Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2025

Mathematics

StemUp Model Solution

Unit M2
(With calculator)
Foundation Tier



[GMC21]

GMC21

THURSDAY 15 MAY, 9.15am – 11.00am

TIME

1 hour 45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Questions which require drawing or sketching should be completed using an HB pencil.
All working **must** be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.
Answer **all twenty-eight** questions.

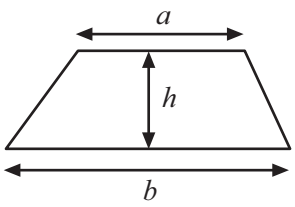
INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

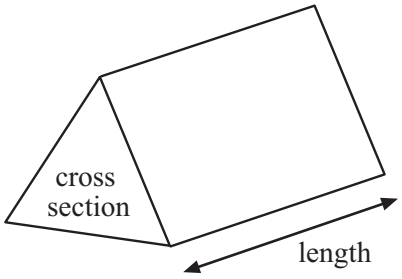
15853

Formula Sheet

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross section × length



15853

1 Show that $8 + 4 \times 5$ does not equal $(8 + 4) \times 5$

$8 + 4 \times 5 = 8 + 20 = 28$

$(8 + 4) \times 5 = 12 \times 5 = 60$

$28 \neq 60$, so $8 + 4 \times 5$ does not equal $(8 + 4) \times 5$

[2]

[Turn over



2 **(a)** Hamilton ran around a race track in 43.812 seconds.

Round this time to 1 decimal place.

Answer 43.8 seconds [1]

(b) Write down the place value of the 4 in the number 7 654 321

Answer 4000 (4 thousands) [1]

(c) Write these numbers in order from largest to smallest.

0.605 **0.6** **0.61**

Answer 0.61, 0.605, 0.6 [1]

3 **(a)** Sean has h hoodies.

Conor has 5 more hoodies than Sean.

Write down an expression, in terms of h, for the number of hoodies Conor has.

Answer $h + 5$ [1]

(b) Martha has the same number of hoodies as Sean and Conor have altogether.

Write down an expression, in terms of h, for the number of hoodies Martha has.

Give your answer in its **simplest** form.

$h + h + 5$

Answer $2h + 5$ [1]

[Turn over



4



Ticket Prices

Adult (17+)	**£13.50**
Child (4–16 years old)	**£6.75**
Child (under 4 years old)	**Free**
Student	**£7.50**
Senior	**£5.45**
Carer	**Free**
Family day ticket (up to 2 adults and 4 children)	**£37.50**

(a) A student, a senior and a carer visit the zoo.

How much do they pay altogether for their tickets?

7.50 + 5.45 + 0 = 12.95

Answer £ 12.95 [2]

(b) Mr and Mrs Foster and their four children aged 3, 7, 9 and 11 visit the zoo.

Mr Foster says they will save at least £10 if they buy a Family day ticket.

Do you agree with Mr Foster?

Show your working out clearly.

Child aged 3 is free.

2 adults: 2 × 13.50 = £27.00

3 children (7, 9, 11): 3 × 6.75 = £20.25

Total without family ticket = 27.00 + 20.25 = £47.25

Saving = 47.25 − 37.50 = £9.75

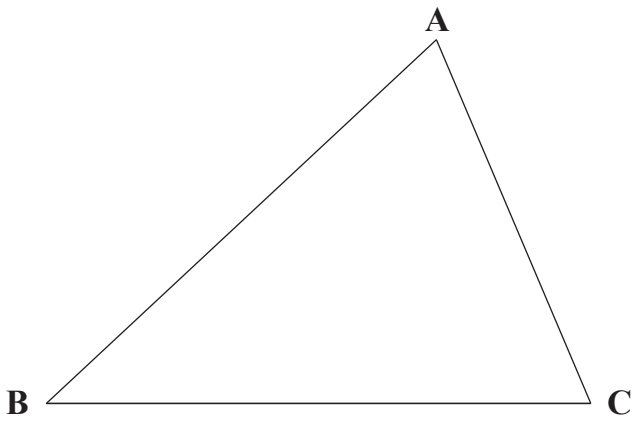
£9.75 is less than £10, so they do not save at least £10

Answer No [3]

[Turn over



5 A triangle ABC is drawn below.



(a) Using a protractor, measure the size of the angle at C.

Answer 67 ° [1]

(b) (i) Using a ruler, measure the length of the line BC in **centimetres**.

