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MATHEMATICS**0580/21**

Paper 2 (Extended)

May/June 2023**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.

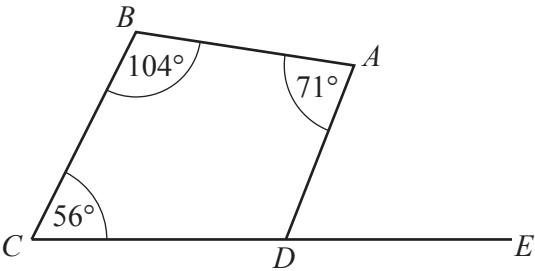
INFORMATION

- 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.

2

1



NOT TO
SCALE

CDE is a straight line.

Find angle ADE .

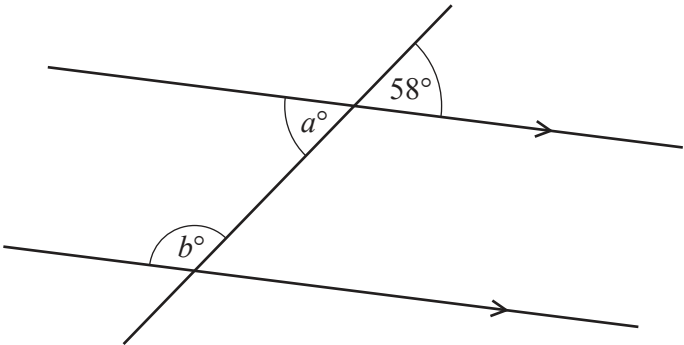
..... [2]

- 2 A train journey starts at 21 43.
It takes 8 hours and 32 minutes.

Find the time the journey finishes.

..... [1]

3



NOT TO
SCALE

The diagram shows a straight line intersecting two parallel lines.

Find the value of a and the value of b , giving a geometrical reason for each answer.

$a =$ because

$b =$ because [4]

3

- 4 By writing each number in the calculation correct to 1 significant figure, work out an estimate for the value of

$$\frac{6.7 \times 2.1}{18 - 5.9}.$$

You must show all your working.

..... [2]

- 5 Eric has four colours of paint.
The table shows the probability that he uses each colour.

Colour	Red	Blue	Green	Yellow
Probability	0.3	0.35	0.13	x

Find the value of x .

$x =$ [2]

- 6 Calculate the volume of a sphere with diameter 4.8 cm.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

..... cm^3 [2]

- 7 The scale of a map is 1 : 125 000.
On a map, the length of an island is 9.4 cm.

Calculate the actual length of the island, giving your answer in kilometres.

..... km [2]
[Turn over]

4

- 8 (a) The n th term of a sequence is $10 - n^2$.

Write down the first three terms of this sequence.

.....,, [2]

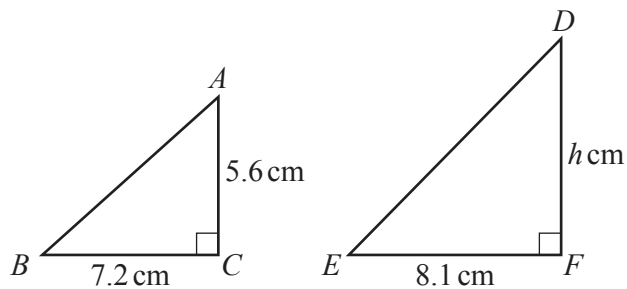
- (b) These are the first four terms of another sequence.

7 10 13 16

Find an expression for the n th term of this sequence.

..... [2]

9



NOT TO
SCALE

Triangle ABC is similar to triangle DEF .

Calculate the value of h .

