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MATHEMATICS**0580/23**

Paper 2 (Extended)

May/June 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. Any blank pages are indicated.



- 1 Write the number two million two thousand and two in figures.

..... [1]

- 2 Put one pair of brackets into this calculation to make it correct.

$$5 - 4 \times 3 - 9 - 2 = 0$$

[1]

- 3 Simplify.

$$7x - 8y - x - y$$

..... [2]

- 4 The base of a cuboid measures 10 cm by 7 cm.
The volume of the cuboid is 280 cm^3 .

Calculate the height of the cuboid.

..... cm [2]

- 5 In a city, the probability that it will rain today is 0.15 .

Find the probability that it will not rain today in this city.

..... [1]

- 6 Factorise completely.

$$4x^2y - 5xy^2$$

..... [2]



- 7 The scale of a map is 1 : 40 000.
On the map the distance between two villages is 37 cm.

Calculate the actual distance between the two villages.
Give your answer in kilometres.

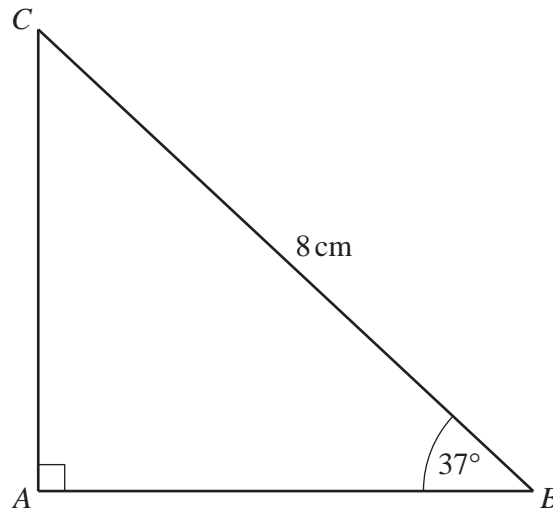
..... km [2]

- 8 Without using a calculator, work out $\frac{3}{7} - \frac{1}{14}$.

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

..... [2]

9



NOT TO
SCALE

The diagram shows a right-angled triangle.

Calculate AB .

$AB =$ cm [2]

[Turn over]





- 10 Find the gradient of the line joining the points $(-2, 7)$ and $(3, 1)$.

..... [2]

- 11 Solve the simultaneous equations.

$$5t - 2w = 19$$

$$3t + 2w = 5$$

$$t = \dots\dots\dots$$

$$w = \dots\dots\dots [2]$$

- 12 Simplify.

(a) $\frac{32g^{16}}{16g^8}$

..... [2]

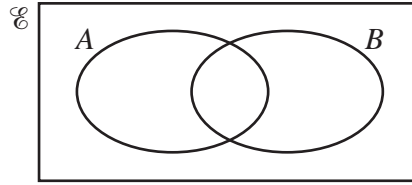
(b) $(625k^8)^{\frac{3}{4}}$

..... [2]





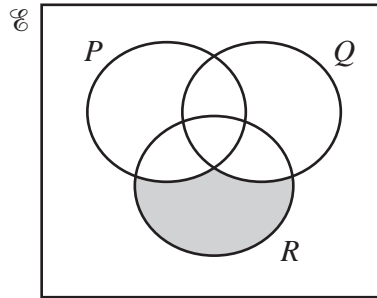
13 (a)



Shade the region $A \cup B'$.

[1]

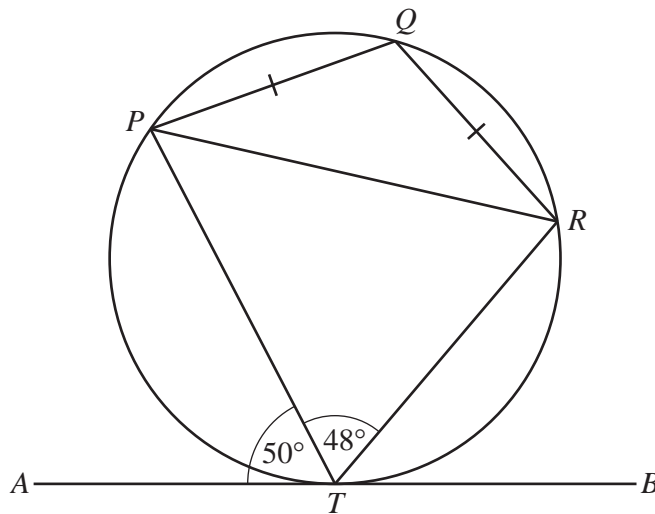
(b)



Use set notation to describe the shaded region.

..... [1]

14



NOT TO
SCALE

P, Q, R and T are points on the circle.
 AB is a tangent to the circle at T .
 Angle $ATP = 50^\circ$, angle $PTR = 48^\circ$ and $PQ = QR$.

