Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2

PAPER 2

MAY/JUNE SESSION 2001 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
- Electronic calculator
- Geometrical instruments
- Mathematical tables (optional)
- Tracing paper (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

If working is needed for any question it must be shown below that question.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 70.

Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 12 printed pages.

[Turn over

1 Work out $\dfrac{7.7}{3 + \sqrt{6.25}}$.

Answer ..... [1]

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2 A map has a scale of 1 : 250 000. Complete the statement below.

1 centimetre on the map represents ..... kilometres on the ground. [1]

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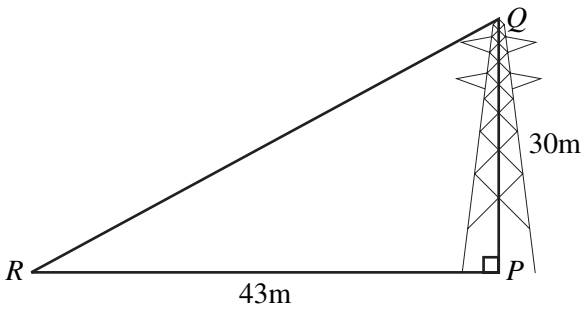
3 **(a)** One gigabyte is 1 000 000 000 bytes. A computer has a 12.6 gigabyte hard disk.
Write 12.6 gigabytes in bytes, giving your answer in standard form.

Answer (a) .....bytes [1]

(b) A picosecond is 10^{-12} seconds. A computer takes 150 picoseconds to complete a task.
Write 150 picoseconds in seconds, giving your answer in standard form.

Answer (b).....s [1]

4

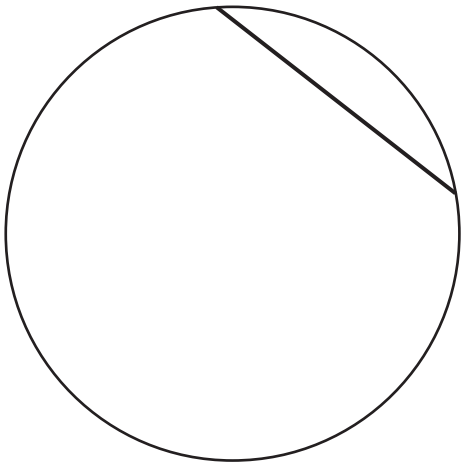


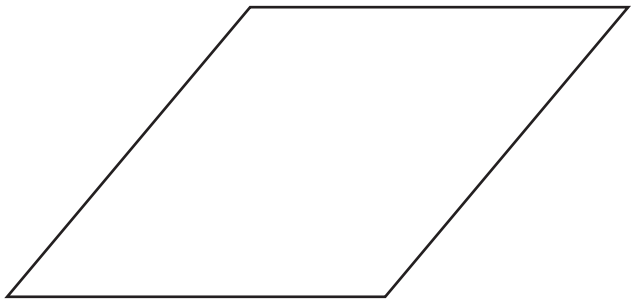
NOT TO SCALE

A pylon PQ is 30 metres high and it stands on level ground.
Its base P is 43 metres from a point R.
Find the angle of elevation of the top of the pylon from R.

Answer ..... [2]

5





Draw any lines of symmetry on each of the diagrams above. [2]

---

6 Solve the inequality $25 - 3x < 7$.

Answer ..... [2]

---

7 Juan and Pedro each make similar models of the same aeroplane.
Juan uses a scale of 1 : 50.
Pedro uses a scale of 1 : 100.
Find the ratio of the **volumes** of Juan's model : Pedro's model.

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

[Turn over

8 It takes Nina 2 hours 30 minutes to fill a swimming pool using 2 hosepipes.
How long will it take Nina to fill the pool if she uses 3 hosepipes?
[You may assume all the hosepipes supply water at the same rate.]

Answer ..... h..... min [2]

---

9 **(a)** Maria paid \$1320 tax in 1999. She paid 10% less tax in 2000.
Calculate the tax Maria paid in 2000.

Answer (a) \$ ..... [1]

(b) \$1320 was 10% **more** than she paid in 1998.
Calculate the tax Maria paid in 1998.

Answer (b) \$ ..... [2]

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10 Solve the simultaneous equations $3x + 4y = 27$,
$4x - 2y = 25$.

Answer x = ...

y = ... [3]

---

11 The capacity of a jug is 3.5 litres correct to the nearest 0.1 litre.
The capacity of a glass is 0.25 litres correct to the nearest 0.01 litre.

(a) Complete the following statements.

