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MATHEMATICS **0580/21**

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.

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1 A concert starts at 19 50 and finishes 2 hours 42 minutes later.

Work out the time the concert finishes.

..... [1]

2 Find the reciprocal of $1\frac{1}{4}$.

..... [1]

3 Use one of the symbols $<$, $>$ or $=$ to make each statement true.

$\frac{2}{7}$ 0.2861

$\frac{99}{900}$ 11%

1^3 ..... 4^0

[2]

4 Safia has a piece of fabric of length 5.6 m.
She cuts the fabric into two parts, with lengths in the ratio 3 : 4.

Calculate the length of the longer part.

..... m [2]

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5 Work out.

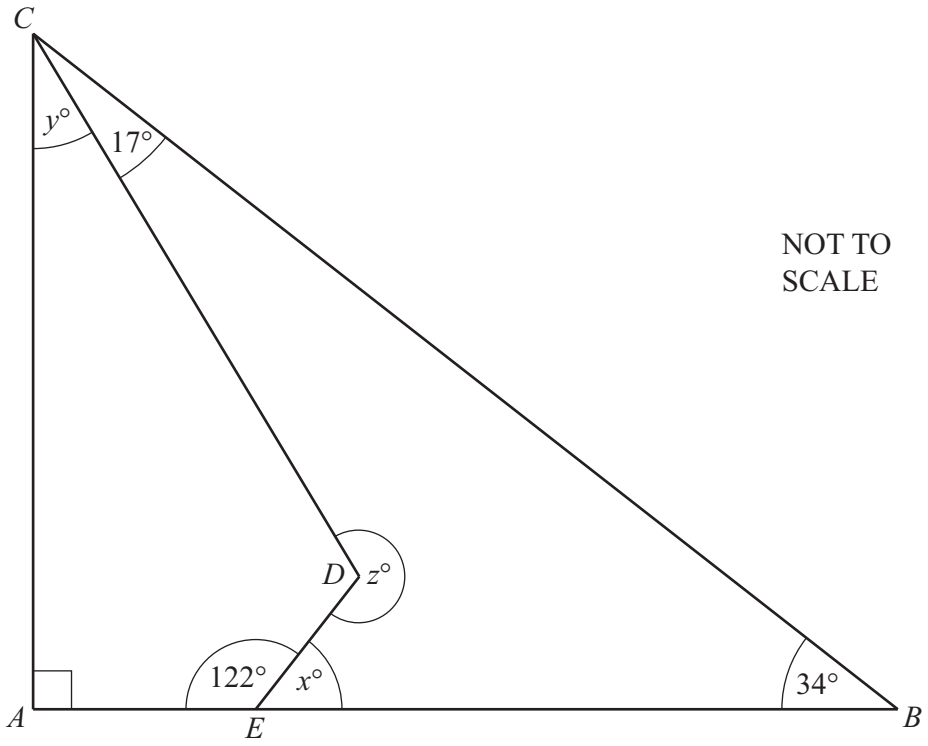
(a) $3\begin{pmatrix} 6 \\ -4 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) $\begin{pmatrix} 4 \\ -1 \end{pmatrix} + \begin{pmatrix} -7 \\ 5 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

6 The diagram shows a right-angled triangle *ABC* and a quadrilateral *AEDC*.



Find the value of

(a) x

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

(b) y

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

(c) z.

$z =$ ..... [1]

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7 Factorise.

$28x - 35$

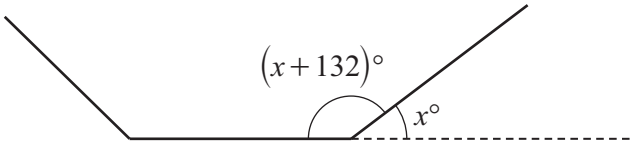
..... [1]

8 Edith invests $3000 in a savings account.
The account pays simple interest at a rate of 2.6% per year.

Calculate the total interest earned at the end of 3 years.

$ ..... [2]

9



NOT TO SCALE

The diagram shows part of a regular polygon.
The interior angle of the polygon is 132° larger than the exterior angle.

Calculate the number of sides of this polygon.

..... [3]

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10 Jacinda plays a game with her friend.
She can win, lose or draw the game.
The probability that she wins the game is 0.28 .

