OCR
Oxford Cambridge and RSA

Monday 10 June 2024 – Morning

GCSE (9–1) Mathematics

J560/03 Paper 3 (Foundation Tier)

Time allowed: 1 hour 30 minutes

You must have:
- the Formulae Sheet for Foundation Tier (inside this document)

You can use:
- a scientific or graphical calculator
- geometrical instruments
- tracing paper

F

J560/03

1394198040

Please write clearly in black ink. **Do not write in the barcodes.**

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

First name(s) _____

Last name _____

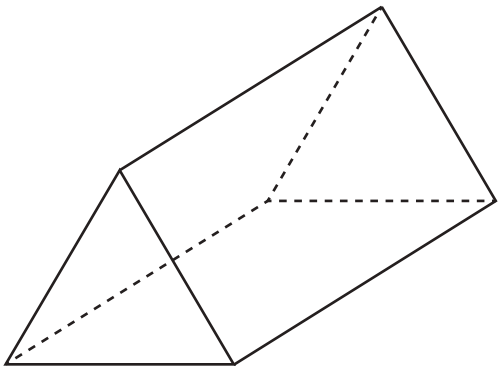
INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.
- Use the π button on your calculator or take π to be 3.142 unless the question says something different.

INFORMATION
- The total mark for this paper is **100**.
- The marks for each question are shown in brackets **[ ]**.
- This document has **20** pages.

ADVICE
- Read each question carefully before you start your answer.

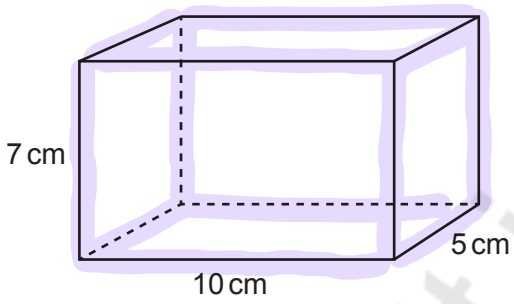
1 **(a)** Write down the mathematical name of this solid.
Choose from the list in the box.

cone	cube	cylinder	prism	sphere



(a) Prism [1]

(b) The diagram shows a cuboid.



(i) How many edges does the cuboid have?

(b)(i) 12 [1]

(ii) The cuboid has dimensions 10 cm, 7 cm and 5 cm.

Work out the volume of the cuboid.

$V = l \times w \times h$

$= 10 \times 5 \times 7$

$= 350 \text{ cm}^3$

(ii) 350 cm^3 [2]

2 This table shows the weight of each ingredient used to make 5.5 kg of concrete.

Complete this table to show the weight of each ingredient used to make 44 kg of the same concrete.

Ingredient	Weight (kg)	Weight (kg)
Cement	1	8
Gravel	3	24
Sand	1.5	12
Total weight	5.5	44

×8 ×8 ×8

[2]

3 **(a)** Use your calculator to work out.

(i) 6^4

(a)(i) 1296 **[1]**

(ii) $\sqrt{529}$

(ii) 23 **[1]**

(b) Complete this statement to make it correct.
Give your answer as a number in ordinary form.

$\sqrt[3]{1728} = 12$

$12^3 = 1728$

[2]

4 A watch costs £207.50.
The exchange rate is 1 dollar ($) = £0.83.

÷0.83

Calculate the price of the watch in dollars ($).

£207.50 ÷ 0.83 = 250

$ 250 **[2]**

5 **(a)** Work out $\frac{2}{3}$ of 103.

Give your answer correct to **1** decimal place.

$\frac{2}{3} \times 103 = 68.666\ldots$

≈ 68.7

(a) 68.7 **[3]**

(b) Write 400 metres as a fraction of 2 kilometres.
Give your answer in its simplest form.

1 km = 1000 m

×1000

2 km × 1000 = 2000 m

$\frac{400}{2000} = \frac{1}{5}$

(b) $\frac{1}{5}$ **[3]**

6 Finley and Gabi share £14 in the ratio 1 : 3.

(a) Write down the letter of the correct calculation to work out **Gabi's** share.