(i) The **minimum** capacity of the jug is ..... litres. [1]

(ii) The **maximum** capacity of the glass is ..... litres. [1]

(b) Calculate the greatest number of glasses which you can be sure to fill from a full jug.

Answer (b) ..... [1]

12

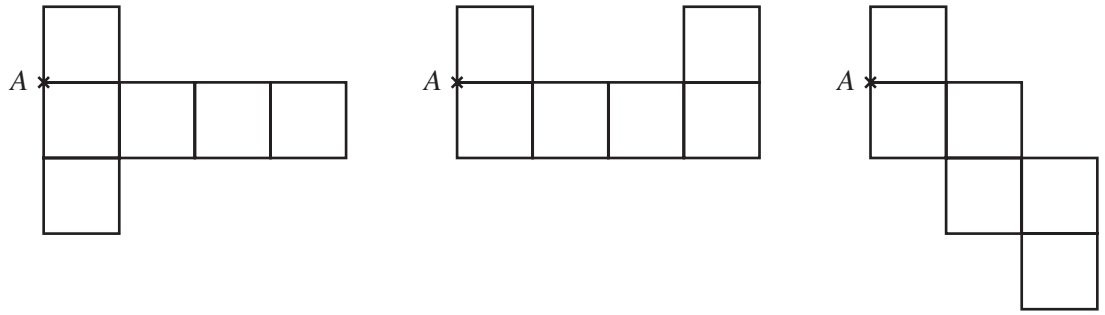


Diagram 1 Diagram 2 Diagram 3

(a) One of the three diagrams above is **not** the net of a cube. Which diagram is it?

Answer (a) Diagram ..... [1]

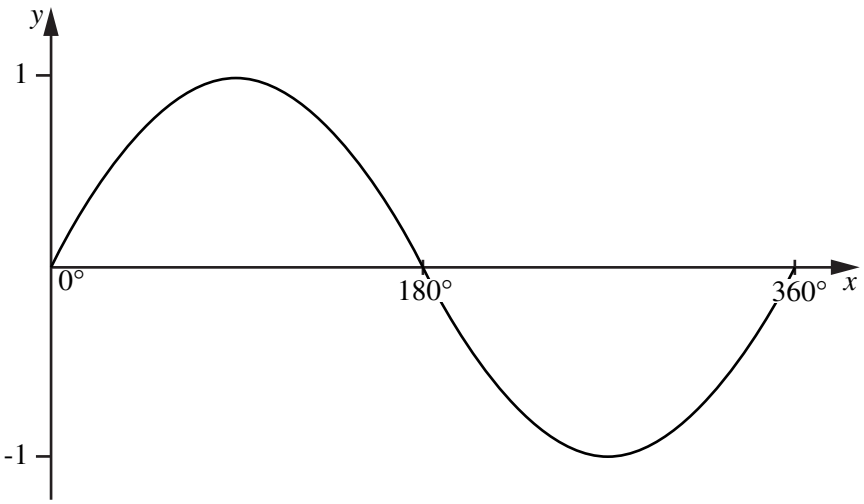
(b) On each of the other two diagrams, mark and label A' the point which will touch the point A when the net is folded to make a cube. [2]

[Turn over

13 Make y the subject of the formula $x = \dfrac{4 + \sqrt{y}}{3}$.

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

14



The sketch graph shows $y = \sin x$ for $0° \leqslant x \leqslant 360°$.

(a) Find the obtuse angle x for which $\sin x = \sin 50°$.

Answer (a) $x =$ ..... [1]

(b) Find the two values of x for which $\sin x = -\sin 50°$ and $0° \leqslant x \leqslant 360°$.

Answer (b) $x =$ ..... or $x =$ ..... [2]

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15 Simplify $\frac{4x-3}{8} - \frac{3x-4}{12}$.

Answer ..... [3]

---

16 A cycle race began at 09 40.
Henri finished at 11 16 exactly and his average speed was 30 kilometres per hour.

(a) Calculate the length of the race in kilometres.

Answer (a) .....km [2]

(b) The winning time was 1 hour 25 minutes 27 seconds.
How many minutes and seconds was Henri behind the winner?

Answer (b) ..... min .....s [1]

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17 The interior angle of a regular n-sided polygon is 48° more than the interior angle of a regular hexagon.

(a) Find the size of the interior angle of the n-sided polygon.

Answer (a) ..... [2]

(b) Find the value of n.

