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

Wednesday **3 NOVEMBER 1999** Afternoon 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
- Electronic calculator
- Geometrical instruments
- Mathematical tables (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, the answer should be given to three significant figures. Answers in degrees should be given to one decimal place.

For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 11 printed pages and 1 blank page.

MFK (0811) QK93684

[Turn over

1 The sea level at low tide is -2.40 metres.
What is the sea level when it is 1.97 metres above this?

Answer ..... m [1]

---

2 Solve the inequality $3(x + 1) \geqslant 5 - x$.

Answer x ..... [2]

---

3 Elena invests \$560 at 5.5% per annum simple interest.
Calculate the number of years it will take to earn \$123.20 interest.

Answer ..... [2]

---

4 $x = 0.083$, $y = \dfrac{84}{991}$ and $z = 8.4 \times 10^{-3}$.
Write x, y and z in order, with the **smallest** first.

Answer ..... < ..... < ..... [2]

---

5 By writing each number in the calculation below correct to two significant figures, **estimate** the value of

$$\frac{478 \times 49.82}{0.1248}.$$

Answer ..... [2]

6 In 1998 the same cycle cost 1600 French francs in Paris and £170 (pounds) in London.
One pound was equal to 9.30 French francs.
In which city did the cycle cost less and by how much?
Give your answer either in French francs or in pounds.

Answer City .....

Amount ..... [2]

7 The perimeter of an equilateral triangle is 65 cm, to the nearest centimetre.
Find the smallest possible length of a side of the triangle.

Answer ..... cm [2]

For Examiner's Use

8 Solve the simultaneous equations $3x - y = -3$,

$9x + 2y = 1$.

Answer $x =$ .....

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

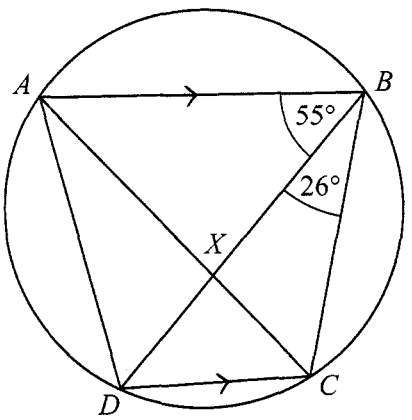
---

9 A is the point (1, 0) and B is the point (4, 6).
Calculate the acute angle that the line AB makes with the x-axis.

Answer ..... [3]

---

10 $ABCD$ is a cyclic quadrilateral in which AB is parallel to DC.
The diagonals AC and BD meet at X.
Angle $ABD = 55°$ and angle $DBC = 26°$.



NOT TO SCALE

Work out

(a) angle BCD,

Answer (a) angle $BCD =$ ..... [1]

(b) angle BXC,

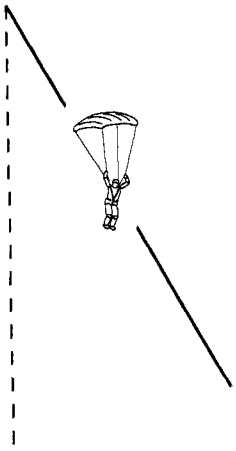
Answer (b) angle $BXC =$ ..... [1]

(c) angle ADB.

Answer (c) angle $ADB =$ ..... [1]

---

11 Vanessa does a parachute jump. There is a wind blowing which makes her fall in a straight line at an angle of 13° to the vertical.
She travels 1800 m along this straight line.
Calculate the vertical distance she falls, giving your answer to the **nearest metre**.



NOT TO SCALE

Answer ..... m [3]

---

12 Simplify $\dfrac{ax - ay}{px - py + qx - qy}$.

Answer ..... [3]

---

13 Two water containers are similar in shape.
When they are full one holds 3 litres and the other holds 24 litres.
The height of the smaller container is 15.5 cm.
Work out the height of the larger container.