A: $\frac{1}{3} \times 14$ B: $\frac{3}{1} \times 14$ C: $\frac{3}{4} \times 14$ D: $\frac{4}{3} \times 14$

(a) C **[1]**

(b) Work out **Finley's** share.

$\frac{1}{4} \times 14 = 3.5$

(b) £ 3.50 **[2]**

7 A circle has radius 8 cm.

Work out the area of the circle.

$A = \pi r^2$

$= \pi (8)^2$

$= 64\pi$

$= 201.061928 \approx 201$

..... 201 ..... cm^2 **[2]**

8 Kai buys some keyrings.
Each keyring costs £1.19.
Kai pays with a £20 note and buys the largest number of keyrings possible.

How much change should Kai receive?

£20 ÷ £1.19 = 16.8 keyrings

≈ 16 keyrings

16 × £1.19 = £19.04

£20 − £19.04 = £0.96 or 96p

..... 96 ..... p **[4]**

9 When Layla walks to school she always takes 28 minutes.
When Layla cycles to school her speed is double her walking speed.

(a) One day Layla leaves home at 0820 and cycles to school.

Find the time that Layla arrives at school.

14 mins to cycle

08 20 + 14 mins = 08 34

(a) 08 34 **[2]**

(b) On another day Layla cycles half-way to school.
She walks the rest of the way at her normal walking speed.

Find how many minutes Layla takes to get to school on this day.

Cycle = 7 mins

Walk = 14 mins

7 + 14 = 21 mins

(b) 21 minutes **[3]**

10 **(a)** Simplify.

$h \times h \times h \times h$

(a) ..... h^4 ..... **[1]**

(b) Factorise fully.