Answer 7.2 cm [1]

(ii) Write your answer to part **(b) (i)** in **millimetres**.

Answer 72 mm [1]

7.2 × 10 = 72

(c) Sam measured the angle at B as 137°

(i) Without measuring the angle, explain why Sam must be wrong.

The angle at B is acute (less than 90°), but 137° is an obtuse angle, so it cannot be 137° [1]

(ii) Now measure the angle.

What mistake did Sam make when he measured the angle?

The angle is 43°. Sam read the wrong scale on the protractor (180 – 43 = 137) [1]

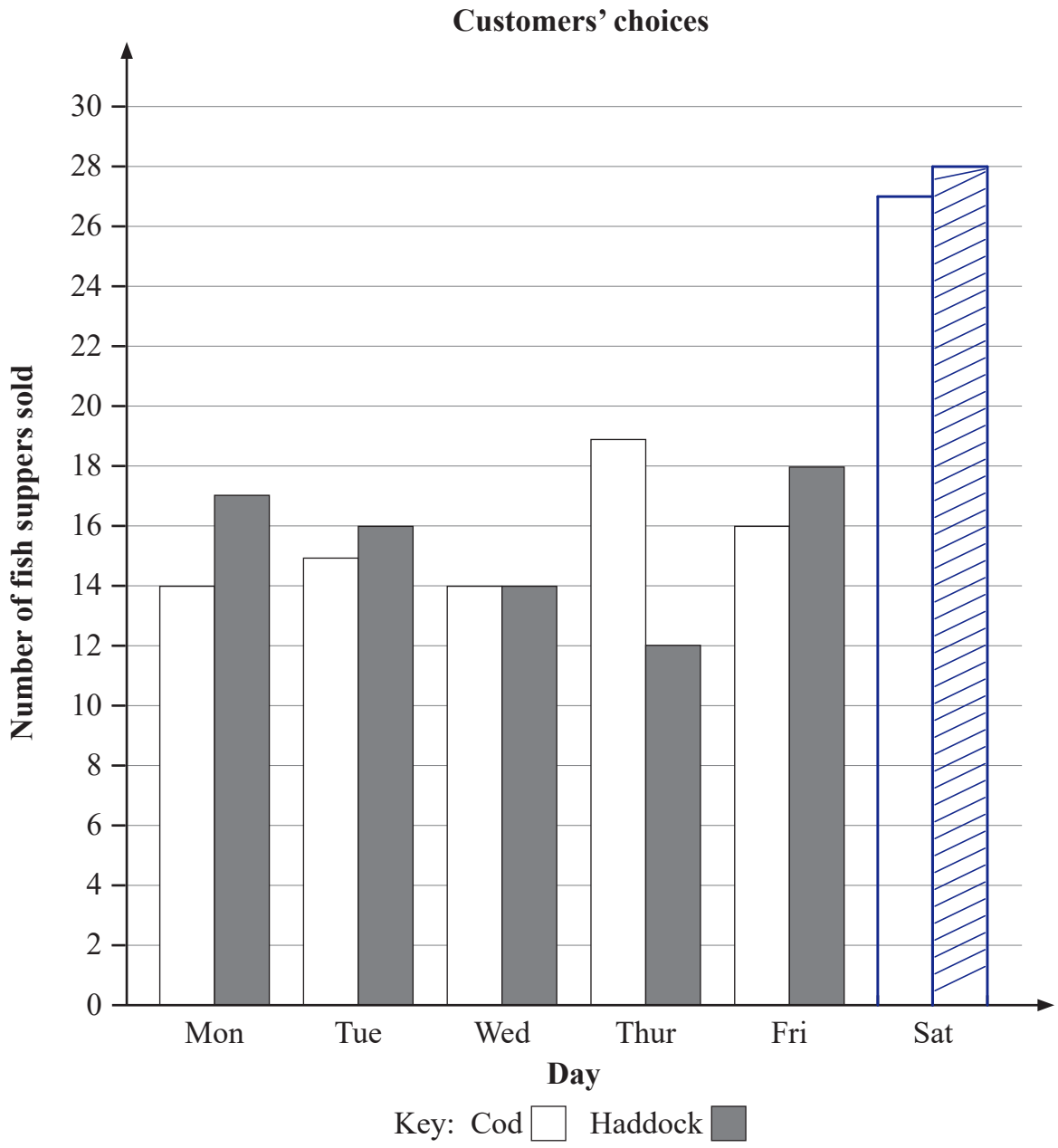
[Turn over

6 A local chippy sells fish suppers.

Customers can choose whether to have cod or haddock in their fish supper.

