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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 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.

- 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.

..... $^{\circ}\text{C}$ [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]

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

..... cm² [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.

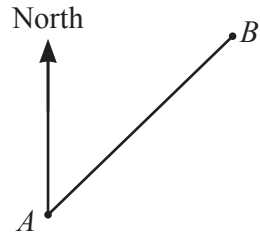
\$ [2]

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

Find the first three terms of this sequence.

.....,, [2]

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

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

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

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

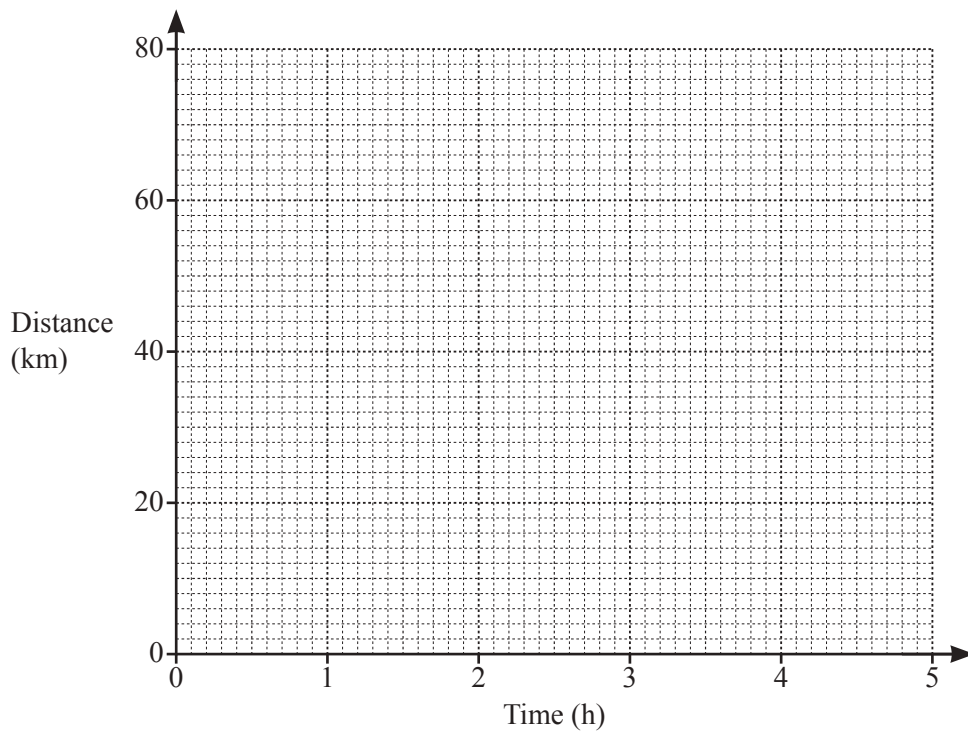
(b) Find $|\mathbf{p} - \mathbf{q}|$.

..... [2]

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

$p = \dots\dots\dots$ [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. [3]

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

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

- 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.

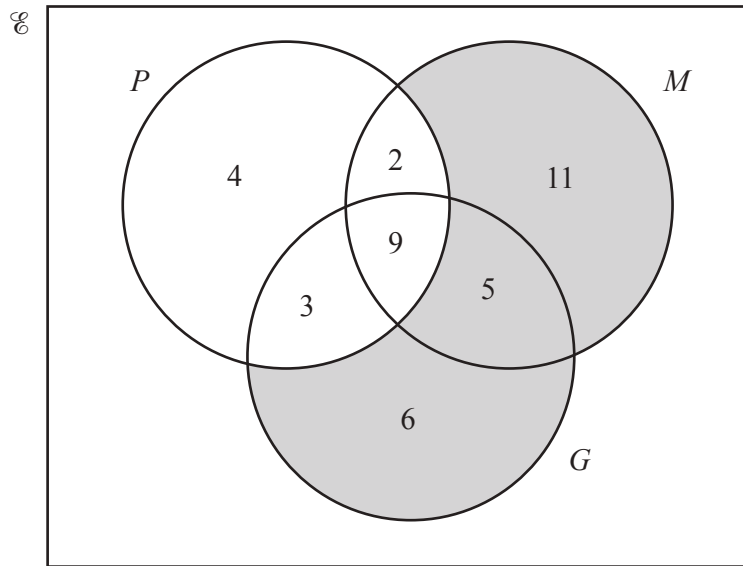
Calculate the value of r .

$r =$ [3]

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

..... [2]

- 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 $n((P \cap G) \cup M')$.

..... [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]

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



[2]

- (b) Solve the equation $3 \sin x + 1 = 0$ for $0^\circ \leq x \leq 360^\circ$.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [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 $x = 124$.

$y = \dots\dots\dots$ [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 $f^{-1}(x)$.

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

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

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

20 Factorise completely.

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

$\dots\dots\dots [2]$

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

$\dots\dots\dots [3]$

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

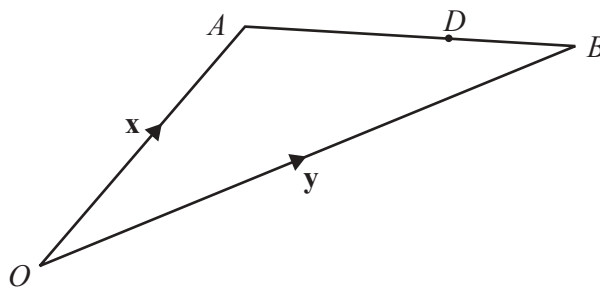
The first term is -3 and the second term is 2 .

Find the value of a and the value of b .

$a = \dots\dots\dots$

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

22

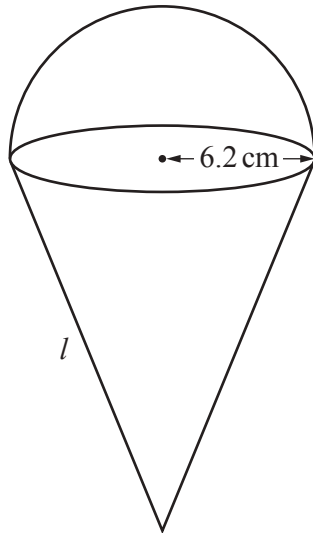


NOT TO SCALE

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

Calculate the ratio $AD:DB$.

$\dots\dots\dots : \dots\dots\dots$ [2]



NOT TO
SCALE

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 $A = \pi r l$.]

$l = \dots\dots\dots \text{ cm}$ [4]