$3fg + 12g$

$3g(f + 4)$

(b) ..... $3g(f+4)$ ..... **[2]**

11 Choose a word from this list which best describes each statement.

Equation	Expression	Formula	Identity	Inequality	Term

(a) $x^2 + 3x + 2$

(a) ..... Expression ..... **[1]**

(b) $(x + 1)(x + 2) = x^2 + 3x + 2$

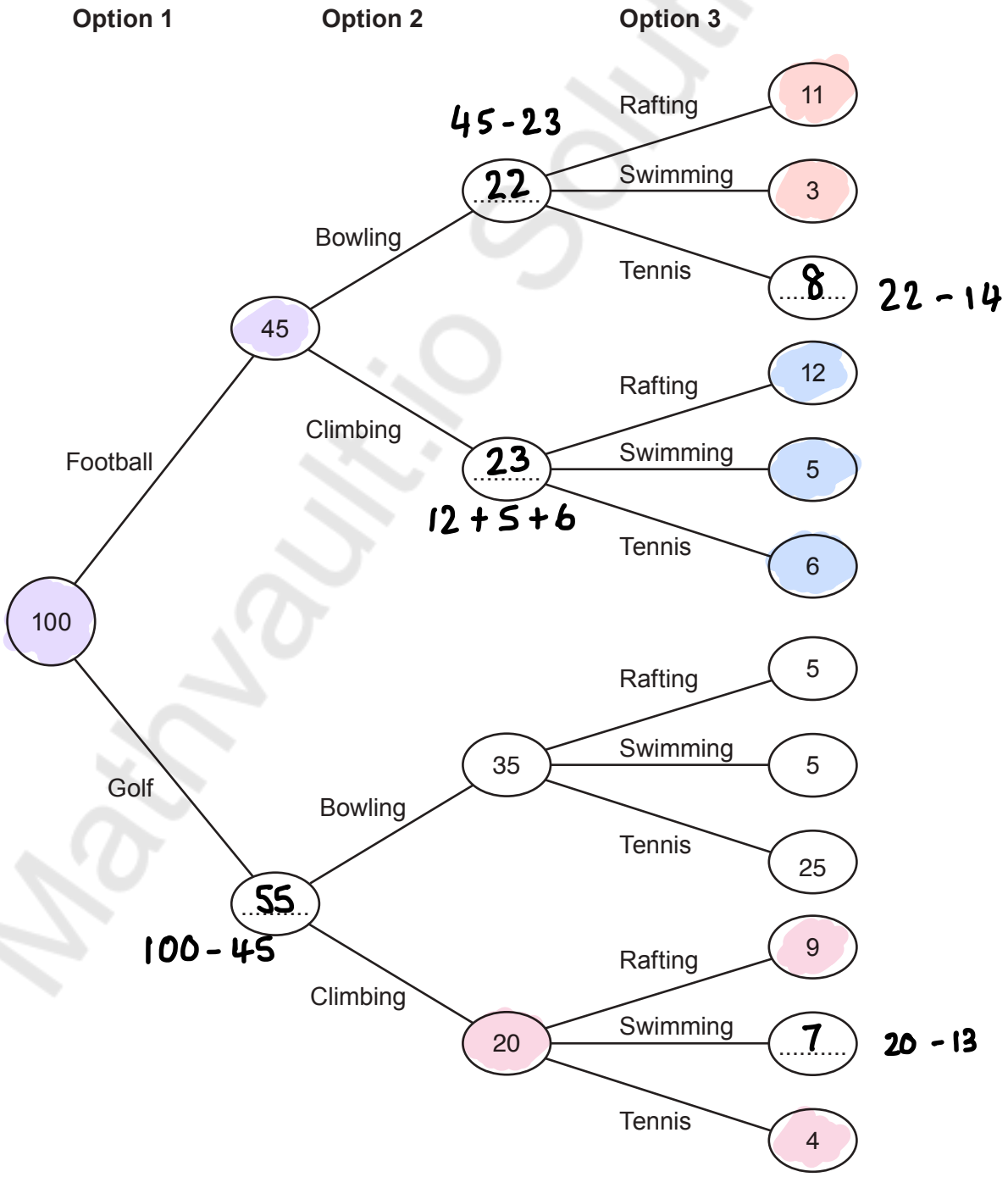
(b) ..... Identity ..... **[1]**

12 At an adventure park, all children participate in three activities, choosing exactly one activity from each of three options.

Option	Activity
1	football or golf
2	bowling or climbing
3	rafting or swimming or tennis

On one Monday morning, 100 children visited the adventure park.

The frequency tree shows the number of children choosing some of the activities.



(a) Complete the frequency tree. **[3]**

(b) Which was the most popular activity out of rafting, swimming and tennis?
Show how you decide.

Rafting = 11 + 12 + 5 + 9 = 37

Swimming = 3 + 5 + 5 + 7 = 20

Tennis = 8 + 6 + 25 + 4 = 43

Tennis because 43 is greater than 37 and 20.

[3]

(c) One of the 100 children is picked at random.

Find the probability that this child chose bowling.

$\frac{22 + 35}{100} = \frac{57}{100}$

(c) $\frac{57}{100}$ **[2]**

(d) Alex says

45% of all children coming to the adventure park choose football.

What assumption has Alex made?

The 100 children are representative of all children attending the park. **[1]**

13 Jane and Kofi both have the same number of newspapers to deliver.

By 8 am
- Jane has delivered 64% of her newspapers
- Kofi has delivered $\frac{5}{8}$ of his newspapers.

(a) Who has delivered the greater proportion of their newspapers?
Show how you decide.

64% ÷ 100 = 0.64 [Jane]

$\frac{5}{8}$ 5 ÷ 8 = 0.625 [Kofi]

.....Jane..... because .....64% is greater than $\frac{5}{8}$.....

..... **[3]**

(b) Work out the smallest possible number of newspapers that Jane must deliver.

