AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

Model Solutions

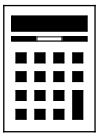
F

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	

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Answer **all** questions in the spaces provided

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

60 minutes in 1 hour

2 hours = 60 × 2 = 120 minutes

$\frac{1}{4}$ hour = $\frac{60}{4}$ = 15 minutes

Circle your answer. **[1 mark]**

135 145 215 225

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

Circle your answer. **[1 mark]**

2 × 2 = 4

4 ÷ 2 = 2

1 2 3 4

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

0.03 = $\frac{3}{100}$

[1 mark]

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

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

Circle the correct formula. A is 2× the value of B

[1 mark]

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

5 (a) Simplify $y \times y$

[1 mark]

$y \times y = y^2$

Answer y^2

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

[2 marks]

$5a + 2 - a + 9$

$= (5a - a) + (2 + 9)$

$= 4a + 11$

Answer $4a + 11$

Turn over for the next question

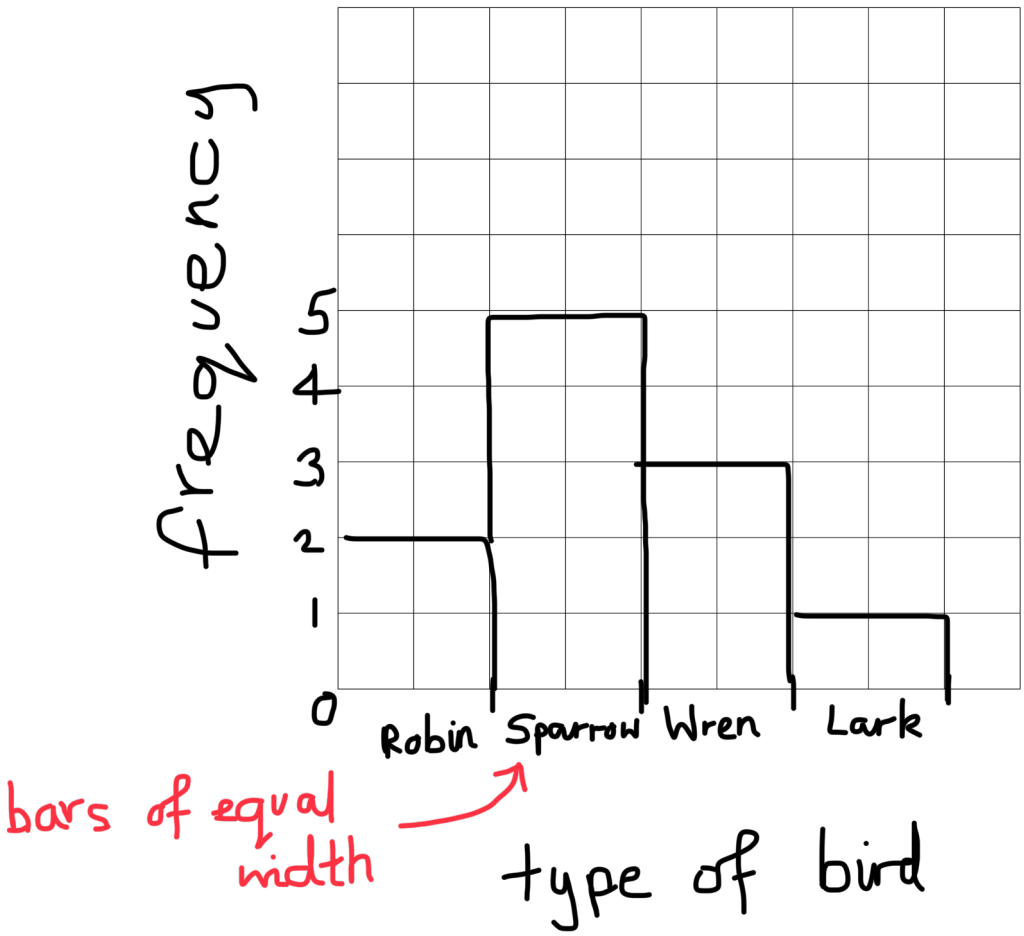
7

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]

Eve : £2 + £1 + 50p + 20p + 20p + 5p + 2p = £3 + 97p = £3.97

Ola : £1 + 50p + 2p + 1p = £1.53

$\frac{£3.97 + £1.53}{2} = \frac{£5.50}{2} = £2.75$

£3.97 - £2.75 = £1.22 so Eve gives £1.22 away.