Each day for a week, the owner recorded the customers' choices.

The results are displayed in this dual bar chart.



15853

(a) On which day, from Monday to Friday, were most fish suppers sold?

Answer Friday [1]

(b) The owner thinks that, from Monday to Friday, he sold more haddock than cod.

Is he correct? Explain your answer clearly.

Cod: 14 + 15 + 14 + 19 + 16 = 78

Haddock: 17 + 16 + 14 + 12 + 18 = 77

Answer No because he sold 78 cod but only 77 haddock,

so he sold more cod than haddock (78 > 77) [2]

(c) On Saturday, 27 cod suppers were sold.

Overall, from Monday to Saturday, the same number of cod suppers and haddock suppers were sold.

Complete the bar chart. [2]

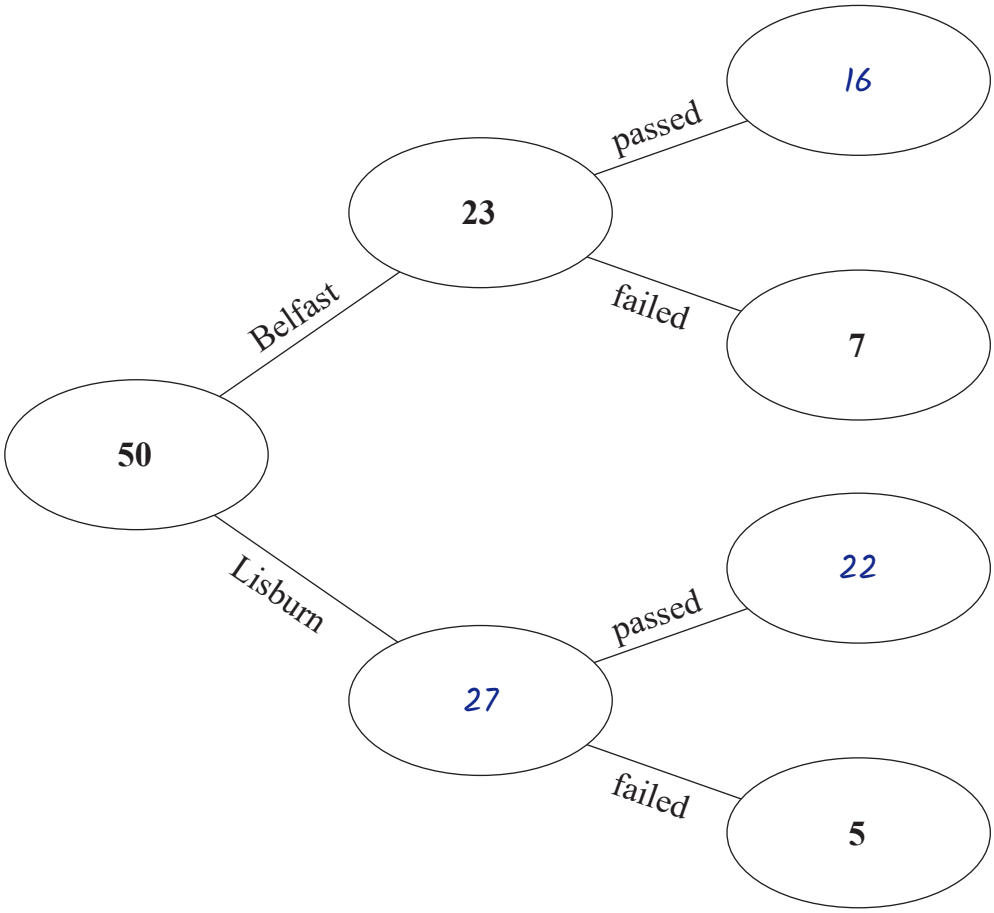
Cod total = 78 + 27 = 105

Haddock on Saturday = 105 − 77 = 28

[Turn over

7 50 people booked an MOT test in either Belfast or Lisburn.

Some of the results are shown in the frequency tree below.