64% = $\frac{64}{100}$ ×2 ×2 = $\frac{128}{200}$

$\frac{5}{8}$ = 0.625 = 62.5 = $\frac{62.5}{100}$ ×2 ×2 = $\frac{125}{200}$

(b) .....200..... **[2]**

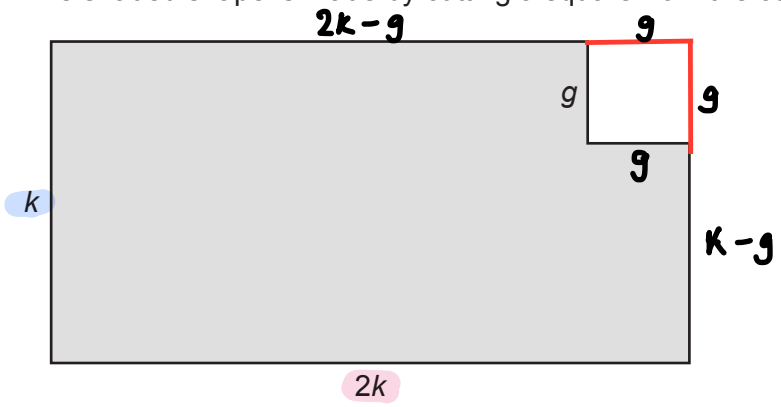
14 A number, n, is given as 2.6, truncated to 1 decimal place.

Complete the error interval for n using a number and a symbol.

.....2.6..... $\leqslant n$ .....<..... 2.7 **[2]**

15 In this question all measurements are in centimetres.

The shaded shape is made by cutting a square from the corner of a rectangle.



The width of the rectangle is k.
The length of the rectangle is $2k$.
Each side of the square is g.

(a) Write down the relationship between the length and the width of the rectangle.

Length is two times the width. [1]

(b) Find an expression for the area of the shaded shape.
Give your answer in its simplest form.

Area rectangle $= l \times w$
$= 2k \times k$
$= 2k^2$

Area square $= l \times w$
$= g \times g$
$= g^2$

Area shaded $= 2k^2 - g^2$

(b) $2k^2 - g^2$ [2]

(c) **(i)** Find an expression for the perimeter of the shaded shape.
Give your answer in its simplest form.

$k + 2k - g + g + g + k - g + 2k$

$6k$

(c)(i) $6k$ [3]

(ii) Find the value of k when the perimeter of the shaded shape is 62.4.

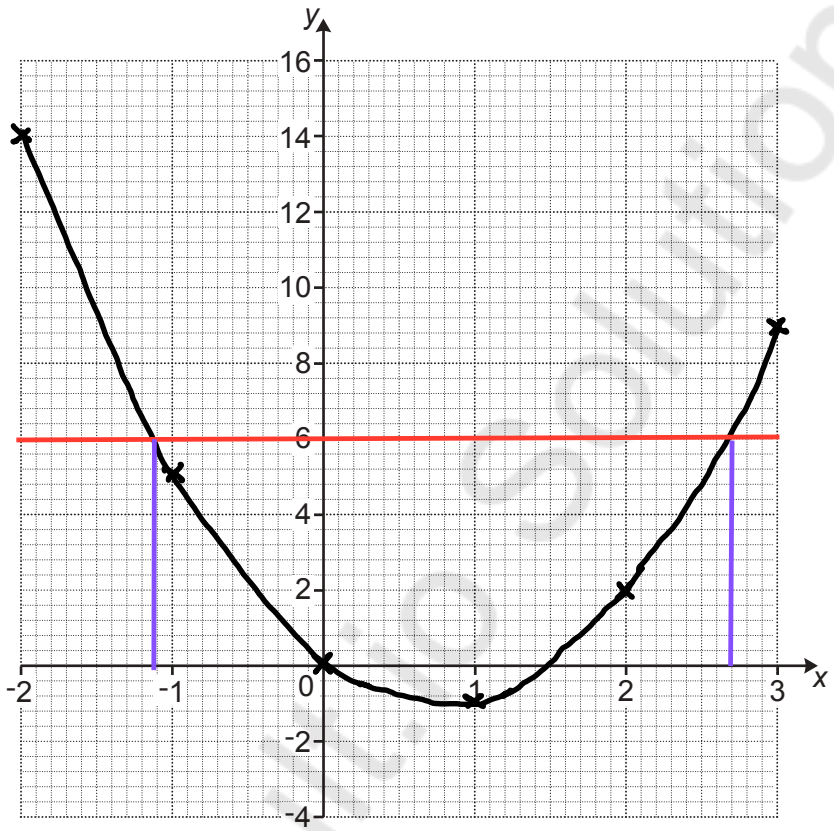
$6k = 62.4$
$\div 6 \quad \div 6$
$k = 10.4$