This is from the coins £1, 20p and 2p = £1.22

Answer £1 , 20p , 2p

Turn over for the next question

6

Do not write outside the box

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]

2 suits = 1 normal price + 1 half price

cost = £12.50 + $\frac{£12.50}{2}$

= £18.75

6 dresses = 2 × (3 for the price of 2)

= cost of 4 dresses

£9.75 × 4 = £39

total cost = £18.75 + £39

= £57.75

Answer £ 57.75

Do not write outside the box

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]

age of Karl = K

age of 1 sister = S

① $K + 2S = 39$

② $S = 18 - 4 = 14$

② into ① $K + 2(14) = 39$

$K + 28 = 39$

$K = 11$

So in 4 years time, Karl will be $11 + 4 = 15$

Answer 15

Turn over for the next question

7

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
1	The triangle is equilateral			✓
2	The triangle has at least one other acute angle	✓		
3	The triangle is right-angled			✓
4	The other two angles are each less than 60°		✓	

[4 marks]

1 → the other 2 angles could be 60°.

2 → the remaining angles add to 180 - 60 = 120, so at least one of them must be less than 90°

3 → the angles could be 60°, 90° and 30°

4 → the other 2 angles need to add to 120°, if they are both less than 60° this is not possible.

60 + 60 = 120°

e.g. 59 + 59 = 118°

Do not write outside the box

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

Circle your answer.

factors of 6 : 1, 2, 3, 6
factors of 7 : 1, 7

[1 mark]

6 | (7) | 8 | 9

12 Work out $\sqrt{7.5^2 + 18^2}$ $= \sqrt{56.25 + 324} = \sqrt{380.25}$

$= 19.5$

Circle your answer.

[1 mark]

(19.5) | 25.5 | 331.5 | 380.25

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

$= \frac{8282461}{11} = 752951$

[1 mark]

Answer 752951

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

[3 marks]

$18\,953 = 20000$ (1.s.f)

$437 = 400$ (1.s.f)

$11 = 10$ (1.s.f)

$\frac{20000 \times 400}{10} = 800000$

so Yes, answer to part (a) is suitable.

$752951 = 800000$ (1.s.f)

10

Do not write outside the box

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
2015	9	72	61	1
2014	19	58	53	2

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

You **must** show your working.

2016 total → 17+64+50+5 = 136 **[2 marks]**

2015 total → 9 +72+ 61 +1 = 143

2014 total → 19 + 58 + 53 + 2 = 132

so sells the most in 2015

Answer 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. for all 3 years, this is the quarter when he sells the most lawnmowers. **[1 mark]**

Quarter 1 Quarter 2 Quarter 3 Quarter 4

Do not write outside the box

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]

$80 \times 0.55 = 44$

so scores 44 marks in section A

$120 \times 0.7 = 84$

so scores 84 marks in section B

$\frac{44+84}{80+120} = \frac{128}{200}$

$\frac{128}{200} \times 100 = 64\%$

Answer Needs 65% to pass, so No she does not pass.

7

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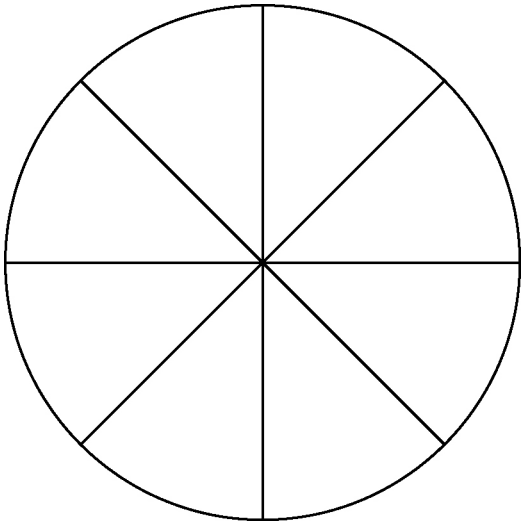
16 A wheel is made of a circular rim and 8 spokes as shown.



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The length of each spoke is 37 cm

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

[3 marks]

total length of spokes:
$8 \times 37 = 296$ cm
length of rim is the circumference
$2\pi \times 37 = 74\pi$
so total length $= 296 + 74\pi$ cm

Answer $296 + 74\pi$ 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]

When $C = -40$

$F = 1.8(-40) + 32$

$= -40$

hence $-40°C = -40°F$

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]

when $C = -15$

$F = 1.8(-15) + 32$

$F = -27 + 32 = 5$

Answer No he is not correct because 5°F is positive.

