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MATHEMATICS **0580/23**

Paper 2 (Extended) **October/November 2024**

1 hour 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages.

[Turn over

1

61	62	63	64	65	66	67	68	69

From the list of numbers, write down

(a) a cube number

..... [1]

(b) a prime number.

..... [1]

2 A train journey starts at 23 30 and finishes at 07 15 the next day.

Find the time taken for this journey.

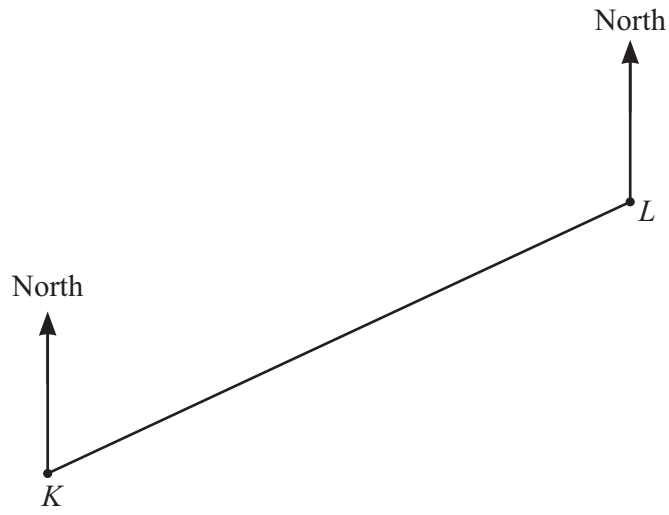
..... h ..... min [1]

3 Simplify.

$3p - t - p - 4t$

..... [2]

4 The scale drawing shows the positions of town K and town L.
The scale is 1 cm represents 10 km.



Scale : 1 cm to 10 km

(a) Find the actual distance between town K and town L.

..... km [2]

(b) Measure the bearing of town L from town K.

..... [1]

5 Each student in a class of 20 students records the number of coins in their pockets.
The table shows the results.

Number of coins	0	1	2	3	4	5	6
Frequency	3	1	7	8	0	0	1

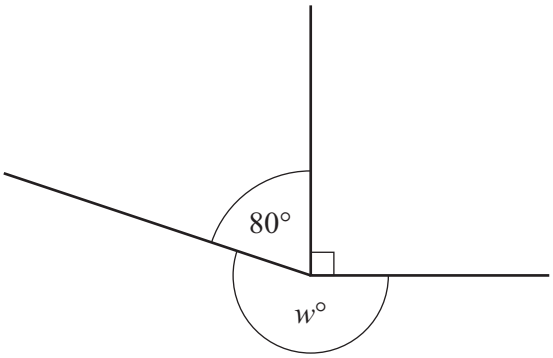
(a) Find the median.

..... [1]

(b) Calculate the mean.

..... [3]

6



NOT TO SCALE

The diagram shows three lines meeting at a point.

Find the value of w.

$w =$ ..... [1]

7 Solve the equation.

$$7 - h = 3 - 5h$$

$h =$ ..... [2]

8 Sacha buys b books and m magazines.
The cost of each book is \$12 and the cost of each magazine is \$5.

Write an expression, in terms of b and m, for the total cost of the books and the magazines.

\$ ..... [2]

9 Find the size of an interior angle of a regular 15-sided polygon.

..... [2]

10 **Without using a calculator**, work out $2\frac{1}{4} - 1\frac{11}{12}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [3]

11 Solve the simultaneous equations.

$$3p - 2q = 7$$
$$p + 2q = 1$$

$p =$ .....

$q =$ ..... [2]

12 $V = \sqrt[3]{\frac{x}{y}}$

Rearrange the formula to write x in terms of V and y.

$x =$ ..... [2]

13 Find the nth term of each sequence.

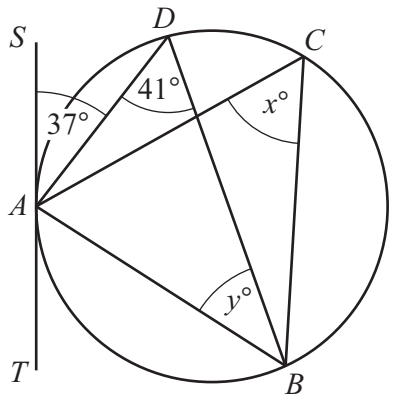
(a) 21, 13, 5, −3, −11, …

..... [2]

(b) 2.5, 5, 10, 20, 40, …

..... [2]

14 (a)



NOT TO SCALE

A, B, C and D lie on the circle.
TAS is a tangent to the circle at A.