(ii) $k =$ 10.4 [2]

16 Here is a table of values for $y = 2x^2 - 3x$.

x	-2	-1	0	1	2	3
y	14	5	0	-1	2	9

(a) Draw the graph of $y = 2x^2 - 3x$ for values of x from -2 to 3.



[3]

(b) Use your graph to find the x-coordinates of the points where the graph of $y = 2x^2 - 3x$ crosses the line $y = 6$.

(b) $x =$ ...-1.1... and $x =$ ...2.6... **[2]**

17 Riley invests some money in a savings account that pays 4% simple interest per year.
After 5 years the total interest that Riley's investment has earned is £360.

Find the total value of Riley's investment after 5 years.
You must show your working.

$4\% \times 5 = 20\%$

$x \times 0.2 = 0.2x$

$0.2x = £360$

$\div 0.2 \qquad \div 0.2$

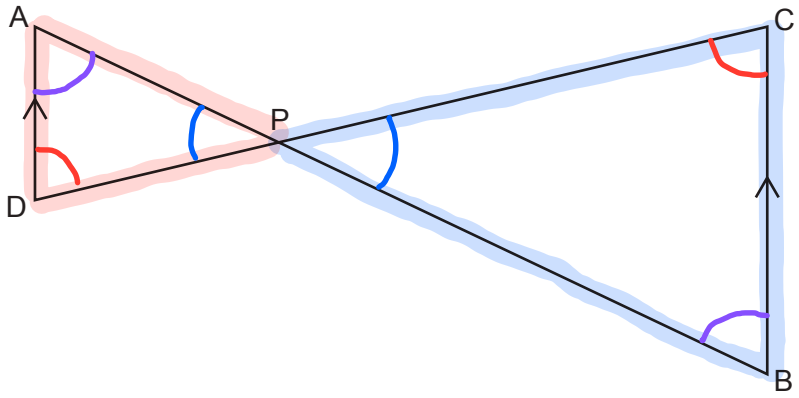
$x = 1800$

Total $= 1800 + 360$

$= 2160$

£ 2160 **[5]**

18 The diagram shows two straight lines AB and DC that intersect at P.
DA is parallel to BC.



Complete these statements to show that triangle PAD is similar to triangle PBC.

