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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

3296413975

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 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.

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1 At noon, the temperature is 4 °C.
At midnight, the temperature is −9 °C.

Work out the difference in temperature between noon and midnight.

..... °C [1]

2 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.

..... [2]

3 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 and ..... cents change [3]

4 Find the value of $\sqrt{68} \times \sqrt{153}$.

..... [1]

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5 Find the total surface area of a cuboid with length 8 cm, width 6 cm and height 3 cm.

..... cm^2 [3]

6 Some cards have either a square, a circle or a triangle drawn on them.
Piet chooses one of the cards at random.

Complete the table to show the probability of choosing 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 by 18%.

Find the sale price of the coat.

$ ..... [2]

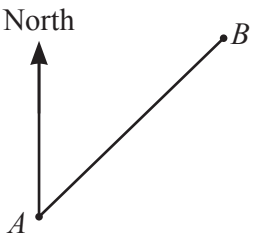
8 The nth term of a sequence is $n^2 + 12$.

Find the first three terms of this sequence.

..... , ... , ... [2]

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9



NOT TO SCALE

The bearing of B from A is 059°.

Work out the bearing of A from B.

..... [2]

10 $\mathbf{p} = \begin{pmatrix} 2 \\ 8 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$

(a) Find

(i) $\mathbf{p} - \mathbf{q}$,

( ) [1]

(ii) $6\mathbf{p}$.

( ) [1]

(b) Find $|\mathbf{p} - \mathbf{q}|$.

..... [2]

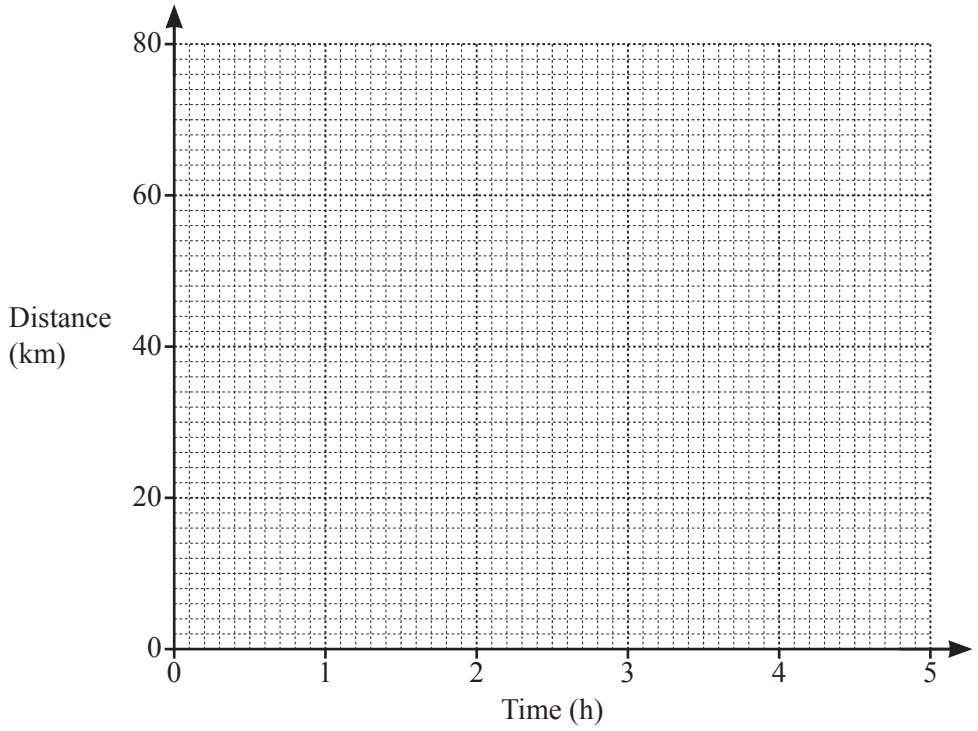
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11 Find the value of p when $6^p \times 6^4 = 6^{28}$.

$p =$ ..... [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. [3]

(b) Calculate the average speed for the whole journey.

..... km/h [3]

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13 **Without using a calculator**, work out $4\frac{1}{8} - 2\frac{5}{6}$.
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.
At the end of 10 years he has earned \$1328.54 in interest.