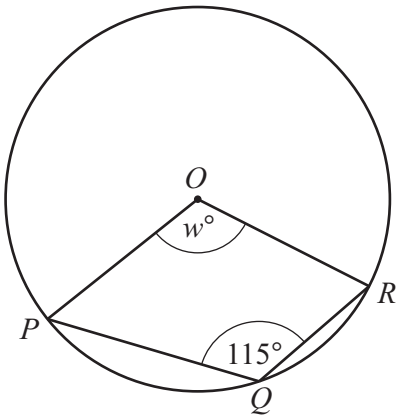
(i) Find the value of x.

$x =$ ..... [1]

(ii) Find the value of y.

$y =$ ..... [1]

(b)



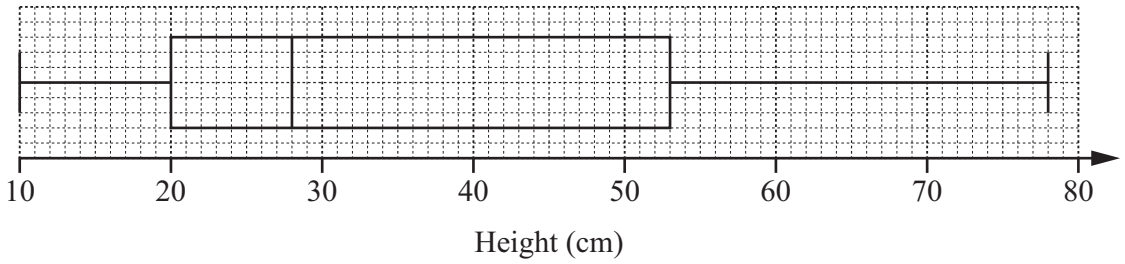
NOT TO SCALE

P, Q and R lie on the circle, centre O.

Find the value of w.

$w =$ ..... [2]

15



The box-and-whisker diagram shows information about the heights of some plants.

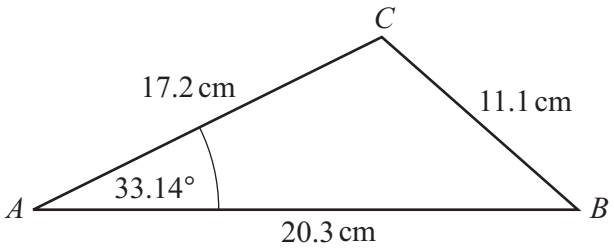
(a) Find the median height.

..... cm [1]

(b) Find the interquartile range of the heights.

..... cm [1]

16



NOT TO SCALE

Calculate the shortest distance from C to AB.

..... cm [3]

17 Simplify.

(a) $18x^{18} \div 3x^{3}$

..... [2]

(b) $\left(125y^{75}\right)^{\frac{2}{3}}$

..... [2]

18 Two mathematically similar solids have volumes $81\,\text{cm}^3$ and $24\,\text{cm}^3$.
The height of the smaller solid is 4.8 cm.

Calculate the height of the larger solid.

..... cm [3]

19 y is inversely proportional to $\sqrt{x+2}$.
When $x = 2$, $y = 3$.

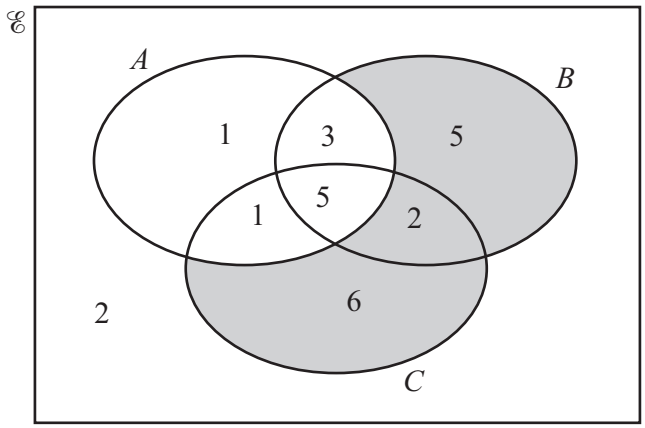
Find y in terms of x.