Angle ADP = angle BCP because they are alternate angles

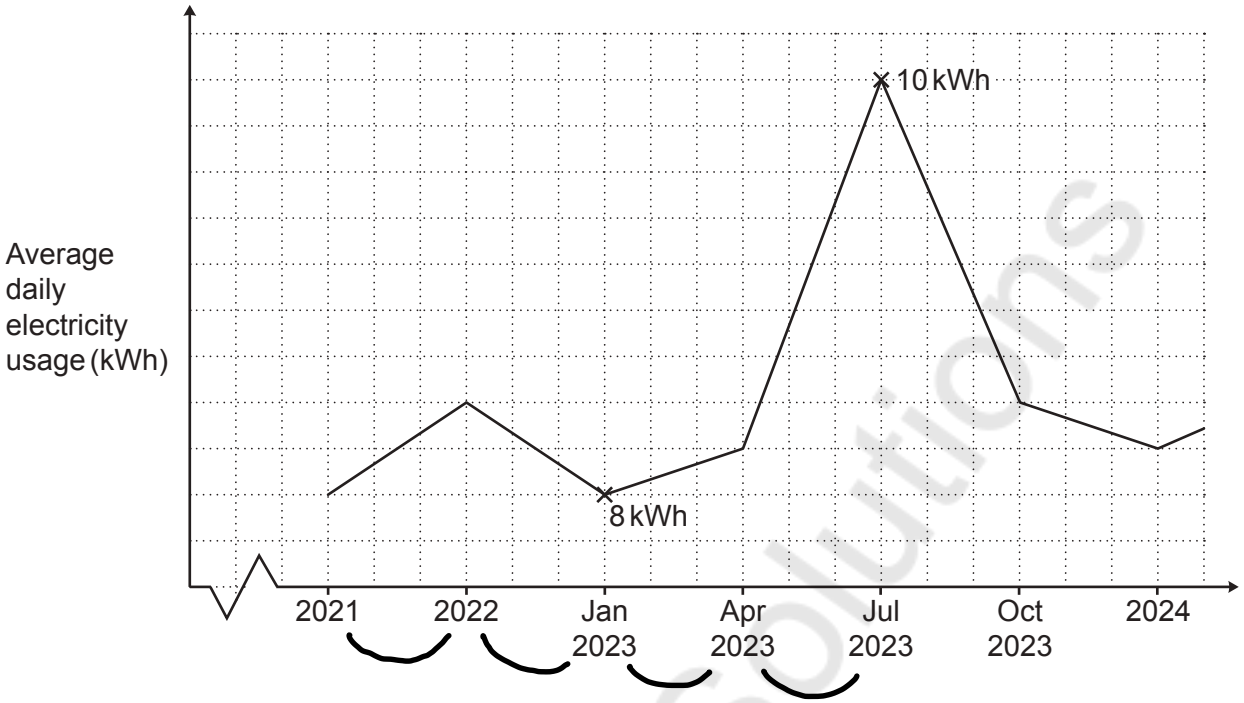
Angle APD = angle CPB because they are vertically opposite angles

Angle PAD = angle PBC because they are alternate angles

Triangle PAD is similar to triangle PBC because AAA

..... **[4]**

19 The graph shows a household's average daily electricity usage, in kilowatt hours (kWh).



Give **two different** reasons why this graph is misleading.

Reason 1: Horizontal scale is not linear

Reason 2: No scale on vertical axis.

[2]

20 The word MATHEMATICS is spelt using tiles.

M	A	T	H	E	M	A	T	I	C	S

The tiles are put into an empty bag.

One at a time, 99 children each take a tile at random from the bag.
They record the letter and then put the tile back in the bag.

Work out how many times the letter M is expected to be taken from the bag.

$P(m) = \frac{2}{11}$

$\frac{2}{11} \times 99 = 18$

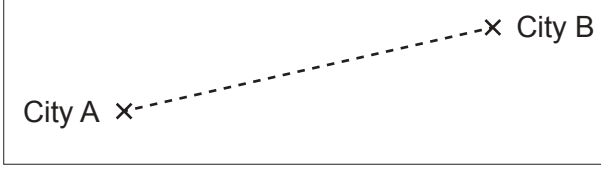
18

[3]

21 1 cm on a map represents 150 km in real life.

(a) Below is part of the map showing City A and City B.

Scale: 1 cm represents 150 km



Heidi is planning to walk from City A to City B for charity.

Heidi measures the straight-line distance on the map from City A to City B accurately as 5 cm. Heidi says she will walk from City A to City B at an average speed of 2.5 km/h for 10 hours per day.

(i) Use this information to work out how many days Heidi needs to complete the walk from City A to City B.

1 cm = 150 km
×150

5 cm × 150 = 750 km

D
S T

D = 750 km
S = 2.5 km/h

$T = \frac{750}{2.5} = 300\text{h}$

Days = 300h ÷ 10h
= 30

(a)(i) ..... 30 ..... days **[4]**

(ii) Explain why the information used in part **(i)** is likely to give an underestimate for the number of days Heidi needs to complete the walk.

