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MATHEMATICS**0580/22**

Paper 2 (Extended)

February/March 2020**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. Blank pages are indicated.

2

1 3.56 5 $\sqrt{196}$ 8 $\sqrt{7}$ 12

From the list, write down a number that is

(a) a multiple of 3,

..... [1]

(b) a cube number,

..... [1]

(c) a prime number,

..... [1]

(d) an irrational number.

..... [1]

2 The number of people swimming in a pool is recorded each day for 12 days.

24 28 13 38 15 26
45 21 48 36 18 38

(a) Complete the stem-and-leaf diagram.

1	
2	
3	
4	

Key: 1 | 3 represents 13 swimmers

[2]

(b) Find the median number of swimmers.

..... [1]

3

- 3** Point A has coordinates $(6, 4)$ and point B has coordinates $(2, 7)$.

Write $\overrightarrow{AB}$ as a column vector.

$$\overrightarrow{AB} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

- 4** Find the interior angle of a regular polygon with 24 sides.

..... [2]

- 5** **Without using a calculator,** work out $\frac{15}{28} \div \frac{4}{7}$.

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

..... [3]

4

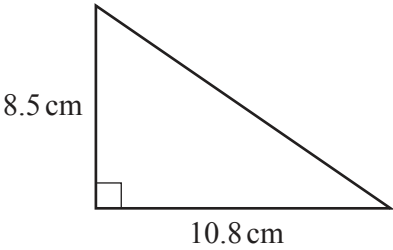
6 The table shows the marks scored by 40 students in a test.

Mark	5	6	7	8	9	10
Frequency	8	5	11	7	5	4

Calculate the mean mark.

..... [3]

7



NOT TO
SCALE

The diagram shows a right-angled triangle.

(a) Calculate the area.

..... cm² [2]

(b) Calculate the perimeter.

..... cm [3]

5

- 8** Calculate the value of $(2.3 \times 10^{-3}) + (6.8 \times 10^{-4})$.
Give your answer in standard form.

..... [1]

- 9 (a)** Factorise completely.

$$3x^2 - 12xy$$

..... [2]

- (b)** Expand and simplify.

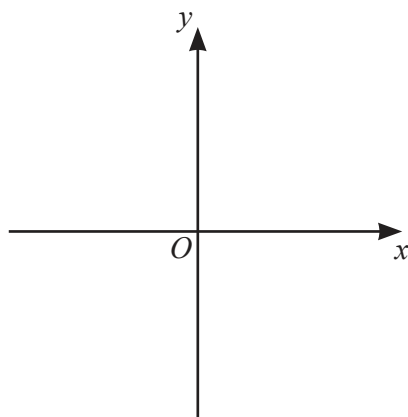
$$(m - 3)(m + 2)$$

..... [2]

6

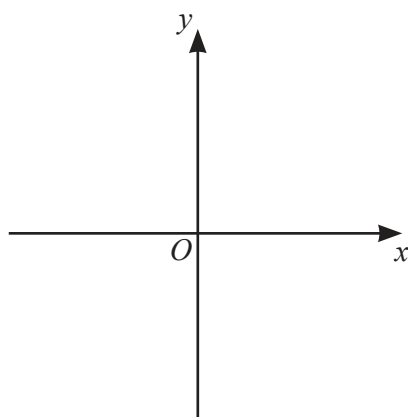
10 Sketch the graph of each function.

