of the rim is 74π cm

296+74π ← Adding the total length of the spokes and the length of the rim gives the total length of the rim and the spokes

Answer 528.5 cm

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17 Here is a formula to convert degrees Celsius (°C) to degrees Fahrenheit (°F).

$$F = 1.8C + 32$$

F is the number of degrees Fahrenheit

C is the number of degrees Celsius

17 (a) Show that –40°C = –40°F

[2 marks]

$1.8 \times -40 + 32 = -40$ ← Substituting -40 for C in the right side converts -40°C to -40°F

17 (b) The temperature is –15°C

Nick says,

"Because the temperature is negative in Celsius, it **must** be negative in Fahrenheit."

Is he correct?

You **must** show your working.

[1 mark]

$1.8 \times -15 + 32 = 5$ ← Substituting -15 for C in the formula converts -15°C into 5°F, which is not negative

Answer No

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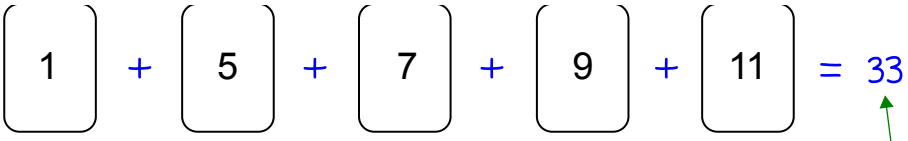
18 Here are five cards.



Adding all the cards works out that their total is 33

One of the cards is removed.

The mean of the numbers on the remaining four cards is 6

Which card was removed?

You **must** show your working.

[3 marks]

m t n

Writing the formula triangle for mean, total, number

6x4

Covering t in the formula triangle finds that total = mean x number. So multiplying the mean of 6 by the 4 cards works out that their total is 24

33-24

Subtracting the total of the remaining 4 cards from the total of all 5 cards works out that the difference is 9 so the 9 must have been removed

Answer 9

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19 (a) Divide 120 in the ratio 1 : 4

[2 marks]

1+4 ← Adding the 1 part and the 4 parts in the ratio works out that there are 5 parts in total which represent the 120

120÷5 ← Dividing the 120 by the 5 parts works out that 1 part of the ratio is worth 24. So the first amount must be 24

24×4 ← Multiplying the value of 1 part of the ratio by 4 works out that the 4 parts represent 96

Answer 24 : 96

19 (b) Write the ratio 7 : 4 in the form n : 1

[1 mark]

To make an equivalent ratio, all sides of the ratio need to be multiplied or divided by the same amount. 4 was divided by 4 to get 1 so the 7 needs to be divided by 4

Answer $\frac{7}{4}$: 1

Turn over for the next question

6

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20 In 2015, Han was paid £1350 per month.

In 2016, he

had a 2% increase in his monthly pay

worked 37.5 hours per week

worked for 47 weeks.

Work out Han's average pay **per hour** for 2016

[5 marks]

$\frac{2}{100} \times 1350$ ← Putting the 2% over 100 converts it into a fraction, which when multiplied by the £1350 finds that 2% of £1350 is £27

$1350 + 27$ ← Adding the £27 onto the £1350 works out that in 2016 his monthly pay was £1377

1377×12 ← There are 12 months in a year so multiplying the £1377 by 12 works out that his pay for the whole year of 2016 was £16524

$16524 \div 47$ ← Dividing the £16524 by the 47 weeks works out that his pay per week was £352.57...

$351.5... \div 37.5$ ← Dividing the £352.57... by the 37.5 hours worked per week works out that Han's average pay per hour for 2016 was £9.38 when rounded to the nearest pence

Answer £ 9.38

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21 An experiment is carried out 200 times.

The possible outcomes are K, L and M.

21 (a) Complete the table.

[2 marks]

Outcome	K	L	M
Frequency	84	54	62
Relative frequency	0.42	$\frac{54}{200}$	$\frac{62}{200}$

Subtracting the frequency of K and L from the 200 times the experiment was carried out must leave the frequency of M. 200 - 84 - 54 = 62. The relative frequencies can be left as fractions of the amount of times each outcome happened

21 (b) Altogether, the experiment is carried out 500 times.

How many times would you expect the outcome to be K?

[2 marks]

0.42×500

The relative frequency is the proportion of the times each outcome happened. We can estimate that the relative frequency will stay the same for more experiments. Doing this proportion of the 500 times works out an estimate of the number of times K will happen

Answer 210

Turn over for the next question

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22 The table shows information about the UK and Germany.