6

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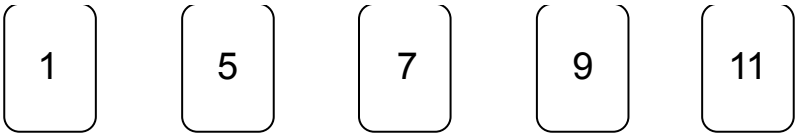
18 Here are five cards.



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]

$6 \times 4 = 24$

The remaining 4 cards add to 24

$1 + 5 + 7 + 11 = 24$

hence the card with 9 on was removed.

Answer 9

Do not write outside the box

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

[2 marks]

$\frac{120}{1+4} = \frac{120}{5} = 24$

1 : 4

×24 ↓ ×24

24 : 96

$24 + 96 = 120$

Answer 24 : 96

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

[1 mark]

7 : 4

÷4 ↓ ÷4

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

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

Turn over for the next question

6

Do not write outside the box

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]

per month : £1350 × 1·02 = £1377

total earnt in 2016 = £1377 × 12 months = £16524

total hours worked = 37.5 × 47 = 1762.5 hours

$$\text{pay per hour} = \frac{\text{total pay}}{\text{total hours}} = \frac{16524}{1762.5} = 9.38$$

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	0.27	0.31

relative frequency = $\frac{\text{frequency}}{200}$

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

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

[2 marks]

$500 \times 0.42 = 210$

Answer 210

Turn over for the next question

9

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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

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

Compare the population densities of the UK and Germany.

[3 marks]

UK population density = $\frac{64000000}{95000}$

$= 673.7$

Germany population density = $\frac{82000000}{140000}$

$= 585.7$

$673.7 > 585.7$, so population density is greater in the UK.

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

Circle your answer.

[1 mark]

discrete data can only take certain values.

Mass of a television

Time taken to deliver a television

Height of a television mast

Number of televisions sold

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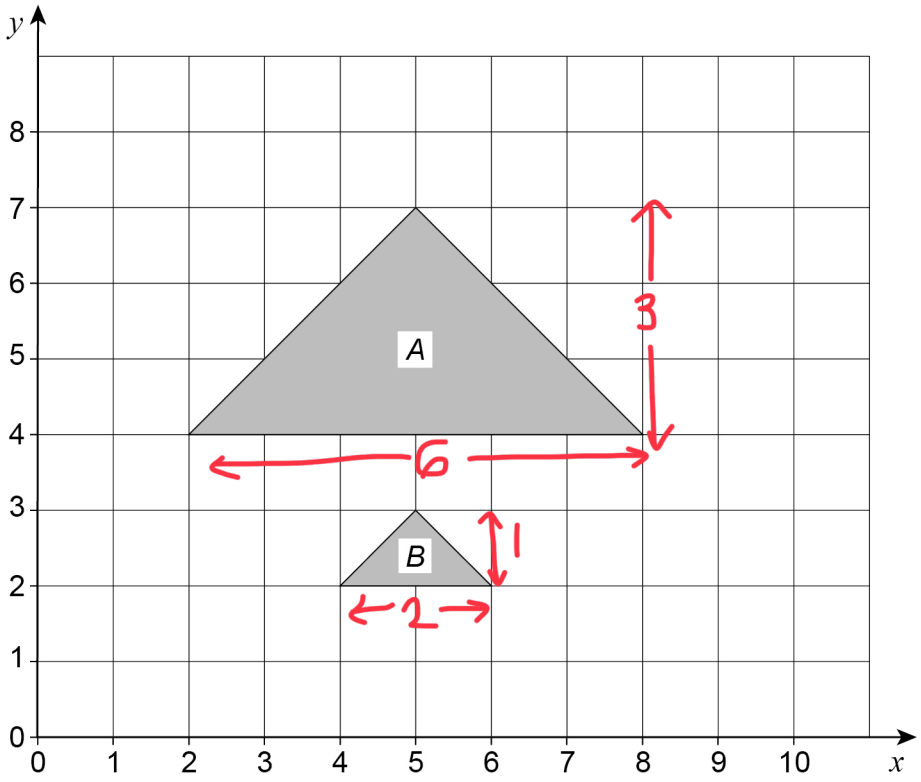
24 Describe fully the **single** transformation that maps triangle *A* to triangle *B*.