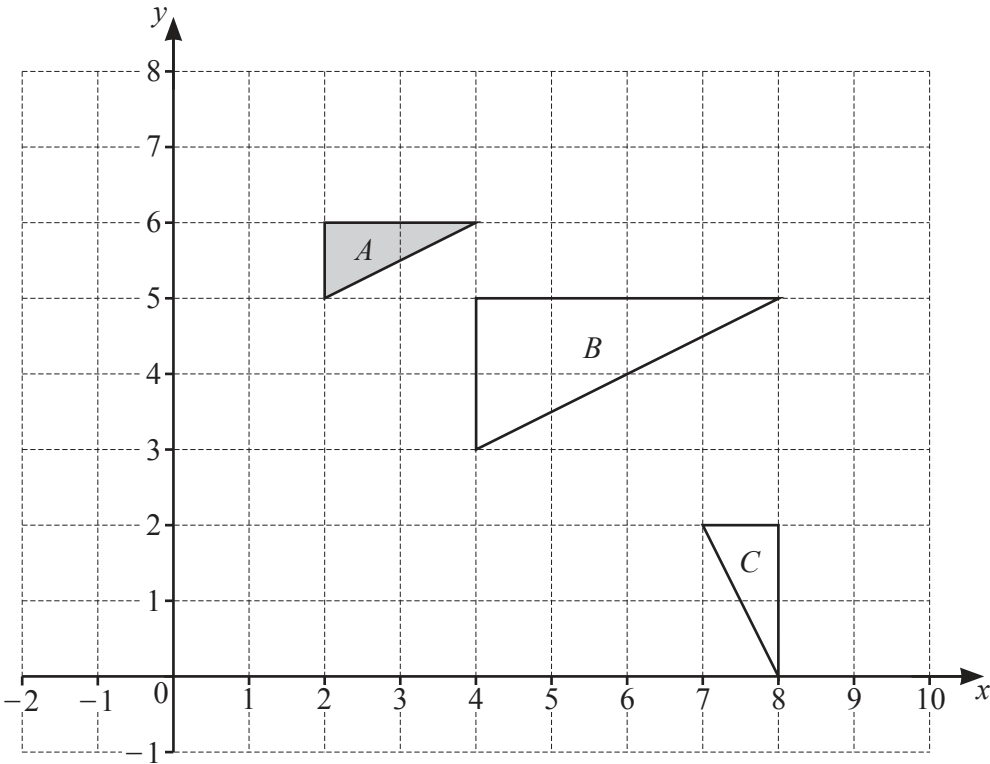
$h =$ [2]

10 Without using a calculator, work out $2\frac{1}{7} \div \frac{5}{9}$.

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

..... [3]

11



Describe the **single** transformation that maps

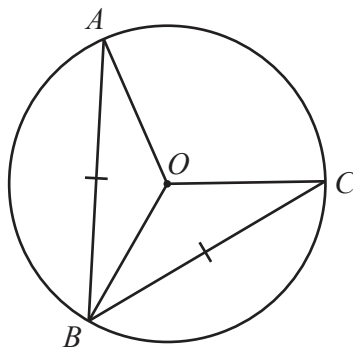
(a) triangle *A* onto triangle *B*

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

(b) triangle *A* onto triangle *C*.

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

12 (a)

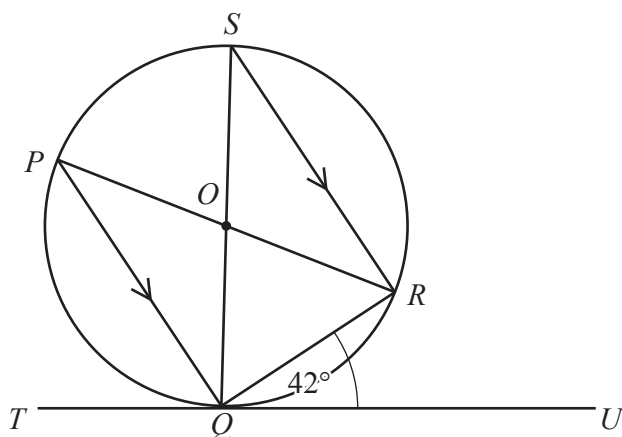
NOT TO
SCALE AO , OB and OC are all radii of the circle. $AB = BC$.Therefore triangle AOB is congruent to triangle COB .

Draw a ring around the correct criterion for this statement.

*SAS**RHS**SSS**ASA*

[1]

(b)

NOT TO
SCALE P , Q , R and S are points on the circle and TQU is a tangent to the circle at Q . PR and SQ intersect at the centre of the circle, O , and PQ is parallel to SR .Angle $RQU = 42^\circ$.