	Population	Area (square miles)
UK	64 000 000	95 000
Germany	82 000 000	140 000

64 000 000 ÷ 95 000 = 674

82 000 000 ÷ 140 000 = 586

Dividing the populations by the area works out the population densities

Population density = $\frac{\text{population}}{\text{area}}$

Compare the population densities of the UK and Germany.

[3 marks]

Greater for UK ← 674 is greater than 586

23 Which **one** of the following is discrete data?

Circle your answer.

[1 mark]

Mass of a television

Time taken to deliver a television

Height of a television mast

Number of televisions sold

Discrete data can only be certain values. It cannot be any value. Number of televisions sold can only be whole numbers

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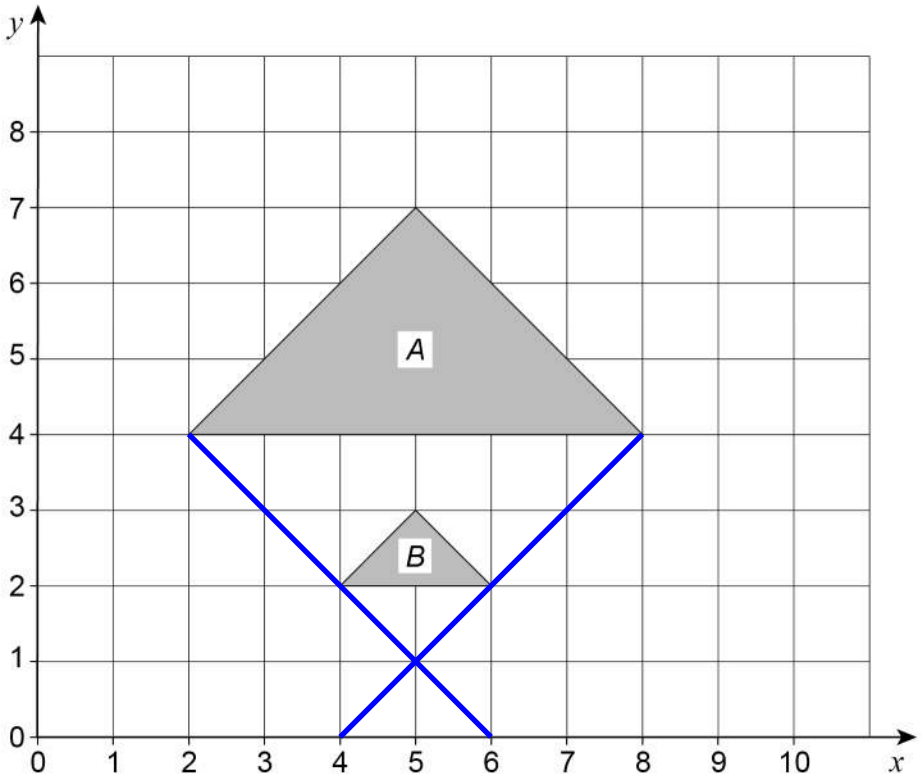
24 Describe fully the **single** transformation that maps triangle *A* to triangle *B*.



[3 marks]

Enlargement, scale factor 1/3, centre (5, 1)

It is an enlargement as it has changed size. The scale factor is 1/3 as the sides are 1/3 of the size on B and the shape is the same way up. Drawing lines through the corners of both shapes then finding where they cross works out the centre of enlargement