[3 marks]

Enlargement, scale factor $\frac{1}{3}$
Centre (5, 1)

Turn over for the next question

7

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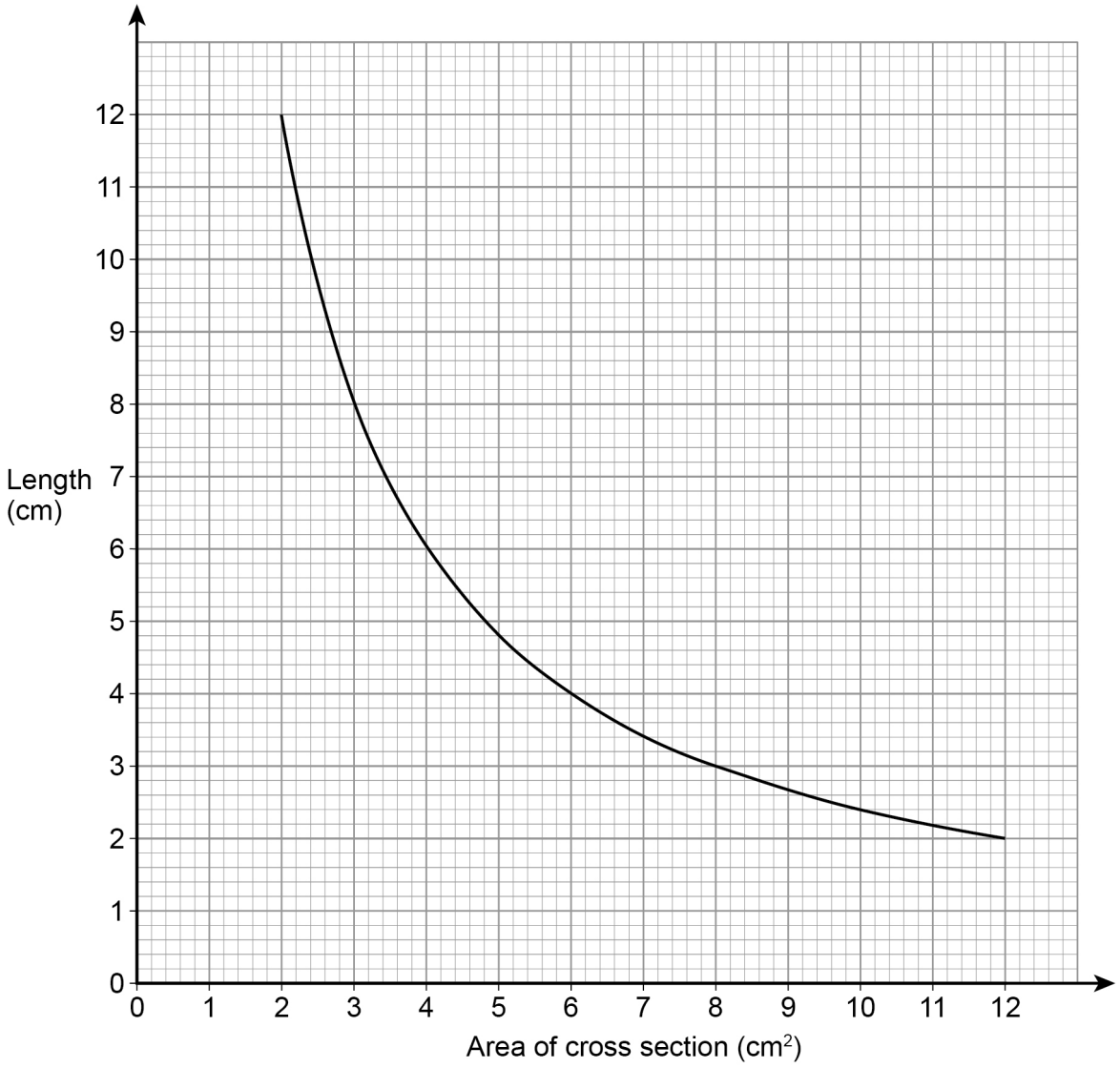
25 The graph shows information about prisms with the same volume.