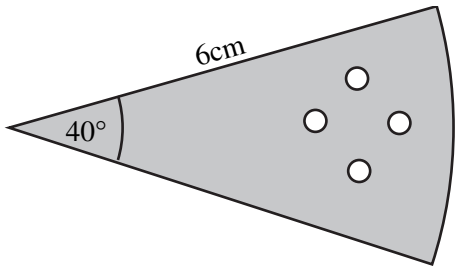
Answer (b) $n =$ ..... [2]

[Turn over

18 **(a)** Calculate the area of a sector of a circle which has an angle of 40° and a radius of 6 cm.

Answer (a) .....cm^2 [2]

(b) A brooch is in the shape of a sector of a circle with 4 small identical circular holes.



NOT
TO
SCALE

The radius of each hole is 0.3 cm.
Calculate

(i) the area of **one** hole,

Answer (b)(i) .....cm^2 [1]

(ii) the area of the brooch, which is shaded in the diagram above.

Answer (b)(ii) .....cm^2 [1]

---

19 **(a)** **(i)** Expand $(x^2 - 1)(x^2 + 1)$.

Answer (a)(i) ..... [1]

(ii) Factorise $x^2 - 1$.

Answer (a)(ii) ..... [1]

(b) $9999 = 10^4 - 1$. Write 9999 as a product of prime factors.

Answer (b) 9999 = ... [2]

---

20 $f(x) = \frac{x+1}{3x}$ for $x > 0$. $g(x) = 3 - 3x$ for any value of x.

(a) Find

(i) $f\left(\frac{3}{4}\right)$, giving your answer as a fraction,

Answer (a)(i) ..... [1]

(ii) $g\left[f\left(\frac{3}{4}\right)\right]$, giving your answer as a fraction.

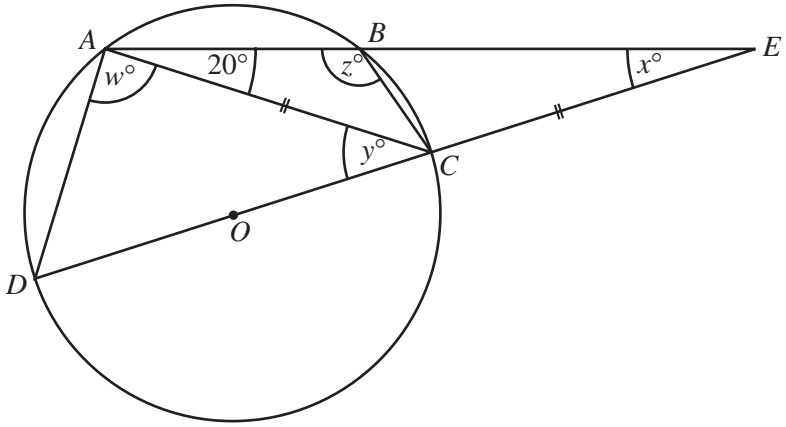
Answer (a)(ii) ..... [1]

(b) Find $g^{-1}(18)$.

Answer (b) ..... [2]

[Turn over

21



NOT TO SCALE

The centre of the circle *ABCD* is *O*.
ABE and *DOCE* are straight lines.
AC = *CE* and angle *BAC* = 20°.
Find the values of *w*, *x*, *y* and *z*.

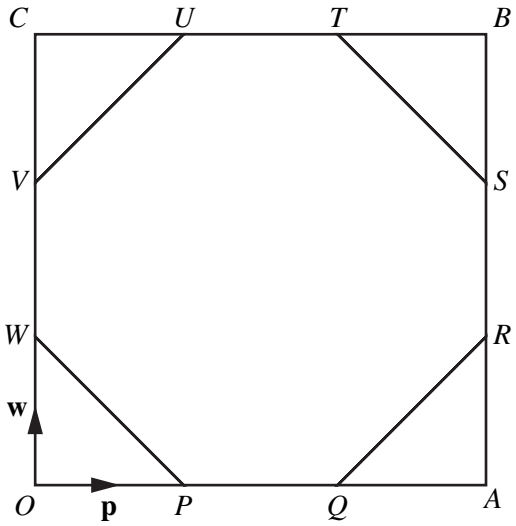
Answer w = ... [1]

x = ... [1]

y = ... [1]

z = ... [1]

22



Each side of the square $OABC$ is divided into 3 equal parts to form the octagon $PQRSTUVW$.

$\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OW} = \mathbf{w}$.

(a) Find the following vectors in terms of **p** and **w**. Write your answers in their simplest form.

(i) $\overrightarrow{WP}$,

Answer (a)(i) $\overrightarrow{WP}$ = ... [1]

(ii) $\overrightarrow{OB}$,

Answer (a)(ii) $\overrightarrow{OB}$ = ... [1]

(iii) $\overrightarrow{RV}$.