Turn over for the next question

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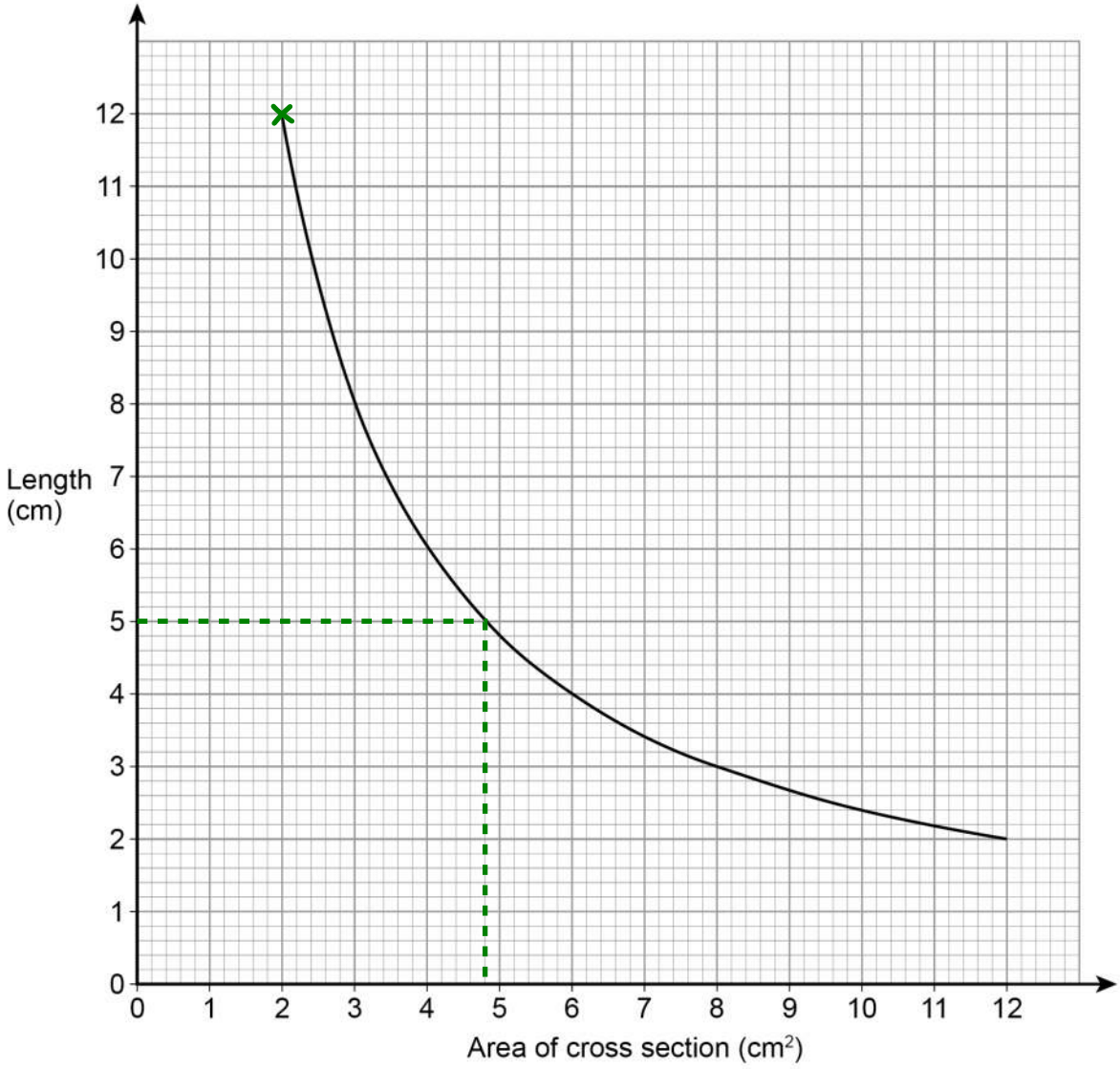
25 The graph shows information about prisms with the same volume.



25 (a) Give **one** example to show the volume is 24 cm^3

[1 mark]

2X12=24

Volume of prism = area of cross section x length. At the point indicated, the area of cross section is 2 cm^2 and the length is 12 cm. Multiplying these gives a volume of 24 cm^3

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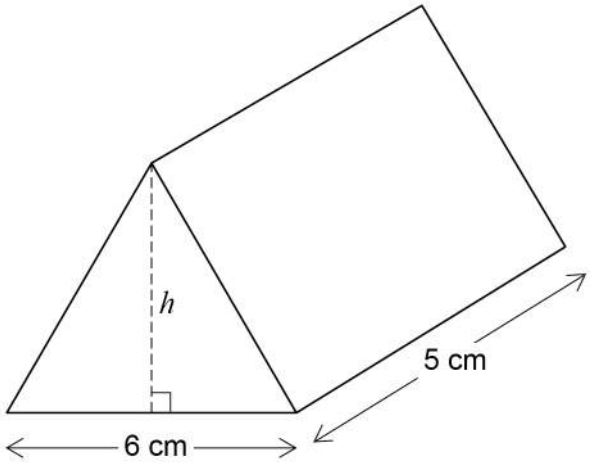
25 (b) The diagram shows a prism with volume 24 cm^3

The height of the triangular cross section is h.



Work out the height, h.