(a) $y = x - 3$



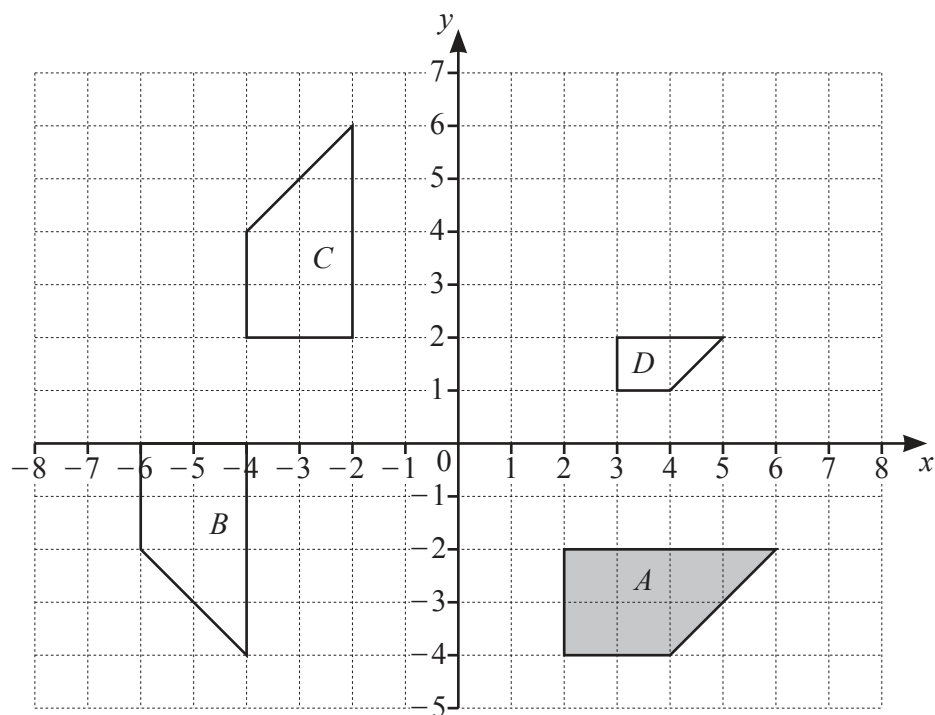
[1]

(b) $y = \frac{1}{x}$



[2]

11



Describe fully the **single** transformation that maps

- (a) shape *A* onto shape *B*,

.....
 [3]

- (b) shape *A* onto shape *C*,

.....
 [2]

- (c) shape *A* onto shape *D*.

.....
 [3]

8

- 12** The population of a town decreases exponentially at a rate of 1.7% per year.
The population now is 250 000.

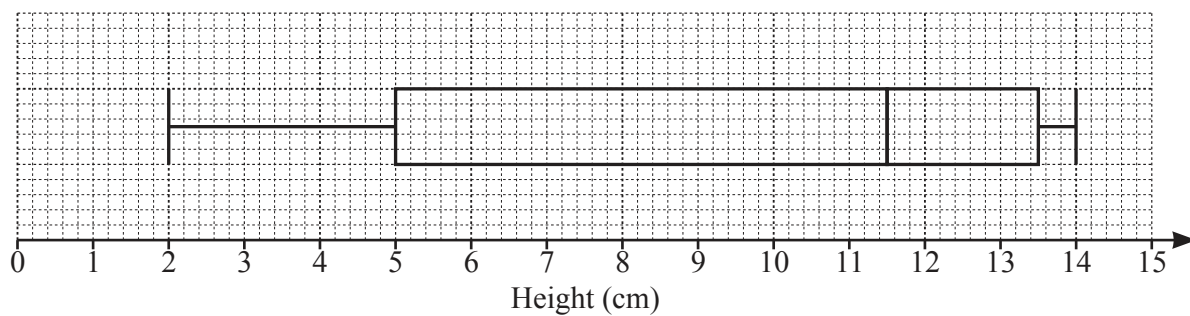
Calculate the population at the end of 5 years.
Give your answer correct to the nearest hundred.

..... [3]

- 13** Write the recurring decimal $0.2\dot{6}$ as a fraction.
You must show all your working.

..... [2]

- 14 The box-and-whisker plot gives information about the heights, in centimetres, of some plants.



- (a) Write down the median.