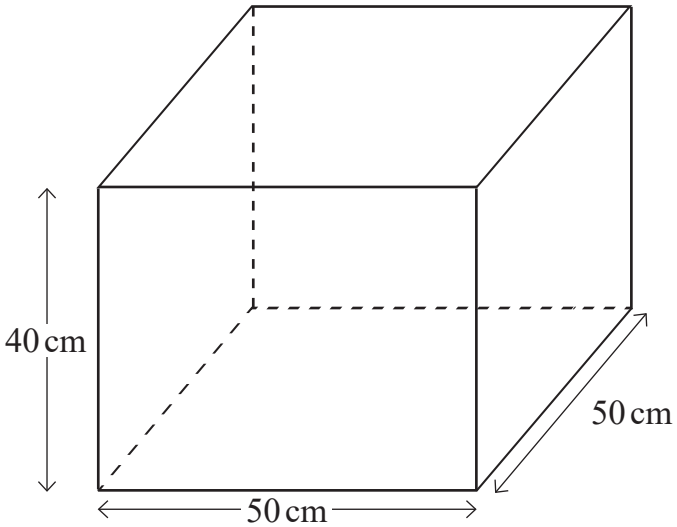
How many MOT tests were passed in Lisburn?

Lisburn: 50 − 23 = 27

Passed: 27 − 5 = 22

Answer 22 [2]

8 A container, in the shape of a cuboid, has dimensions as shown in the diagram.



(a) What is the **volume** of the container?

$V = 50 \times 50 \times 40$

$= 100\ 000$

Answer 100 000 cm^3 [2]

(b) 60 litres of liquid are poured into the container.

How deep will the liquid be?

60 litres = 60 000 cm^3

Base area = $50 \times 50 = 2500\ cm^2$

Depth = $60\ 000 \div 2500 = 24$

Answer 24 cm [3]

[Turn over

9 Engine oil costs £14.80 per litre.

Jason buys 6.5 litres of engine oil.

He also buys 5 identical spark plugs.

The total cost is £113

How much does each spark plug cost?

Oil: $6.5 \times 14.80 = £96.20$

Spark plugs: $113 - 96.20 = £16.80$

Each plug: $16.80 \div 5 = £3.36$

Answer £ 3.36 [3]

10 At the start of the year, Sue's caravan was worth £9 600

By the end of the year, Sue's caravan had lost 26% of its value.

At the start of the year, John's caravan was worth £9 975

By the end of the year, John's caravan had lost $\frac{2}{7}$ of its value.

Whose caravan was worth more by the end of the year and by how much more?

Sue: 26% of 9600 = 9600 ÷ 100 × 26 = 2496

9600 − 2496 = £7104

John: 2/7 of 9975 = 9975 ÷ 7 × 2 = 2850

9975 − 2850 = £7125

Difference = 7125 − 7104 = £21

John's caravan is worth £21 more

Answer John by £ 21 [5]

[Turn over

11 **(a)** Simplify $4c + 5d + c - 7d$

$4c + c = 5c, \quad 5d - 7d = -2d$

Answer $5c - 2d$ [2]

(b) Expand $5(2t + 5)$

$5 \times 2t + 5 \times 5$

Answer $10t + 25$ [1]

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12

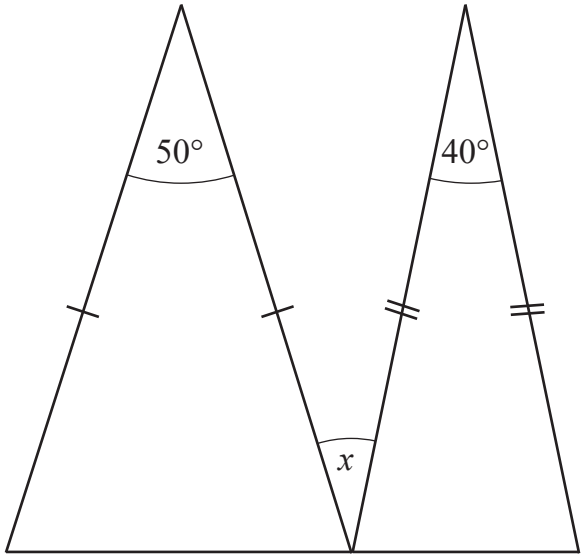


diagram not drawn accurately

Calculate the size of the angle marked x

Left triangle is isosceles: (180 − 50) ÷ 2 = 65°

Right triangle is isosceles: (180 − 40) ÷ 2 = 70°

Angles on a straight line add up to 180°:

x = 180 − (65 + 70) = 45°

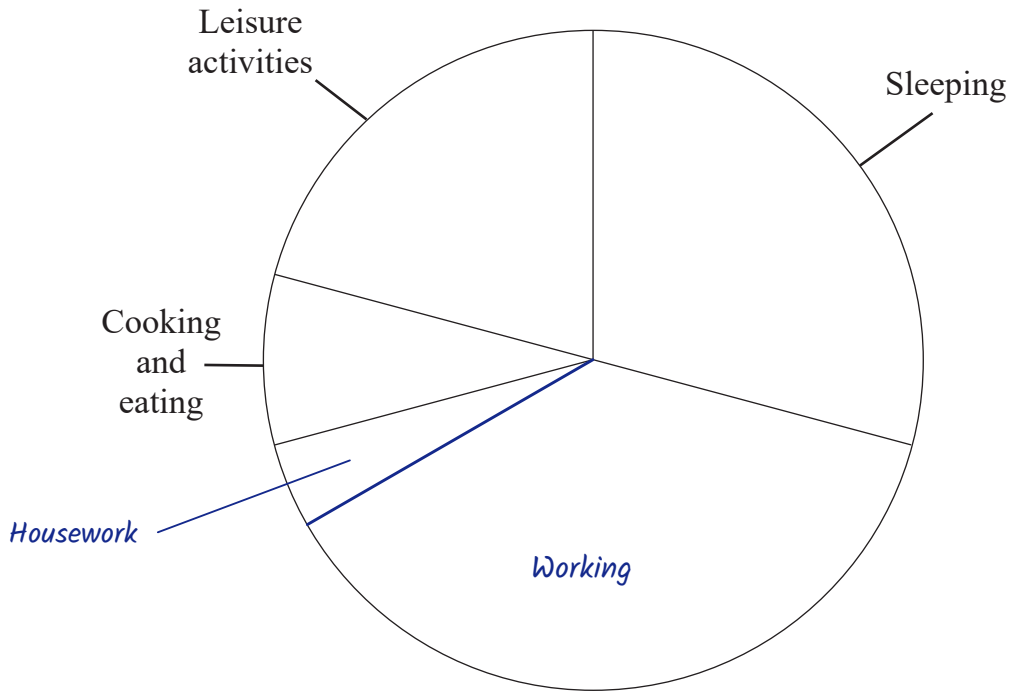
Answer 45 ° [3]

[Turn over

13 Philip wanted to draw a pie chart to display the results of a study on how adults spend their time each day.

He used the information in the table to start drawing the pie chart.

Activity	No. of hours	Angle
Sleeping	7	105°
Leisure activities	5	75°
Cooking and eating	2	30°
Working	9	135°
Housework	1	15°
Total	**24**	**360°**



(a) Complete the table. [2]

(b) Complete the pie chart. [2]

(c) Philip says, "The angle for leisure activities is 75°. This means adults spend 75% of their time on leisure activities."

Is Philip correct? Explain your answer clearly.

No. 75° is 75 out of 360, not out of 100. 75 ÷ 360 × 100

= 20.8%, so adults spend 20.8% of their time, not 75% [2]

14 What is the difference in size between the largest and smallest of these numbers?

$$2 \qquad 2\frac{1}{2} \qquad 0.02 \qquad \frac{2}{10}$$

Show your working out clearly.

2 = 2, 2½ = 2.5, 0.02, 2/10 = 0.2

Largest = 2.5, smallest = 0.02

2.5 − 0.02 = 2.48

Answer 2.48 [3]

[Turn over

15 Last season 103 750 people watched the Belfast Giants.

This season 8300 more people watched.

What was the percentage increase?

8300 ÷ 103 750 × 100

= 8

Answer 8 % [2]

16 A charity holds a collection day.

During the collection day, 200 notes are donated to the charity.

25% of the notes are £10 notes.

$\frac{3}{5}$ of the notes are £5 notes.

There are eighteen £20 notes.

The rest of the notes are £50 notes.

What is the total value of all the notes donated?

Show your working out clearly.

£10 notes: 25% of 200 = 50, 50 × £10 = £500

£5 notes: 3/5 of 200 = 120, 120 × £5 = £600

£20 notes: 18 × £20 = £360

£50 notes: 200 − 50 − 120 − 18 = 12

12 × £50 = £600

Total = 500 + 600 + 360 + 600 = £2060

Answer £2060 [4]

[Turn over

17 A school has 540 pupils.

45% of the pupils live 2 miles or less from the school.