(a) Jacinda is twice as likely to draw the game as to lose the game.

Work out the probability that she loses the game.

..... [2]

(b) Jacinda plays the game 150 times.

Find the expected number of times that **she wins**.

..... [1]

11 **Without using a calculator**, work out $5\frac{1}{3} - 3\frac{4}{7}$.
You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

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12 Solve the simultaneous equations.
You must show all your working.

$$5x + 6y = 9$$
$$3x - 2y = -17$$

$x =$ .....

$y =$ .....
[3]

13 **(a)** A sequence has nth term $3n^2 - 1$.

Find the second term in this sequence.

..... [1]

(b) The table shows the first five terms of sequences A and B.

	1st term	2nd term	3rd term	4th term	5th term	nth term
Sequence A	–6	–2	2	6	10	
Sequence B	3	17	55	129	251	

Complete the table to show the nth term of each sequence.

[4]

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14 Two solid steel statues are mathematically similar.
The smaller statue has height 12 cm and the larger statue has height 15 cm.
The larger statue has a mass 2.5 kg.
The density of steel is 8 g/cm^3.

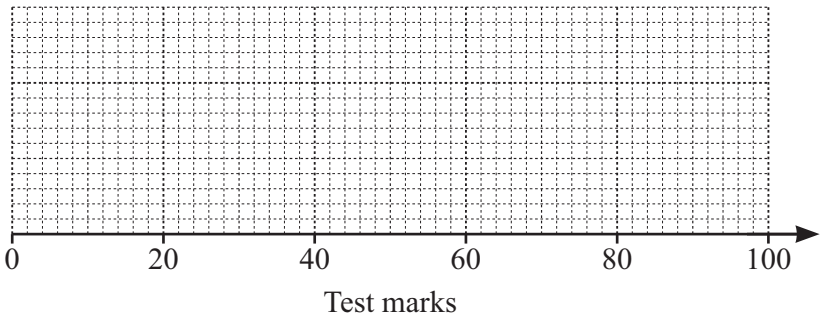
Calculate the volume of the smaller statue.
[Density = mass ÷ volume.]

..... cm^3 [4]

15 Students in class *P* take a test.
These statistics show information about their marks.

- lower quartile = 38
- median = 53
- interquartile range = 28
- range = 81
- highest mark = 96

(a) Draw a box-and-whisker plot to represent this information.



[3]

(b) Students in class *Q* take the same test.
For class *Q*, the median is 49 and the interquartile range is 35.

Make two comments comparing the distribution of marks for class *P* with that of class *Q*.

1. .....

.....

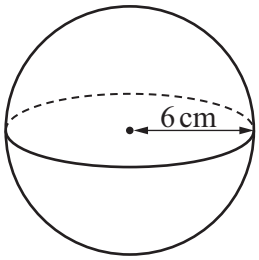
2. .....

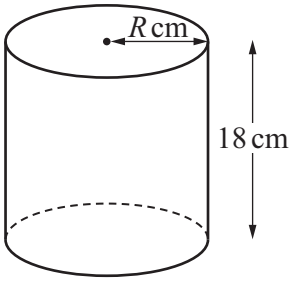
.....

[2]

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16





NOT TO SCALE

The diagram shows a sphere of radius 6 cm and a cylinder of height 18 cm and radius R cm.
The volume of the sphere is equal to the volume of the cylinder.

Calculate the curved surface area of the cylinder.
Give your answer in terms of π.
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$]

..... cm^2 [4]

17 Solve.

$$3x^2 - 7x - 16 = 0$$

You must show all your working and give your answers correct to 2 decimal places.

$x =$ ..... or $x =$ ..... [4]

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18 $g(x) = 4^{x+3}$

(a) Find x when $g(x) = 1$.

..... [1]

(b) Find $g^{-1}\left(\frac{1}{16}\right)$.

..... [2]

19 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$P = \{\text{odd numbers}\}$
$Q = \{\text{multiples of 3}\}$
$R = \{\text{square numbers}\}$

(a) Find $P \cap Q \cap R$.

{ ..... } [1]

(b) **(i)** Find $Q \cup R$.