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

[1 mark]

Volume = length × area
take the point (2, 12)
volume = 12 × 2 = 24 cm^3

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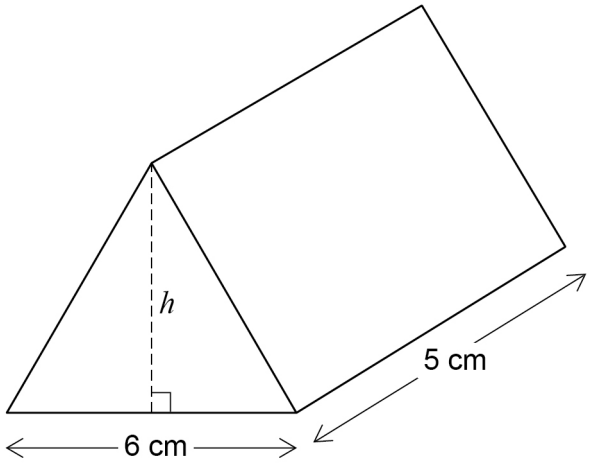
25 (b) The diagram shows a prism with volume 24 cm^3

The height of the triangular cross section is h.



Work out the height, h.

[3 marks]

Volume of prism = area of triangle × length

area of triangle = $\frac{6 \times h}{2} = 3h$

Volume → $24 = 3h \times 5$

$h = \frac{24}{3 \times 5} = 1.6$ cm

Answer 1.6 cm

Turn over for the next question

4

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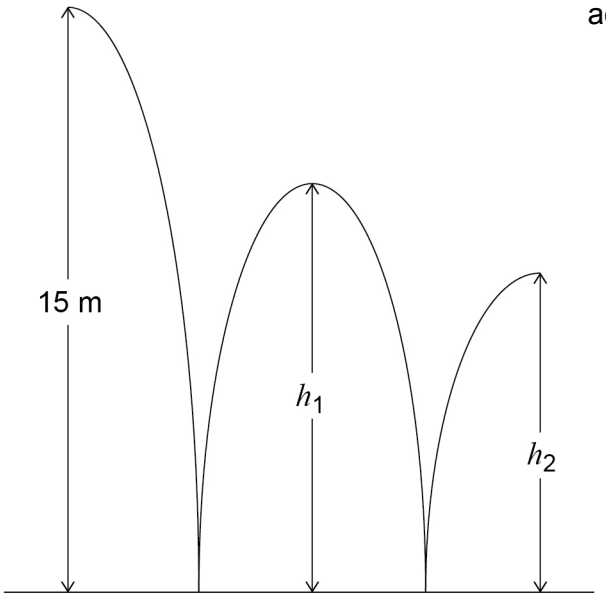
26 A ball is thrown from a height of 15 metres.

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]

$h_2 = 15 \times \frac{3}{4} \times \frac{3}{4}$

$h_2 = 15 \times \frac{9}{16} = 8.4375\text{m}$

Answer 8.4375 metres

Do not write outside the box

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]

$h_1 = 15 \times \frac{3}{4} = 11.25\text{ m}$

$h_2 = 11.25 \times \frac{2}{3} = 7.5\text{m}$

$7.5 < 8.4375$

Turn over for the next question

4

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

[3 marks]

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

$12x - 8 = 2x - 5$

$12x - 2x = -5 + 8$

$10x = 3$

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

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

28 Work out the next term of this quadratic sequence.

[2 marks]

5 8 14 23 .....

+3 +6 +9 +12

+3 +3 +3

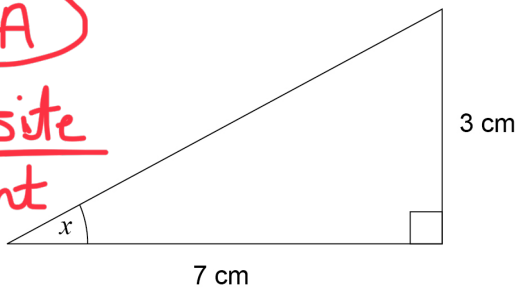
next term = 23 + 12 = 35

Answer 35

Do not write outside the box

29 Work out the size of angle x.

Not drawn accurately



SOH CAH TOA

$\tan x = \frac{\text{opposite}}{\text{adjacent}}$

[2 marks]

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

$x = \tan^{-1}\left(\frac{3}{7}\right) = 23.2°$

Answer 23.2 degrees

END OF QUESTIONS

7

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