$\frac{2}{3}$ of the pupils who live more than 2 miles from the school travel by bus.

How many pupils who live more than 2 miles from the school travel by bus?

45% of 540 = 0.45 × 540 = 243

More than 2 miles: 540 − 243 = 297

Bus: 2/3 × 297 = 198

Answer 198 [3]

18 A pencil cost x pence.

Bernie bought 3 pencils.

Bernie paid with a £2 coin.

Write an expression, in terms of x, for her change in **pence**.

£2 = 200p, 3 pencils cost 3x pence

Answer 200 − 3x [2]

19 Solve $3(y - 7) = 18$

3y − 21 = 18

3y = 39

y = 13

Answer $y =$ 13 [3]

[Turn over

20 Mia asked each person in her class how many devices they owned that could connect to the internet.

She recorded the results as follows.

3	2	2	1	4
1	1	3	4	2
2	2	3	3	2
4	3	1	2	2

(a) Complete the frequency table below.

Number of devices	Number of pupils (frequency)	Total number of devices
1	4	4
2	8	16
3	5	15
4	3	12

[2]

(b) Calculate the mean number of devices per pupil.

Total devices = 4 + 16 + 15 + 12 = 47

Mean = 47 ÷ 20 = 2.35

Answer 2.35 [2]

(c) What was the range of the number of devices?

4 − 1 = 3

Answer 3 [1]

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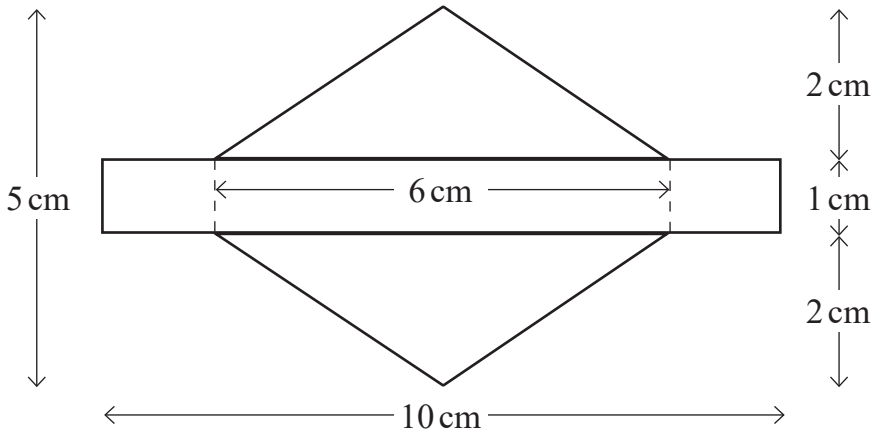
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(Questions continue overleaf)

[Turn over

21 A badge is in the shape of two identical triangles and a rectangle, as shown in the diagram.

diagram not drawn accurately



The badges are cut from a square sheet of metal, of side 1 metre, in rows as shown.

