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MATHEMATICS 0580/22

Paper 2 (Extended) May/June 2022

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  $\pi$ , use either your calculator value or 3.142.

## **INFORMATION**

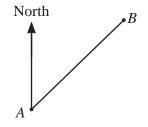
- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in brackets [ ].

This document has 12 pages. Any blank pages are indicated.

| Work out the difference in temperature between noon and midnight.  "C  Thibault records the number of cars of each colour in a car park.  Colour Black White Silver Red Number of cars 8 5 4 3  He draws a pie chart to show this information.  Calculate the sector angle for the red cars. | A | At noon, the temperate At midnight, the temp | ture is 4°C. perature is -9°C.      |                      |                   |                     |       |
|--|---|--|-------------------------------------|----------------------|-------------------|---------------------|-------|
| Thibault records the number of cars of each colour in a car park.    Colour Black White Silver Red   Number of cars 8 5 4 3    He draws a pie chart to show this information.  | V | Work out the differen                        | ce in temperature l                 | between noon and     | midnight.         |                     |       |
| Thibault records the number of cars of each colour in a car park.    Colour Black White Silver Red   Number of cars 8 5 4 3    He draws a pie chart to show this information.  |   |  |                                     |                      |                   |                     |       |
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| Colour     Black     White     Silver     Red       Number of cars     8     5     4     3   He draws a pie chart to show this information.  |   |  |                                     |                      |                   |                     | °C    |
| Number of cars 8 5 4 3  He draws a pie chart to show this information.   | Τ | Thibault records the r                       | number of cars of e                 | each colour in a car | r park.           |                     |       |
| He draws a pie chart to show this information.   |   | Colour                                       | Black                               | White                | Silver            | Red                 |       |
|  |   | Number of cars                               | 8                                   | 5                    | 4                 | 3                   |       |
|  | F | He draws a pie chart                         | to show this inforn                 | nation.              |                   |                     |       |
|  |   |  |                                     |                      | ••••••            |                     | ••••• |
|  |   |  |                                     |                      |                   |                     |       |
| Figs cost 43 cents each. Lyra has \$5 to buy some figs.  | C | Calculate the largest                        | number of figs Lyr                  | a can buy and the    | amount of change, | in cents, she recei | ves.  |
| Figs cost 43 cents each.   |   |  |                                     |                      |                   |                     |       |
| Figs cost 43 cents each.<br>Lyra has \$5 to buy some figs.   |   |  |                                     |                      |                   |                     |       |
| Figs cost 43 cents each.<br>Lyra has \$5 to buy some figs.   |   |  |                                     |                      | . figs and        | cents cha           | ange  |
| Figs cost 43 cents each.<br>Lyra has \$5 to buy some figs.   | F | Find the value of $\sqrt{6}$                 | $\overline{68} \times \sqrt{153}$ . |                      |                   |                     |       |
| Figs cost 43 cents each. Lyra has \$5 to buy some figs.  Calculate the largest number of figs Lyra can buy and the amount of change, in cents, she receives.   |   |  |                                     |                      |                   |                     |       |
| Figs cost 43 cents each. Lyra has \$5 to buy some figs.  Calculate the largest number of figs Lyra can buy and the amount of change, in cents, she receives.   |   |  |                                     |                      |                   |                     |       |
| Figs cost 43 cents each. Lyra has \$5 to buy some figs.  Calculate the largest number of figs Lyra can buy and the amount of change, in cents, she receives.   |   |  |                                     |                      |                   |                     |       |

