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MATHEMATICS**0580/21**

Paper 2 (Extended)

May/June 2021**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.

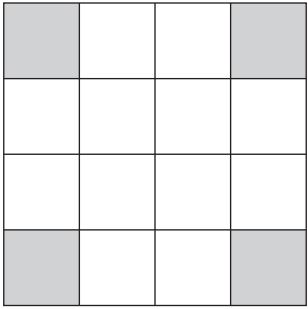
INFORMATION

- 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.

2

1



(a) Write down the order of rotational symmetry of this diagram.

..... [1]

(b) On the diagram, draw all the lines of symmetry.

[2]

2 The probability that a train is late is 0.15 .

Write down the probability that the train is not late.

..... [1]

3 The stem-and-leaf diagram shows the number of hours that each of 16 students studied last week.

1	2	5	6	8	
2	0	1	1	7	9
3	2	3	4	5	
4	4	5	7		

Key: 1|2 represents 12 hours

Find

(a) the median,

..... h [1]

(b) the mode,

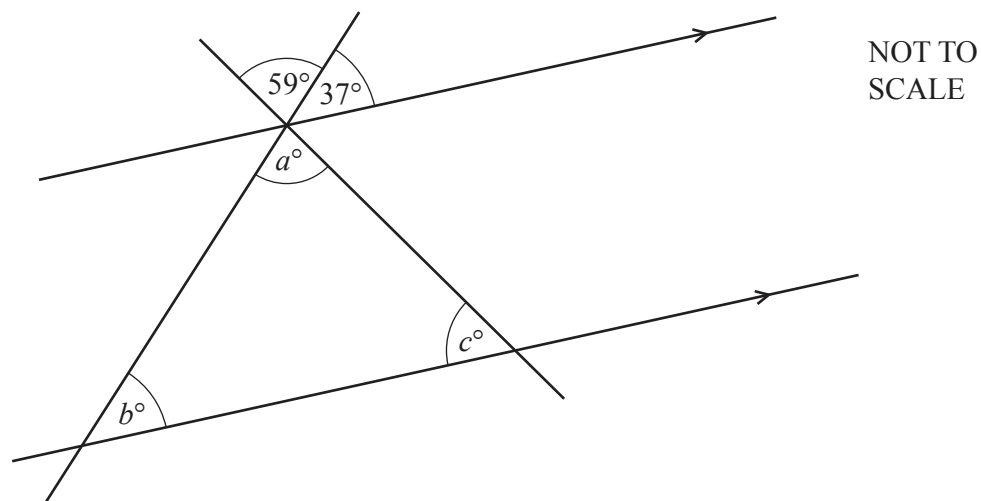
..... h [1]

(c) the range.

..... h [1]

3

4



The diagram shows two parallel lines intersected by two straight lines.

Find the values of a , b and c .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

$$c = \dots\dots\dots [3]$$

5 Work out.

(a) $\begin{pmatrix} 6 \\ -5 \end{pmatrix} + \begin{pmatrix} 8 \\ -1 \end{pmatrix}$

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

(b) $3 \begin{pmatrix} -4 \\ 7 \end{pmatrix}$

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

4

- 6 (a) The n th term of a sequence is $n^2 + 3n$.

Find the first three terms of this sequence.

.....,, [2]

- (b) These are the first five terms of a different sequence.

25 18 11 4 −3

Find the n th term of this sequence.

..... [2]

- 7 Solve the simultaneous equations.
You must show all your working.

$$2x + y = 3$$

$$x - 5y = 40$$

$$x = \dots\dots\dots$$

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

5

- 8** **Without using a calculator**, work out $1\frac{3}{8} - \frac{5}{6}$.

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

..... [3]

- 9** A is the point $(5, -5)$ and B is the point $(9, 3)$.