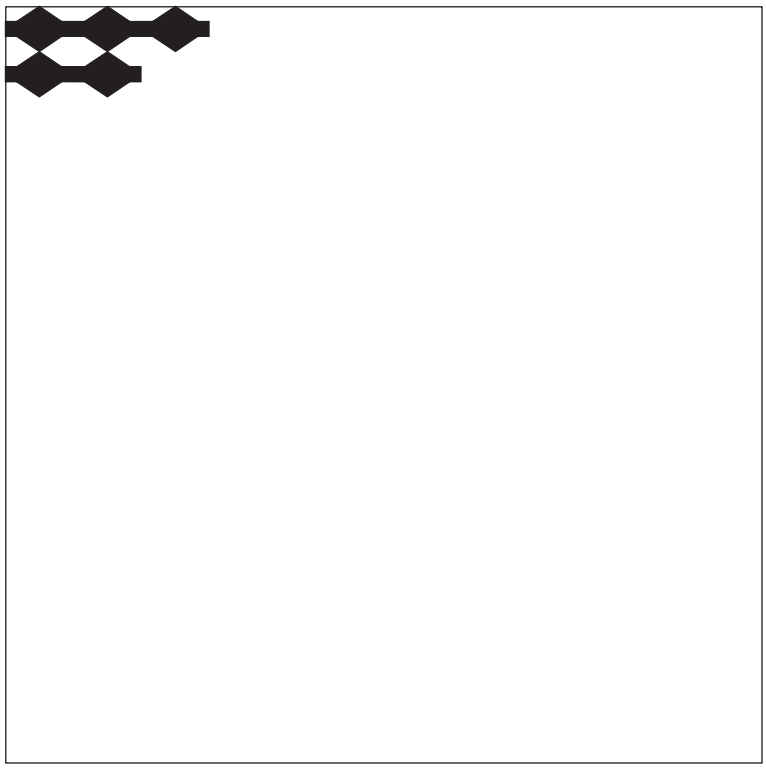


diagram not drawn accurately

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What is the total **area** of the metal left over after the **maximum** number of badges have been cut from the sheet in rows as shown?

Area of one triangle = $6 \times 2 \div 2 = 6$ cm^2

Area of rectangle = $10 \times 1 = 10$ cm^2

Area of badge = $10 + 6 + 6 = 22$ cm^2

1 metre = 100 cm

Badges in a row: $100 \div 10 = 10$

Number of rows: $100 \div 5 = 20$

Number of badges = $10 \times 20 = 200$

Total area of badges = $200 \times 22 = 4400$ cm^2

Area of sheet = $100 \times 100 = 10\,000$ cm^2

Left over = $10\,000 - 4400 = 5600$ cm^2

Answer 5600 cm^2 [6]

[Turn over

22 Find the highest common factor (HCF) of 28 and 42

Factors of 28: 1, 2, 4, 7, 14, 28

Factors of 42: 1, 2, 3, 6, 7, 14, 21, 42

Highest common factor = 14

Answer 14 [3]

23 ABCD is a square of side 60 cm.

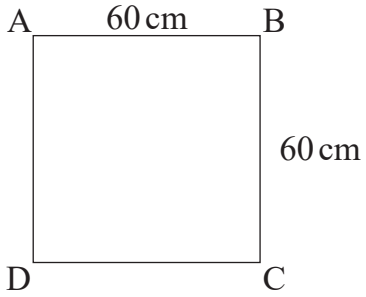


diagram not drawn accurately

The lengths of AB and DC are **increased** by 15%
and the lengths of BC and AD are **decreased** by 20%
to form a rectangle.

State whether the **perimeter** has increased or decreased, and by what percentage.

AB and DC: 15% of 60 = 9, 60 + 9 = 69 cm

BC and AD: 20% of 60 = 12, 60 − 12 = 48 cm

Original perimeter = 4 × 60 = 240 cm

New perimeter = 69 + 48 + 69 + 48 = 234 cm

Change = 240 − 234 = 6 cm decrease

% change = 6 ÷ 240 × 100 = 2.5%

The perimeter has decreased by 2.5%

Answer Perimeter has _____*decreased*_____ by _____*2.5*_____ % [6]

[Turn over

24 Calculate the midpoint of the line joining the points (0, 6) and (2, 14).

x: (0 + 2) ÷ 2 = 1

y: (6 + 14) ÷ 2 = 10

Answer (1 , 10) [2]

25 Solve $\frac{4a-2}{3} = 8$

4a − 2 = 8 × 3

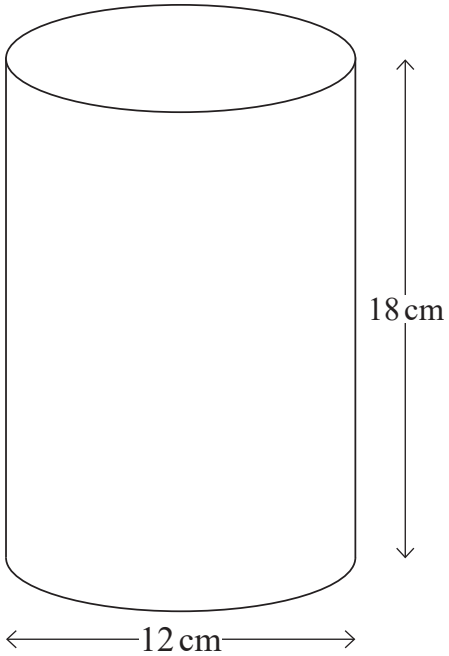
4a − 2 = 24

4a = 26

a = 26 ÷ 4 = 6.5

Answer $a =$ 6.5 [3]