| 5 | Find the total surface area of                                 | a cuboid with lengt | h 8cm, width 6cn   | and height 3 cm. |         |
|---|--|---------------------|--------------------|------------------|---------|
|   |  |                     |                    |                  |         |
|   |  |                     |                    |                  |         |
|   |  |                     |                    |                  |         |
|   |  |                     |                    |                  | am² [2] |
|   |  |                     |                    |                  | cm [3]  |
| 6 | Some cards have either a squ<br>Piet chooses one of the cards  |                     | angle drawn on the | em.              |         |
|   | Complete the table to show t                                   |                     | oosing a card with | each shape.      |         |
|   |  |                     |                    |                  |         |
|   | Shape  | Square              | Circle             | Triangle         |         |
|   | Probability  | 0.2                 | 0.32               |                  |         |
|   |  |                     |                    |                  | [2]     |
| 7 | The price of a coat is \$126. In a sale, this price is reduced | d by 18%.           |                    |                  |         |
|   | Find the sale price of the coa                                 | t.                  |                    |                  |         |
|   |  |                     |                    |                  |         |
|   |  |                     |                    |                  |         |
|   |  |                     |                    |                  |         |
|   |  |                     |                    |                  |         |
|   |  |                     | 9                  | S                | [2]     |
| 8 | The <i>n</i> th term of a sequence is                          | $n^2 + 12$ .        |                    |                  |         |
|   | Find the first three terms of t                                | his sequence.       |                    |                  |         |
|   |  |                     |                    |                  |         |
|   |  |                     |                    |                  |         |
|   |  |                     |                    |                  |         |
|   |  |                     |                    | ,                | [2]     |

9



NOT TO SCALE

The bearing of *B* from *A* is  $059^{\circ}$ .

Work out the bearing of A from B.

.....[2]

 $\mathbf{p} = \begin{pmatrix} 2 \\ 8 \end{pmatrix} \qquad \qquad \mathbf{q} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$ 

- (a) Find
  - (i) p-q,

(ii) 6p.

 $\left(\begin{array}{c} \end{array}\right)$  [1]

(b) Find |p-q|.

.....[2]

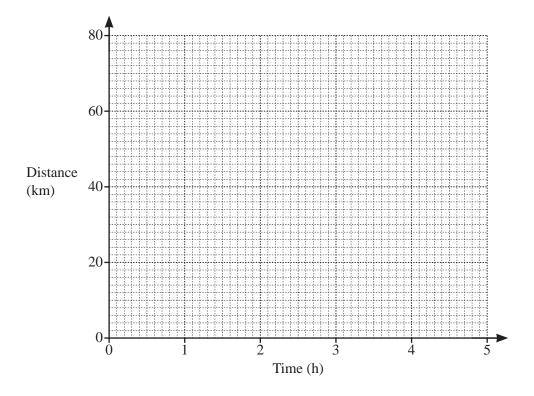
11 Find the value of p when  $6^p \times 6^4 = 6^{28}$ .

$$p = \dots$$
 [1]

12 Annette cycles a distance of 70 km from Midville to Newtown.

Leaving Midville, she cycles for 1 hour 30 minutes at a constant speed of 20 km/h and then stops for 30 minutes.

She then continues the journey to Newtown at a constant speed of 16 km/h.



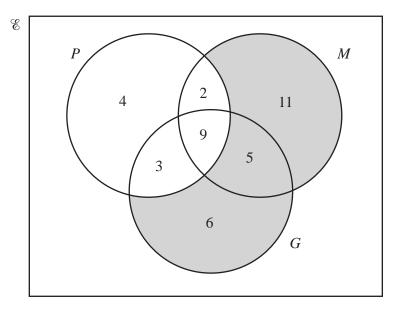
- (a) On the grid, draw the distance—time graph for the journey.
- **(b)** Calculate the average speed for the whole journey.

..... km/h [3]

[3]

| 13  | Without using a calculator, work out $4\frac{1}{8} - 2\frac{5}{6}$ .<br>You must show all your working and give your answer as a mixed number in its simplest form. |     |
|-----|---|-----|
|     |   |     |
|     |   |     |
|     |   |     |
|     |   |     |
|     |   | [3] |
| 14  | Carlos invests \$4540 at a rate of $r$ % per year compound interest.<br>At the end of 10 years he has earned \$1328.54 in interest.                                 |     |
|     | Calculate the value of $r$ .  |     |
|     |   |     |
|     |   |     |
|     |   |     |
|     |   |     |
|     |   | [2] |
| . = | $r = \dots$   | [3] |
| 15  | Find the highest common factor (HCF) of $12a^3b$ and $20a^2b^2$ .   |     |
|     |   |     |
|     |   | [2] |
|     |   |     |