(a) Find angle PRT .

Angle $PRT =$ [1]

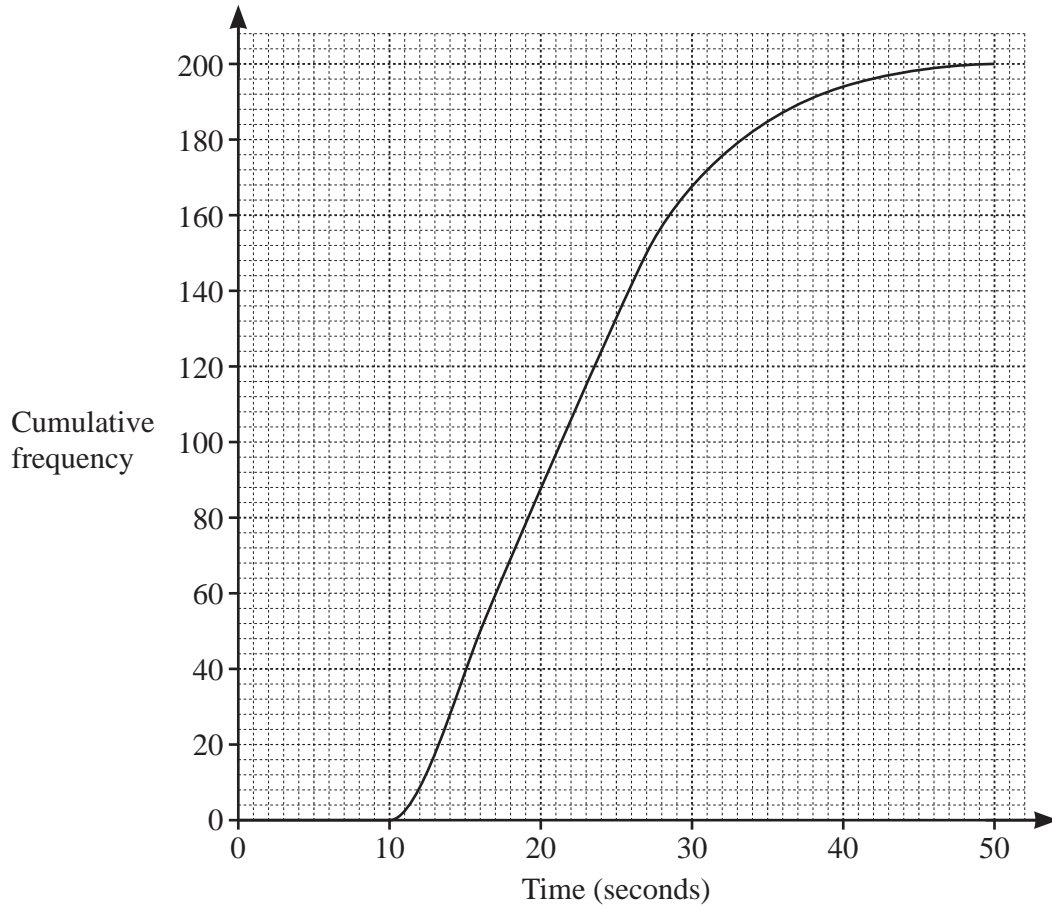
(b) Find angle QPR .

Angle $QPR =$ [2]





15



The time taken for each of 200 students to complete a calculation is measured.
The cumulative frequency diagram shows the results.

Use the diagram to find an estimate for

(a) the interquartile range

..... s [2]

(b) the number of students taking more than 40 seconds to complete the calculation.

..... [2]





16

$$A = \pi r^2 + \pi dh$$

Rearrange the formula to make h the subject.

$$h = \dots\dots\dots [2]$$

17 Work out, giving each answer in standard form.

(a) $(2.1 \times 10^{101}) \times (8 \times 10^{101})$

$$\dots\dots\dots [2]$$

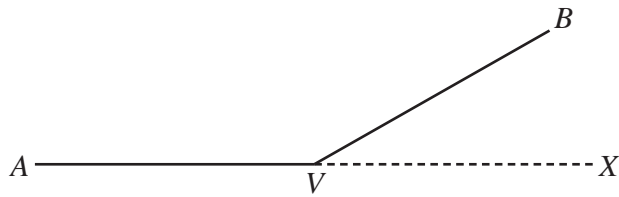
(b) $(2.1 \times 10^{101}) + (2.1 \times 10^{100})$