..... The path is unlikely to be straight. .....

..... **[1]**

(b) Yoshi writes the scale of the map, 1 cm represents 150 km, as the ratio 1 : 150.

Explain Yoshi's error and write the scale correctly in the form 1 : *n*.

150 km × 1000 = 150000m

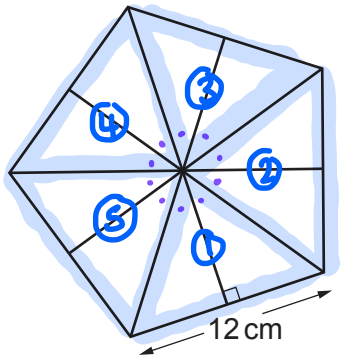
150,000 × 100 = 15,000,000 cm

Yoshi's error is ..... the units are not the same. .....

.....

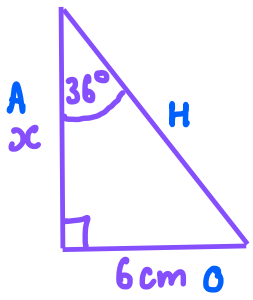
The correct answer is 1 : ..... 15 000 000 ..... **[2]**

22 The diagram shows a regular pentagon made using ten congruent right-angled triangles.
The length of one side of the pentagon is 12 cm.



Not to scale

(a) Show that the area of the pentagon is 247.75 cm^2, correct to **2** decimal places. **[6]**



$360 \div 10 = 36$

$\tan\theta = \frac{O}{A}$

$\tan(36) = \frac{6}{x}$

$x = 6 \div \tan(36)$

$= 8.258291523$ cm

$A = \frac{1}{2}bh$

$= \left(\frac{1}{2} \times 12 \times 8.25\ldots\right) \times 5$

$= 247.7487457$

≈ 247.75 cm^2

(b) The regular pentagon is the base of a pyramid.

The pyramid has volume 450 cm^3.
The perpendicular height of the pyramid is h cm.

Calculate the value of h.

[The volume of a pyramid is $\frac{1}{3}$ × area of base × perpendicular height.]

$450 = \frac{1}{3} \times 247.75 \times h$

$h = 450 \div \left(\frac{1}{3} \times 247.75\right)$

$= 5.449041872$

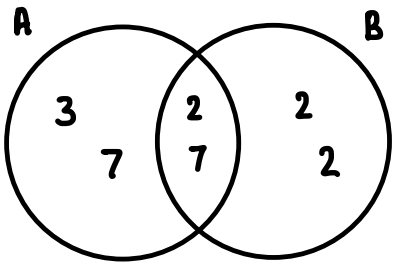
≈ 5.45

(b) $h =$ 5.45 **[3]**

23 **(a)** Two numbers, A and B, are written as the product of their prime factors.

$A = 2 \times 3 \times 7^2$ 2 × 3 × 7 × 7
$B = 2^3 \times 7$ 2 × 2 × 2 × 7

Find the lowest common multiple (LCM) of A and B.
Give your answer as an ordinary number.



LCM = 3 × 7 × 2 × 7 × 2 × 2
= 1176

(a) 1176 ..... **[2]**

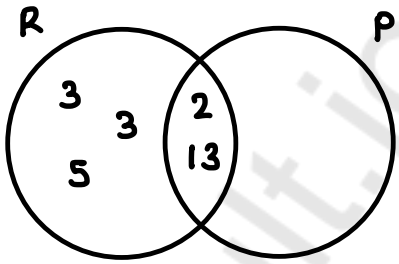
(b) A number, R, is written as the product of its prime factors.

$R = \cancel{2} \times 3^2 \times 5 \times k$, where k is a prime number.

The highest common factor (HCF) of R and another number, P, is 26.

Find the value of k.

26
2 13



(b) $k =$ 13 ..... **[2]**

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).