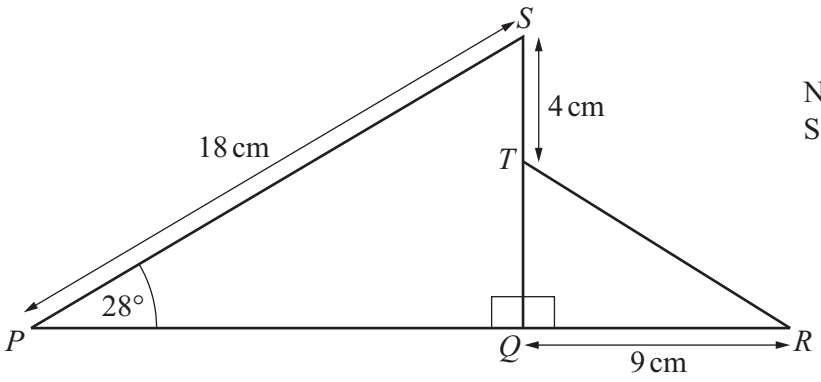
{ ..... } [1]

(ii) Find $n\left(P \cap (Q \cup R)'\right)$.

..... [1]

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20



The diagram shows two right-angled triangles PQS and RQT.
PQR and QTS are straight lines.

Calculate angle QTR.

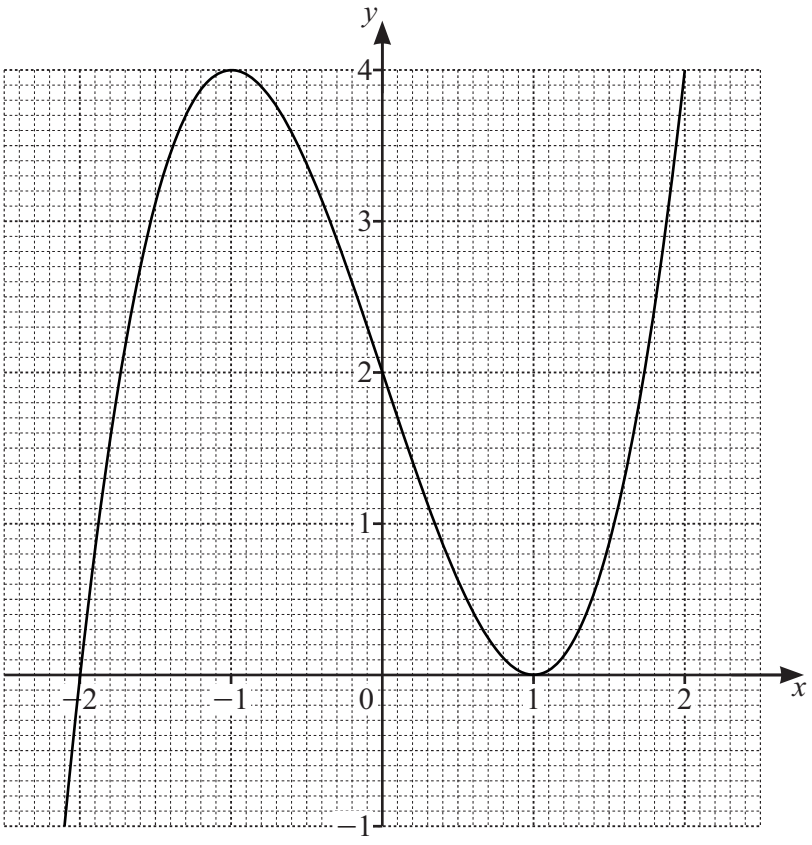
Angle QTR = ... [5]

21 Solve the equation $3\tan x + 5 = 1$ for $0° \leqslant x \leqslant 360°$.

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

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22 The graph of $y = (x+2)(x-1)^2$ is shown on the grid.



(a) Show that $y = (x+2)(x-1)^2$ can be written as $y = x^3 - 3x + 2$.

[2]

(b) By drawing a suitable straight line, solve the equation $2x^3 - 5x = 0$.

$x =$ ..... or $x =$ ..... or $x =$ ..... [4]

Question 23 is printed on the next page.

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23 $(x-5)^2+k=x^2-px-21$

Find the value of p and the value of k.

$p =$ .....

$k =$ .....
[2]

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