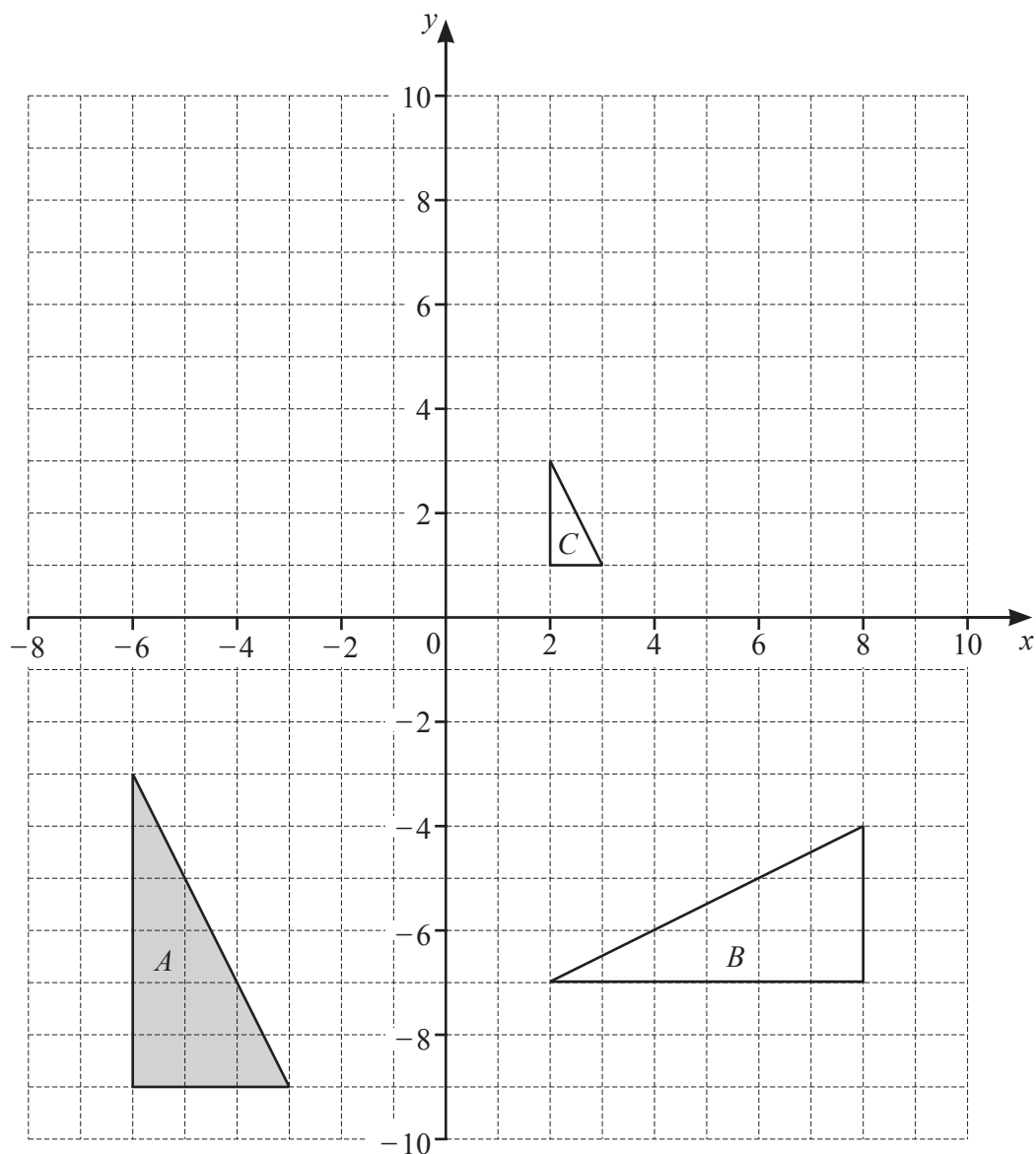
(a) Find the coordinates of the midpoint of AB .

(..... ,) [2]

(b) Find the length of AB .

..... [3]

10



(a) Describe fully the **single** transformation that maps

(i) triangle A onto triangle B ,

.....
 [3]

(ii) triangle A onto triangle C .

.....
 [3]

(b) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} 2 \\ 10 \end{pmatrix}$. [2]

7

- 11 (a) Simplify fully.

$$(4ab^5)^4$$

..... [2]

(b) $2p^{\frac{1}{3}} = 6$

Find the value of p .

$p =$ [1]

(c) $81^2 \div 3^t = 9$

Find the value of t .

$t =$ [2]

- 12 The profit a company makes decreases exponentially at a rate of 0.9% per year.
In 2014, the profit was \$9500.

Calculate the profit in 2019.

\$ [2]

- 13** On a map, a lake has an area of 32 cm^2 .
The scale of the map is $1 : 24\,000$.

Calculate the actual area of the lake.
Give your answer in km^2 .

..... km^2 [2]

- 14** y is directly proportional to the square root of $(x - 3)$.
When $x = 28$, $y = 20$.