16 The Venn diagram shows the number of students in a class of 40 who study physics (P), mathematics (M) and geography (G).



| (a) | Use | set | notation | to | describe | the | shaded | region. |
|-----|-----|-----|----------|----|----------|-----|--------|---------|
|-----|-----|-----|----------|----|----------|-----|--------|---------|

|  |  | 1 | ] | l |
|--|--|---|---|---|
|--|--|---|---|---|

**(b)** Find  $n((P \cap G) \cup M')$ .

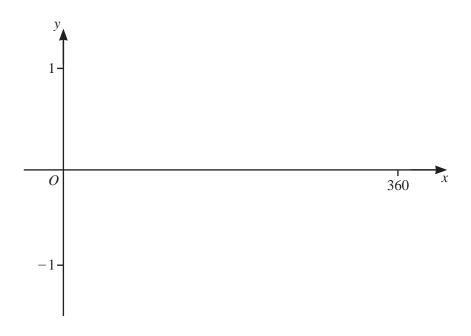
| <br>[1] |
|---------|
|         |

(c) A student is chosen at random from those studying geography.

Find the probability that this student also studies physics or mathematics but not both.

.....[2]

17 (a) Sketch the graph of  $y = \sin x$  for  $0^{\circ} \le x \le 360^{\circ}$ .



**(b)** Solve the equation  $3\sin x + 1 = 0$  for  $0^{\circ} \le x \le 360^{\circ}$ .

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

[2]

**18** (a) *y* is directly proportional to the cube root of (x+1). When x = 7, y = 1.

Find the value of y when x = 124.

 $y = \dots$  [3]

(b) F is inversely proportional to the square of d.

Explain what happens to F when d is halved.

.....[1]

19 
$$f(x) = 7x - 8$$
  $g(x) = \frac{4}{x} + 5$   $h(x) = 2^x + 1$ 

(a) Find  $f^{-1}(x)$ .

$$f^{-1}(x) = \dots [2]$$

**(b)** Find the value of x when  $h(x) = g(\frac{1}{3})$ .

$$x = \dots [2]$$

20 Factorise completely.

(a) 
$$2m + 3p - 8km - 12kp$$

**(b)** 
$$5x^2 - 20y^2$$

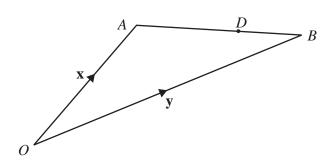
| 21 | The <i>n</i> th ter | m of a sequer | nce is $an^2 + bn - 4$ |
|----|---------------------|---------------|------------------------|
|    |                     |               |                        |

The first term is -3 and the second term is 2.

Find the value of a and the value of b.

$$a = \dots b = \dots [5]$$

22



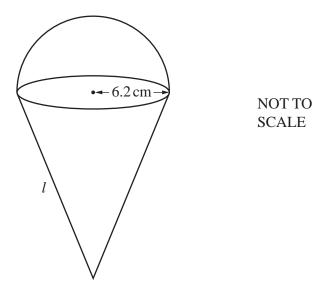
NOT TO SCALE

$$\overrightarrow{OA} = \mathbf{x}$$
,  $\overrightarrow{OB} = \mathbf{y}$  and  $\overrightarrow{OD} = \frac{3}{7}\mathbf{x} + \frac{4}{7}\mathbf{y}$ .

Calculate the ratio *AD*: *DB*.

.....[2]

23



The diagram shows a solid metal shape made from a cone and a hemisphere, both with radius  $6.2\,\mathrm{cm}$ . The total surface area of the solid shape is  $600\,\mathrm{cm}^2$ .

Calculate the slant height, l, of the cone. [The surface area, A, of a sphere with radius r is  $A = 4\pi r^2$ .] [The curved surface area, A, of a cone with radius r and slant height l is  $A = \pi r l$ .]

| 7  | _ | am   | $\Gamma I I$ |
|----|---|------|--------------|
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