..... cm [1]

- (b) Find

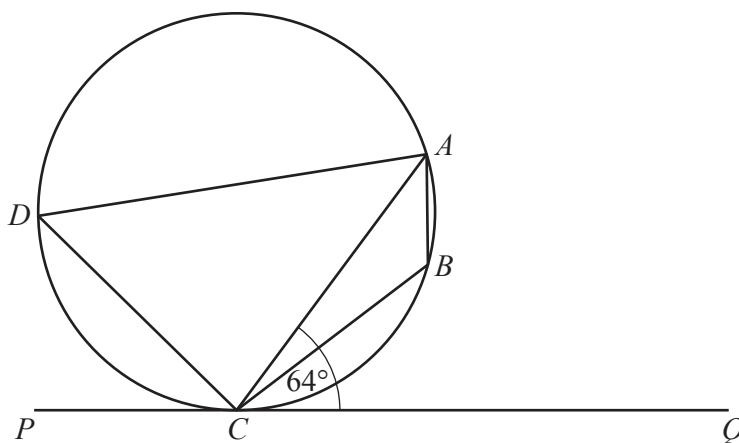
- (i) the range,

..... cm [1]

- (ii) the interquartile range.

..... cm [1]

15



NOT TO
SCALE

A, B, C and D lie on the circle.
 PCQ is a tangent to the circle at C .
 Angle $ACQ = 64^\circ$.

Work out angle ABC , giving reasons for your answer.

Angle $ABC =$ because

.....

..... [3]

10

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

$$\begin{aligned}x &= 7 - 3y \\ x^2 - y^2 &= 39\end{aligned}$$

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

$$x = \dots\dots\dots y = \dots\dots\dots [6]$$

- 17** A is the point $(3, 5)$ and B is the point $(1, -7)$.

Find the equation of the line perpendicular to AB that passes through the point A .
Give your answer in the form $y = mx + c$.

$$y = \dots\dots\dots [4]$$

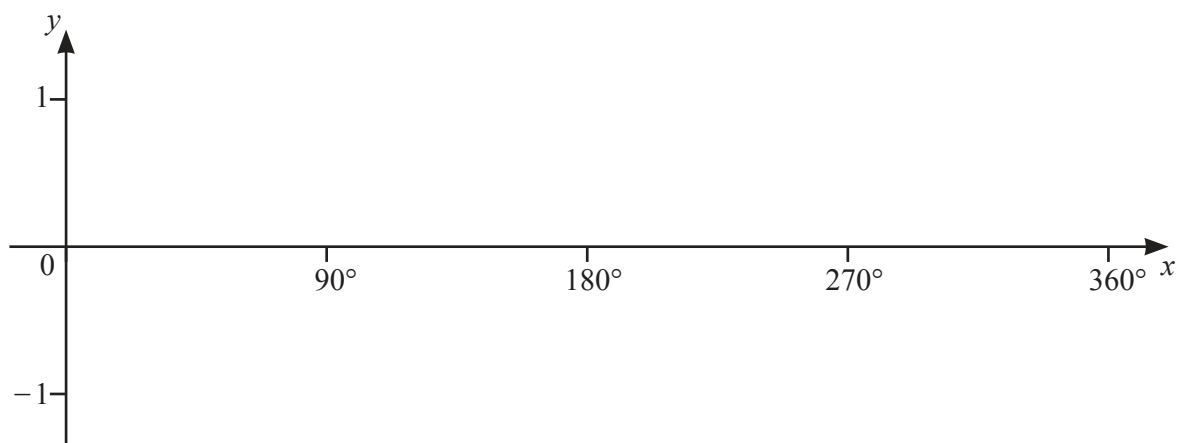
11

- 18** A car travels at a constant speed.
It travels a distance of 146.2 m, correct to 1 decimal place.
This takes 7 seconds, correct to the nearest second.

Calculate the upper bound for the speed of the car.

..... m/s [3]

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 $4 \cos x + 2 = 3$ for $0^\circ \leq x \leq 360^\circ$.

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

Questions 20 and 21 are printed on the next page.

20 $x^2 - 12x + a = (x + b)^2$

Find the value of a and the value of b .

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

$$b = \dots\dots\dots [2]$$

21 $\overrightarrow{XY} = 3\mathbf{a} + 2\mathbf{b}$ and $\overrightarrow{ZY} = 6\mathbf{a} + 4\mathbf{b}$.

Write down two statements about the relationship between the points X , Y and Z .

1 [2]

2 [2]

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