Answer (a)(iii) $\overrightarrow{RV}$ = ... [1]

(b) Find $|\overrightarrow{OB}|$ when $|\mathbf{p}| = |\mathbf{w}| = 5$.

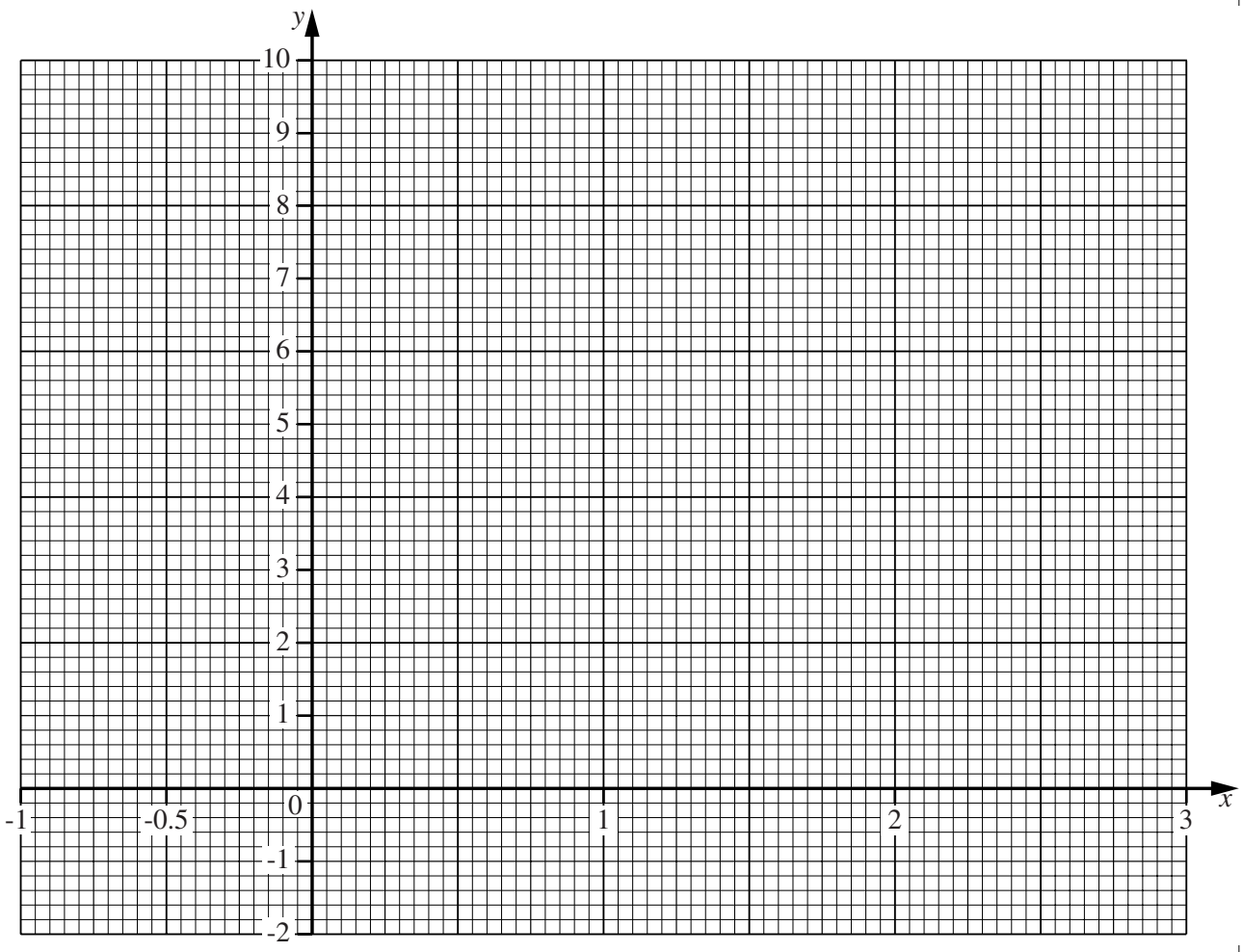
Answer (b) $|\overrightarrow{OB}|$ = ... [2]

23 $f(x) = 2^x$.

(a) Fill in the values of $f(x) = 2^x$ in the table below.

x	–1	–0.5	0	1	2	3
$f(x)$						

[2]



(b) Draw the graph of $y = f(x)$ for $-1 \leqslant x \leqslant 3$ on the grid above. [2]

(c) Use your graph to find the value of x when

(i) $2^x = 3$,

Answer (c)(i) $x =$ ..... [1]

(ii) $2^x = -x$.

Answer (c)(ii) $x =$ ..... [2]