[3 marks]

$4.8=\frac{1}{2}\times 6\times h$

On the graph, reading across from the length of 5 cm to the line then down finds that the the cross sectional area of the prism must be 4.8 cm^2. Setting this equal to the area of the triangle as this shape is the cross section. Area of triangle = 1/2 x base x height. The base is 6 cm and the height is h so substituting these in

$=3h$

1/2 x 6 = 3, then 3 x h = 3h. So 4.8 = 3h

Answer 1.6 cm

Dividing both sides by 3 finds that h = 1.6 cm

Turn over for the next question

4

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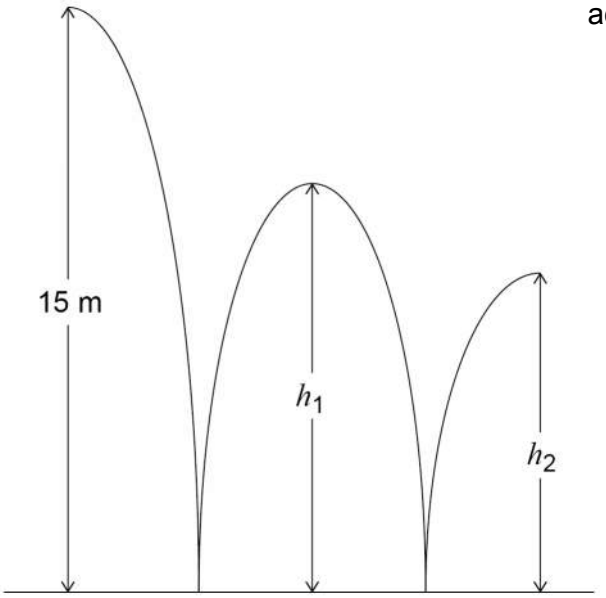
26 A ball is thrown from a height of 15 metres.

It bounces to height h_1, then to height h_2 as shown.

Not drawn accurately



h_1 is three quarters of the original height.

26 (a) Jack expects h_2 to be three quarters of h_1

Work out the value of h_2 that he expects.

[2 marks]

$\frac{3}{4} \times 15$ ← Doing 3/4 of the original height works out that h_1 is 11.25 m. Of means to multiply

$\frac{3}{4} \times 11.25$ ← Doing 3/4 of h_1 works out that h_2 is 8.4... m. Of means to multiply

Answer 8.4 metres

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26 (b) In fact, h_2 is two thirds of h_1

How does this affect the answer to part (a)?

Tick a box.

☐ The ball bounced higher than he expected

☑ The ball bounced lower than he expected

Show working to support your answer.

[2 marks]

$\frac{2}{3} \times 11.25 = 7.5$ ← Doing 2/3 of h_1 works out that h_2 is now 7.5 m, which is lower than the 8.4 m expected. Of means to multiply

Turn over for the next question

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27 Solve $4(3x - 2) = 2x - 5$

[3 marks]

$12x - 8 = 2x - 5$ ← Expanding the bracket

$10x - 8 = -5$ ← Subtracting 2x from both sides to get the x terms on the side with the most x

$10x = 3$ ← Adding 8 to both sides to get the x term on its own

$x =$ $\frac{3}{10}$

Dividing both sides by 10 makes x the subject and finds x

28 Work out the next term of this quadratic sequence.

[2 marks]

5 (+3) 8 (+6) 14 (+9) 23 (+12) ……

23+12

The amount added increases by 3 each time

Answer 35

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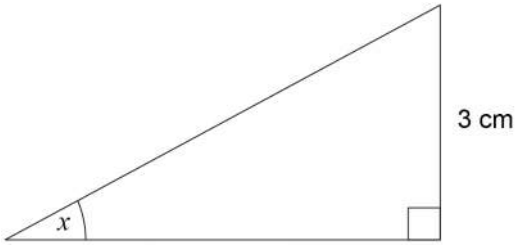
29 Work out the size of angle x.

Not drawn accurately



[2 marks]

SOH CAH TOA

Right angled trigonometry can be used. Ticking O as we have the opposite and A as we have the adjacent. There are two ticks on TOA so this formula triangle can be used

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

Covering t in the TOA formula triangle finds that tan of the angle = opposite/adjacent. The opposite is 3 cm and the adjacent is 7 cm

$x = \tan^{-1}\left(\frac{3}{7}\right)$

Doing the inverse tan of both sides gets x on its own

Answer 23.2 degrees

END OF QUESTIONS

7

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