



# Cambridge IGCSE™ (9–1)

CANDIDATE  
NAME

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CENTRE  
NUMBER

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**MATHEMATICS**

**0980/22**

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.

- 1 At noon, the temperature is  $4^{\circ}\text{C}$ .  
At midnight, the temperature is  $-9^{\circ}\text{C}$ .

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.

..... cm<sup>2</sup> [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.

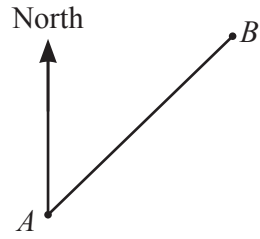
\$ ..... [2]

- 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  $059^\circ$ .

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]

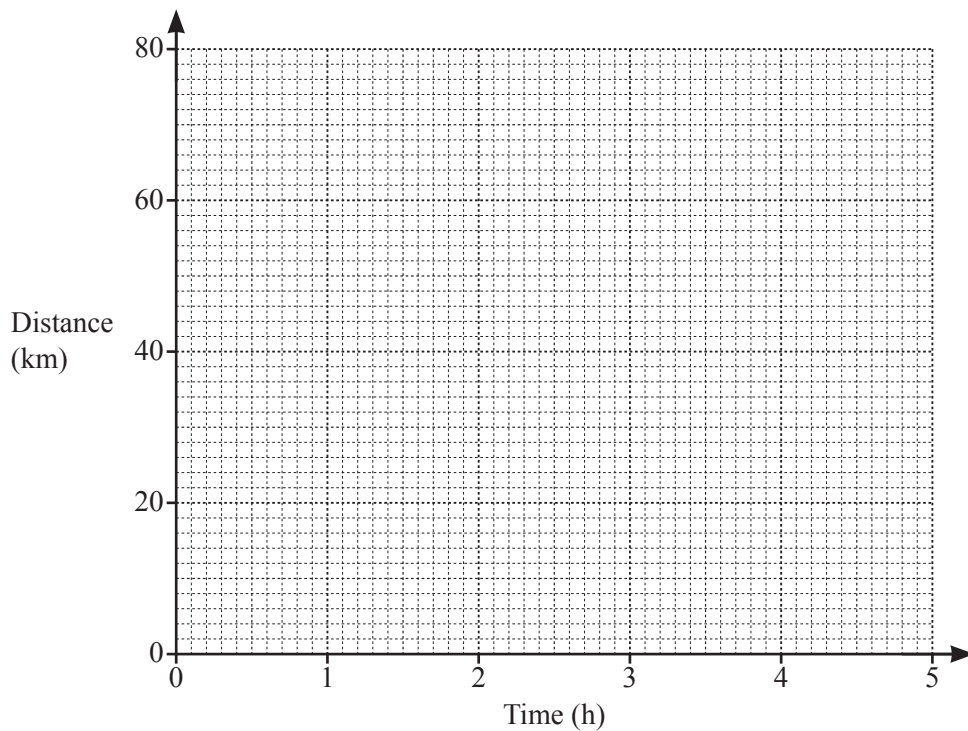
(b) Find  $|\mathbf{p} - \mathbf{q}|$ .

..... [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.

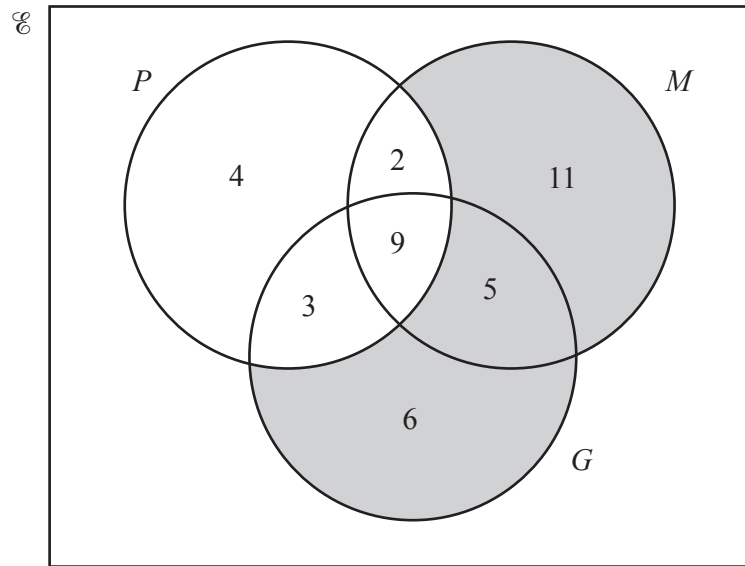
Calculate the value of  $r$ .

$r =$  ..... [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  $an^2 + bn - 4$ .

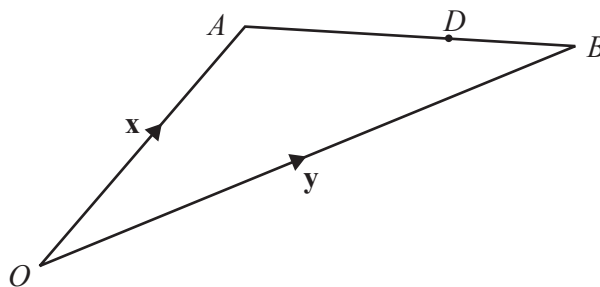
The first term is  $-3$  and the second term is  $2$ .

Find the value of  $a$  and the value of  $b$ .

$a = \dots\dots\dots$

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

22

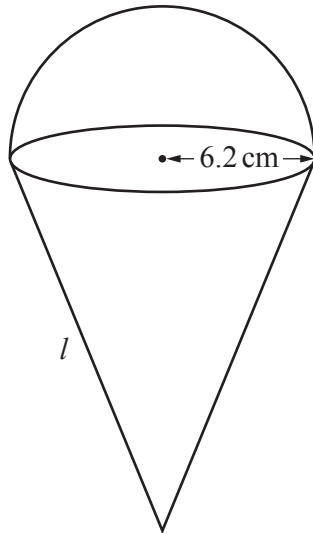


NOT TO SCALE

$\vec{OA} = \mathbf{x}$ ,  $\vec{OB} = \mathbf{y}$  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  $600 \text{ cm}^2$ .

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]

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