$$\dots\dots\dots [2]$$





18



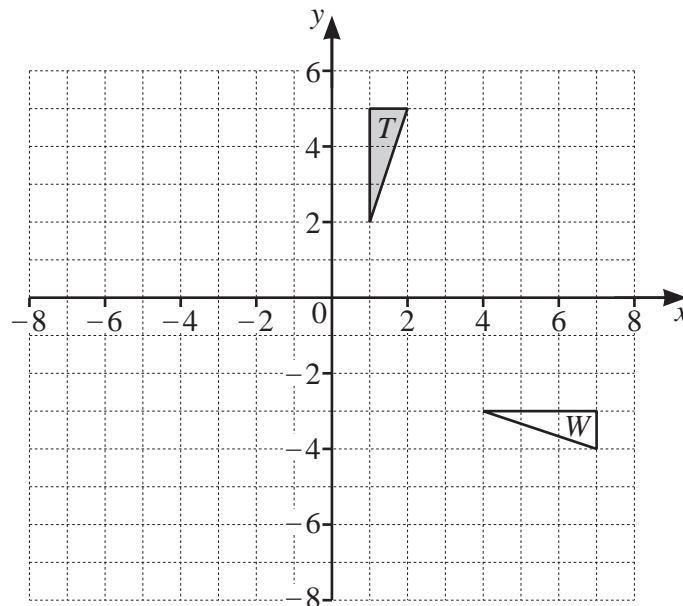
NOT TO
SCALE

The diagram shows two sides, VA and VB , of a regular polygon.
 AVX is a straight line.
 Angle $BVX = y^\circ$ and angle $AVB = 11.5y^\circ$.

Find the number of sides of this polygon.

..... [3]

19



(a) Describe fully the **single** transformation that maps triangle T onto triangle W .

.....
 [3]

(b) Draw the enlargement of triangle T with scale factor -2 and centre of enlargement $(-1, 1)$. [2]





20 $f(x) = 3^x + 2$

(a) Find x when $f(x) = 245$.

$x = \dots\dots\dots$ [2]

(b) Find x when $f^{-1}(x) = 7$.

$x = \dots\dots\dots$ [2]

21 Write the recurring decimal $0.4\dot{1}$ as a fraction in its simplest form.
You must show all your working.

$\dots\dots\dots$ [2]

22 Solve the equation $\tan x + \sqrt{3} = 0$ for $0^\circ \leq x \leq 360^\circ$.

$\dots\dots\dots$ [3]





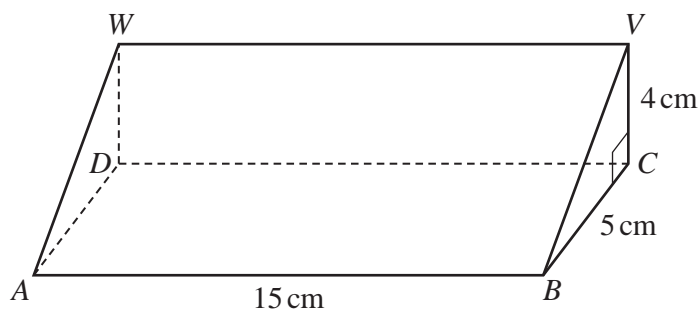
23 Simplify.

$$\frac{2}{y+1} - \frac{3}{y}$$

Give your answer as a single fraction in its simplest form.

..... [3]

24



NOT TO
SCALE

The diagram shows a triangular prism with cross-section triangle BCF .
Angle $BCF = 90^\circ$, $BC = 5\text{ cm}$, $CF = 4\text{ cm}$ and $AB = 15\text{ cm}$.

Calculate the angle between AF and the base $ABCD$.

..... [4]



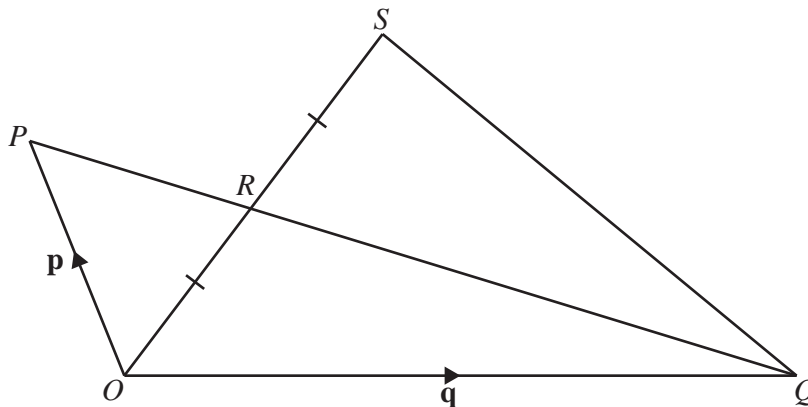


25 Simplify.

$$\frac{pt - p - t + 1}{1 - t^2}$$

..... [4]

26



NOT TO
SCALE

In the diagram, O is the origin.

$\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.

R is the point of intersection of PQ and OS , with $PR : RQ = 1 : 2$ and $OR = RS$.

Find the position vector of S in terms of \mathbf{p} and \mathbf{q} .

Give your answer in its simplest form.

..... [4]





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