26 Calculate the volume of the cylinder.



Radius = 12 ÷ 2 = 6 cm

$V = \pi r^2 h$

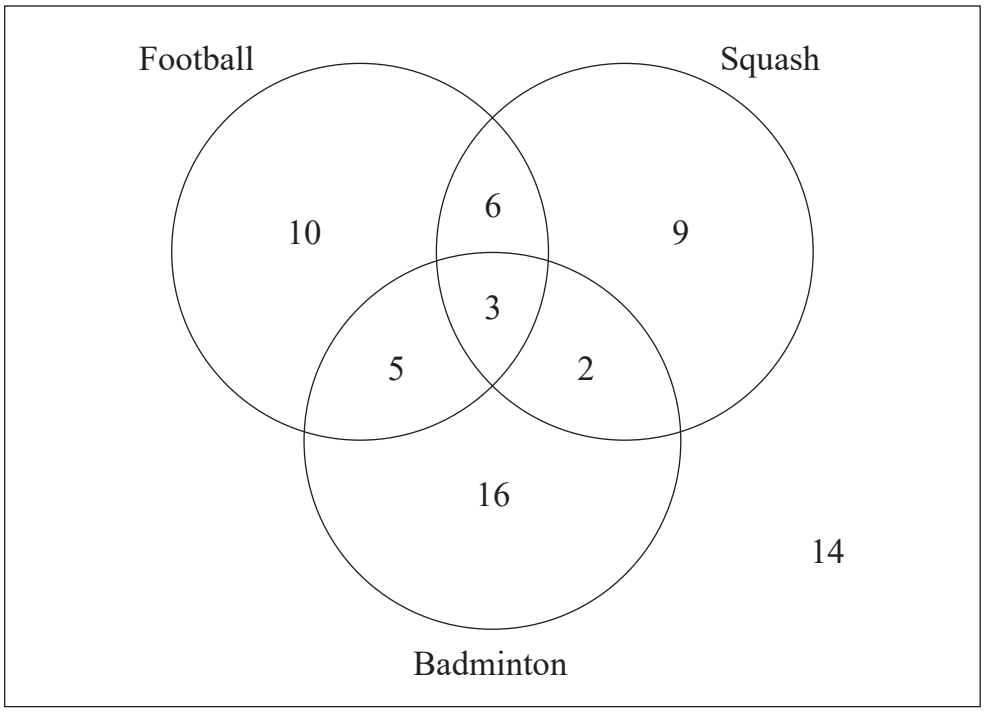
$= \pi \times 6^2 \times 18$

$= 2035.752...$

Answer 2035.75 cm^3 [3]

[Turn over

27 The Venn diagram shows which sports members play at a leisure centre.



(a) How many members play Squash?

6 + 9 + 3 + 2 = 20

Answer 20 [1]

(b) How many members play both Football and Badminton?

5 + 3 = 8

Answer 8 [1]

28 Find the area of the triangle ABC.

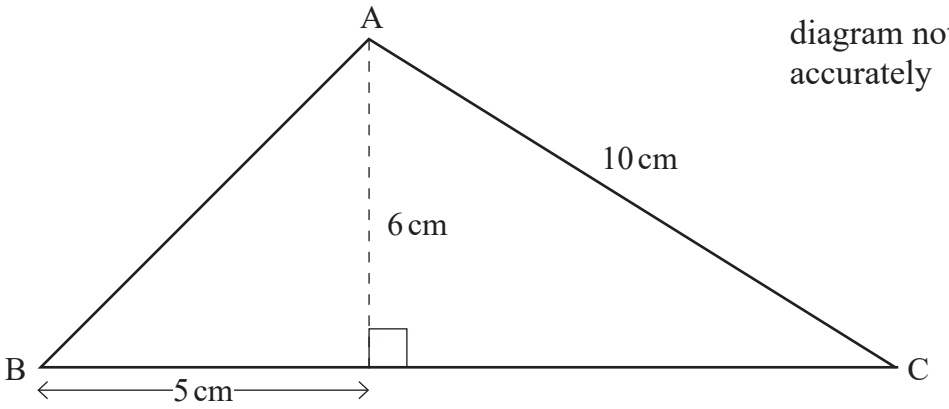


diagram not drawn accurately

Let the foot of the perpendicular be D, DC = x

Pythagoras: $x^2 = 10^2 - 6^2$

$x^2 = 100 - 36 = 64$

$x = \sqrt{64} = 8$ cm

Base BC = 5 + 8 = 13 cm

Area = ½ × 13 × 6 = 39

Answer 39 cm^2 [4]

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