Calculate

(i) angle QSR Angle $QSR = \dots\dots\dots$ [1](ii) angle PQS Angle $PQS = \dots\dots\dots$ [1](iii) angle POS .Angle $POS = \dots\dots\dots$ [1]

7

- 13** Anya invests \$6000 in an account that pays compound interest at a rate of $r\%$ per year. At the end of 8 years, the account has earned \$621.70 in interest.

Calculate the value of r .

$r = \dots\dots\dots$ [3]

- 14** y is directly proportional to the square of $(x + 3)$.
When $x = 2$, $y = 5$.

Find y when $x = 1$.

$y = \dots\dots\dots$ [3]

- 15** A bag contains 5 green buttons, 2 blue buttons and 6 white buttons.
Maya takes two buttons at random from the bag, without replacement.

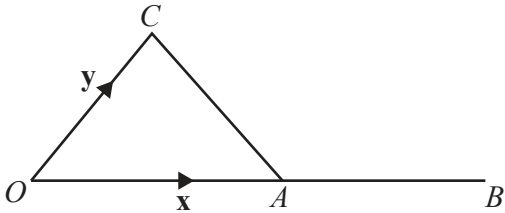
Calculate the probability that one button is green and the other button is not green.

$\dots\dots\dots$ [3]

16 (a) Find the magnitude of the vector $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$.

..... [2]

(b)



NOT TO
SCALE

The diagram shows a triangle OAC .
 A is the midpoint of the straight line OB .
 $\overrightarrow{OA} = \mathbf{x}$ and $\overrightarrow{OC} = \mathbf{y}$.

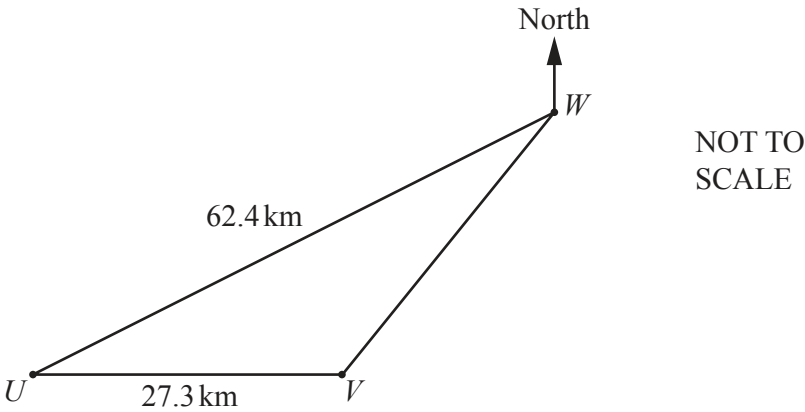
Find $\overrightarrow{CB}$ in terms of $\mathbf{x}$ and $\mathbf{y}$.

$\overrightarrow{CB} =$ [1]

17 Simplify $(81x^{12})^{\frac{3}{4}}$.

..... [2]

18



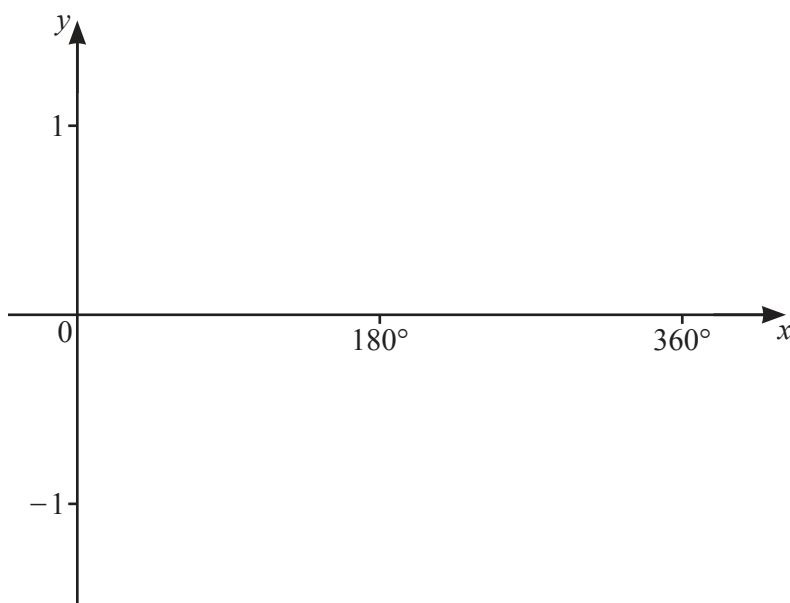
The diagram shows the position of three towns, U , V and W .
 U is due west of V and angle $UVW = 125^\circ$.