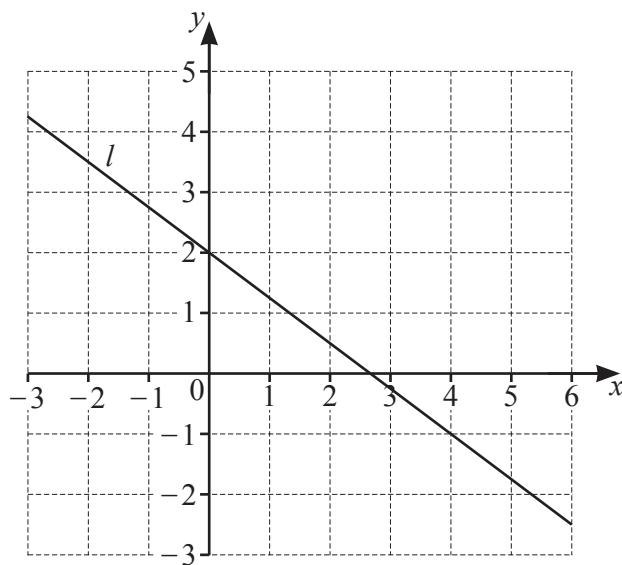
Find y when $x = 39$.

$y =$ [3]

- 15** Make h the subject of the formula $2mh = g(1 - h)$.

$h =$ [4]

16



- (a) Find the gradient of line l .

..... [2]

- (b) Find the equation of line l in the form $y = mx + c$.

$y =$ [2]

- (c) Find the equation of the line that is perpendicular to line l and passes through the point $(12, -7)$.
Give your answer in the form $y = mx + c$.

$y =$ [3]

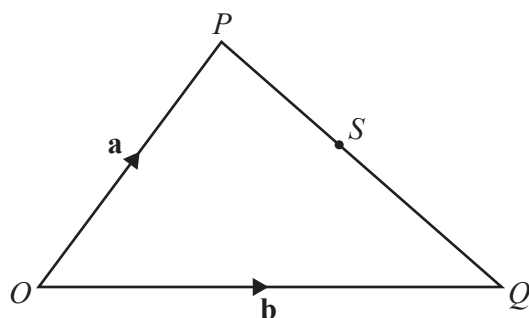
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- 17 A bag contains 3 blue buttons, 8 white buttons and 5 red buttons.
Two buttons are picked at random from the bag, without replacement.

Work out the probability that the two buttons are either both red or both white.

..... [3]

18



NOT TO
SCALE

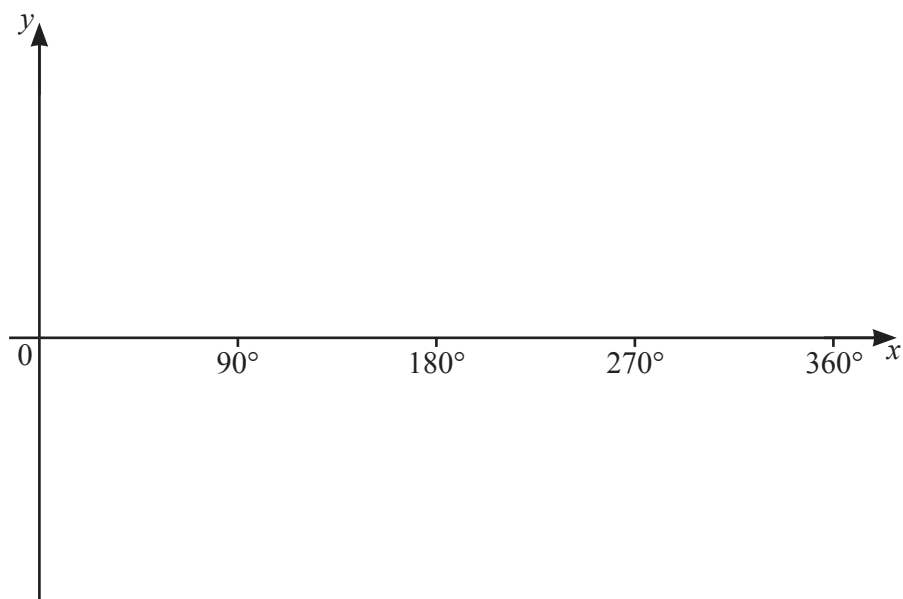
S is a point on PQ such that $PS : SQ = 4 : 5$.

Find $\overrightarrow{OS}$, in terms of $\mathbf{a}$ and $\mathbf{b}$, in its simplest form.

$\overrightarrow{OS} =$ [2]

11

- 19 (a)** Sketch the graph of $y = \tan x$ for $0^\circ \leq x \leq 360^\circ$.



[2]

- (b)** Solve the equation $5 \tan x = 1$ for $0^\circ \leq x \leq 360^\circ$.

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

- 20** The distance between two towns is 600 km, correct to the nearest 10 km.
A car takes 8 hours 40 minutes, correct to the nearest 10 minutes, to travel this distance.

Calculate the lower bound for the average speed of the car in km/h.

$\dots\dots\dots$ km/h [3]

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