Calculate the value of r.

$r =$ ..... [3]

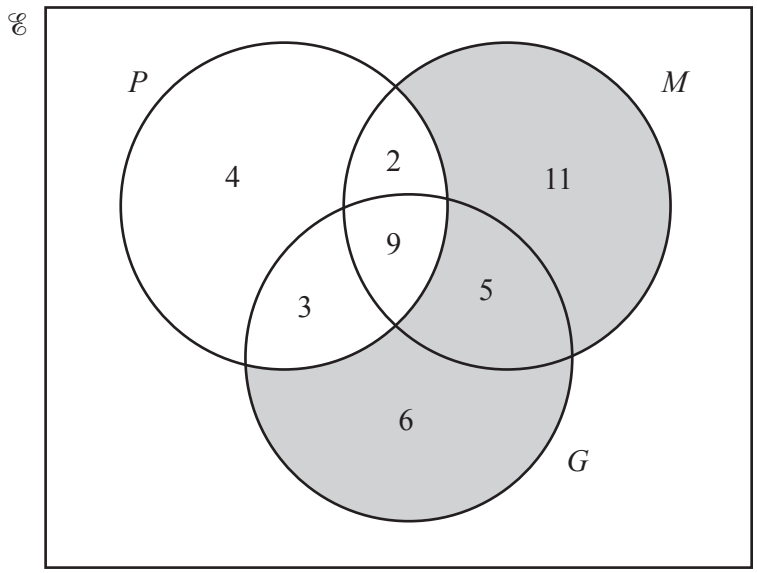
15 Find the highest common factor (HCF) of $12a^3b$ and $20a^2b^2$.

..... [2]

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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]

(b) Find $\mathrm{n}((P \cap G) \cup M')$.

..... [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]

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17 **(a)** Sketch the graph of $y = \sin x$ for $0° \leqslant x \leqslant 360°$.



[2]

(b) Solve the equation $3\sin x + 1 = 0$ for $0° \leqslant x \leqslant 360°$.

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

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

Find the value of y when $x = 124$.

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

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

Explain what happens to F when d is halved.

..... [1]

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

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

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

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

$x =$ ..... [2]

20 Factorise completely.

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

..... [2]

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

..... [3]

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21 The nth term of a sequence is $an^2 + bn - 4$.

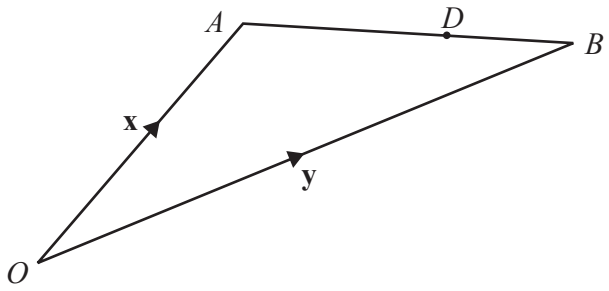
The first term is -3 and the second term is 2.

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [5]

22



NOT TO SCALE

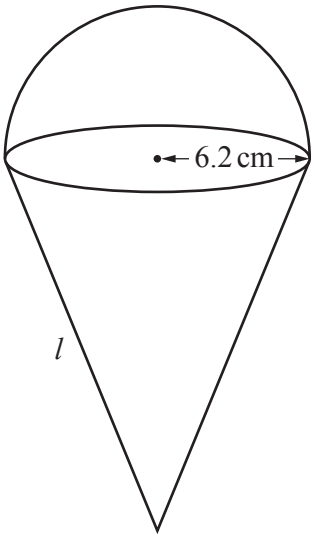
$\overrightarrow{OA} = \mathbf{x}$, $\overrightarrow{OB} = \mathbf{y}$ and $\overrightarrow{OD} = \frac{3}{7}\mathbf{x} + \frac{4}{7}\mathbf{y}$.

Calculate the ratio $AD : DB$.

..... : ..... [2]

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23



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The diagram shows a solid metal shape made from a cone and a hemisphere, both with radius 6.2 cm.
The total surface area of the solid shape is 600 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 $A = \pi rl$.]

$l =$ ..... cm [4]

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