$y =$ ..... [2]

20 Solve the equation $\tan x + 2 = 0$ for $0° \leqslant x \leqslant 360°$.

$x =$ ..... or $x =$ ..... [3]

21



The Venn diagram shows the number of elements in each region.

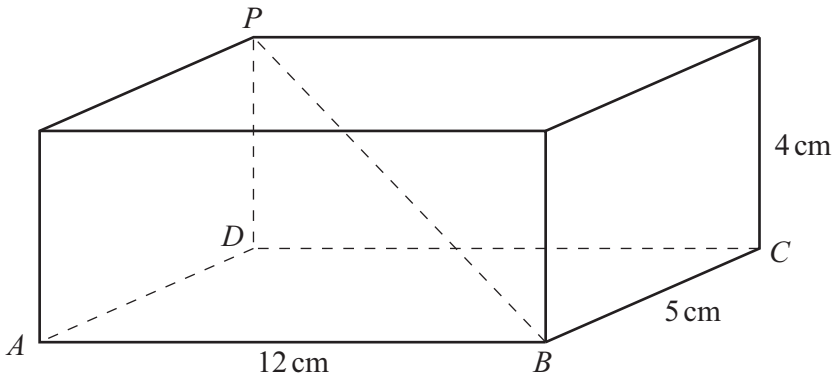
(a) Use set notation to describe the shaded region.

..... [1]

(b) Find $n(A \cap B \cap C)$.

..... [1]

22



NOT TO SCALE

The diagram shows a cuboid with a diagonal PB.

Calculate the angle between the diagonal PB and the base $ABCD$.

..... [4]

23 Write $x^2 + 8x - 7$ in the form $(x + a)^2 + b$.

..... [2]

24 A rectangle has an area of $150\,\text{m}^2$, correct to the nearest square metre.
The length of the rectangle is 22 m, correct to the nearest metre.

Calculate the upper bound of the width of the rectangle.

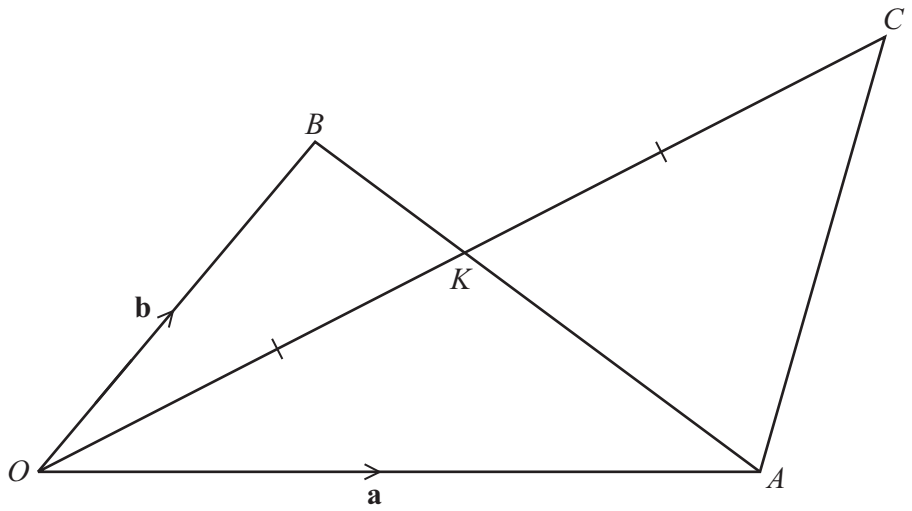
..... m [3]

25 Simplify.

$$\frac{3x - 2 - 3xy + 2y}{1 - y^2}$$

..... [4]

26



NOT TO SCALE

In the diagram, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.
$AK : KB = 2 : 1$.
$OK = KC$.

Find $\overrightarrow{AC}$ in terms of **a** and **b**.
Give your answer in its simplest form.

$\overrightarrow{AC} =$ ..... [4]