Calculate the bearing of U from W .

..... [4]

10

- 19 (a)** On the diagram, sketch the graph of $y = \cos x$ for $0^\circ \leq x \leq 360^\circ$.



[2]

- (b)** Solve the equation $5 \cos x + 3 = 0$ for $0^\circ \leq x \leq 360^\circ$.

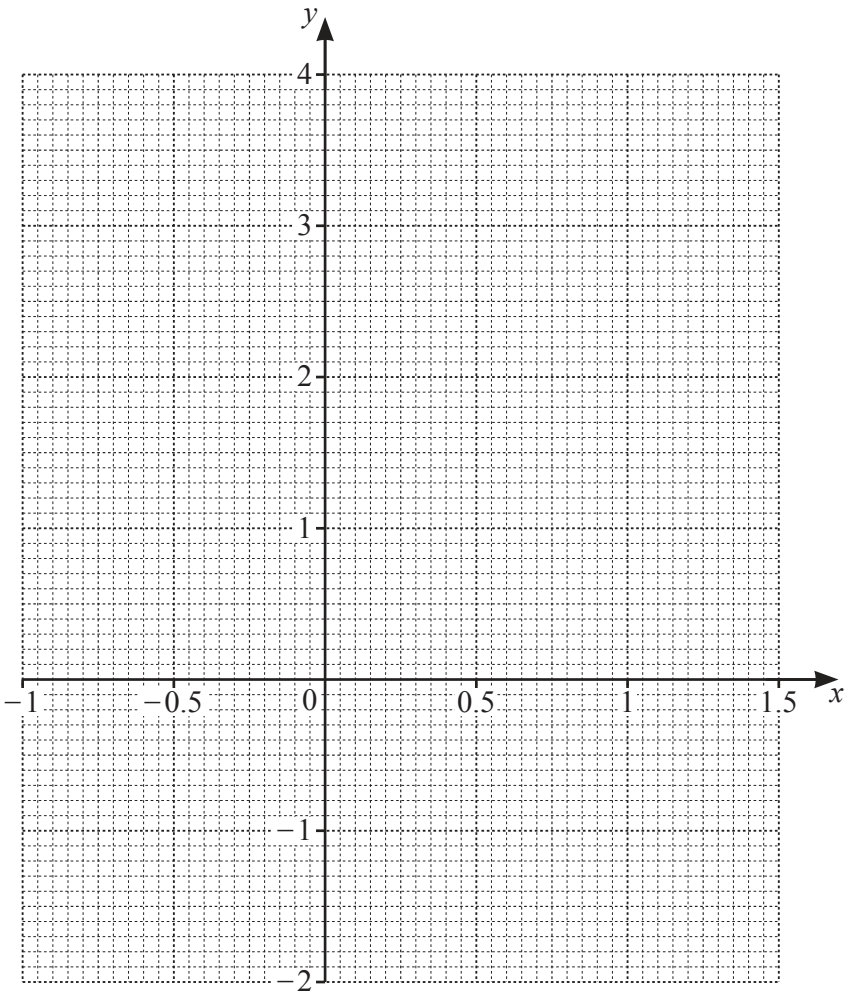
$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [3]

20 The table shows some values for $y = 3x^2 - 2x - 1$.

x	-1	-0.5	0	0.5	1	1.5
y	4		-1		0	2.75

(a) Complete the table. [1]

(b) On the grid, draw the graph of $y = 3x^2 - 2x - 1$ for $-1 \leq x \leq 1.5$.



[3]

(c) By drawing a suitable straight line, solve the equation $3x^2 - 4x - 2 = 0$ for $-1 \leq x \leq 1.5$.

$x =$ [3]

Question 21 is printed on the next page.

12

21 A curve has equation $y = x^3 - 12x$.

(a) Find the gradient of the curve at the point $(1, -11)$.

..... [3]

(b) Find the coordinates of the turning points of the curve.

(..... ,) and (..... ,) [3]

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