Answer ..... cm [3]

---

14 F is proportional to the square of v.
When $F = 180$, $v = 6$.
Calculate F when $v = 3$.

Answer $F =$ ..... [3]

---

15 By construction, using ruler and compasses only, find the region which contains all the points which are less than 4 cm from P **and** nearer to P than to Q.
Shade this region.

[4]

For Examiner's Use

16 Simplify

(a) $2x^4 \times 5x$,

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

(b) $x^2 \div x^{\frac{1}{2}}$,

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

(c) $\left(\sqrt{2x}\right)^6$.

Answer (c) ..... [2]

---

17 Solve the equation $x^2 - 2x - 5 = 0$, giving your answers correct to 2 decimal places.
Show all your working.

Answer $x =$ ..... or ..... [4]

---

18 Given the matrices $\mathbf{M} = \begin{pmatrix} 2 & -3 \\ 4 & -5 \end{pmatrix}$ and $\mathbf{N} = \begin{pmatrix} 2 \\ 5 \end{pmatrix}$, work out

(a) **MN**,

Answer (a) **MN** = [2]

(b) $\mathbf{M}^{-1}$, the inverse of **M**.

Answer (b) $\mathbf{M}^{-1}$ = [2]

---

19 Given the functions $f : x \mapsto 2x - 7$ and $g : x \mapsto \dfrac{x+1}{x}$, where $x \neq 0$, find

(a) the value of fg(2),

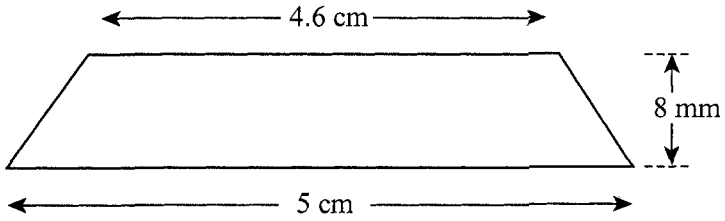
Answer (a) ..... [1]

(b) fg(x), giving your answer as a single fraction.

Answer (b) ..... [3]

For Examiner's Use

20



NOT TO SCALE

The diagram shows an isosceles trapezium which is the cross-section of a bar of chocolate.

(a) Calculate the area of the cross-section, in **square centimetres**.

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

(b) The bar of chocolate is a prism and its length is 9.5 cm.
Calculate its volume, to the nearest cubic centimetre.

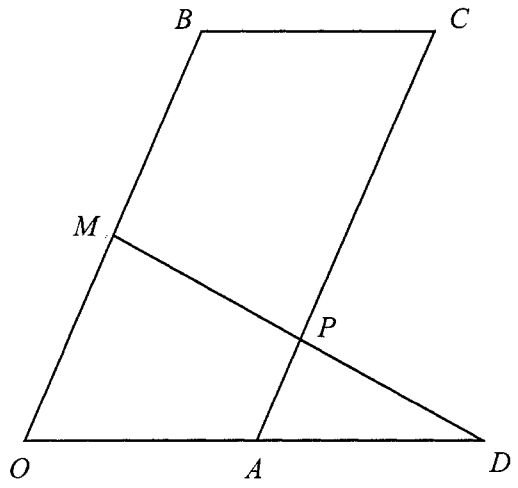
Answer (b) ..... cm^3 [2]

(c) How many planes of symmetry does the bar of chocolate have?

Answer (c) ..... [1]

For Examiner's Use

21



OACB is a parallelogram and *DPM* is a straight line.

O is the origin, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

$\overrightarrow{OD} = 2\overrightarrow{OA}$ and $\overrightarrow{OM} = \frac{1}{2}\overrightarrow{OB}$.

(a) Find $\overrightarrow{DM}$ in terms of **a** and **b**.

Answer (a) $\overrightarrow{DM} =$ ..... [2]

(b) What can you say about triangles *ADP* and *ODM*?

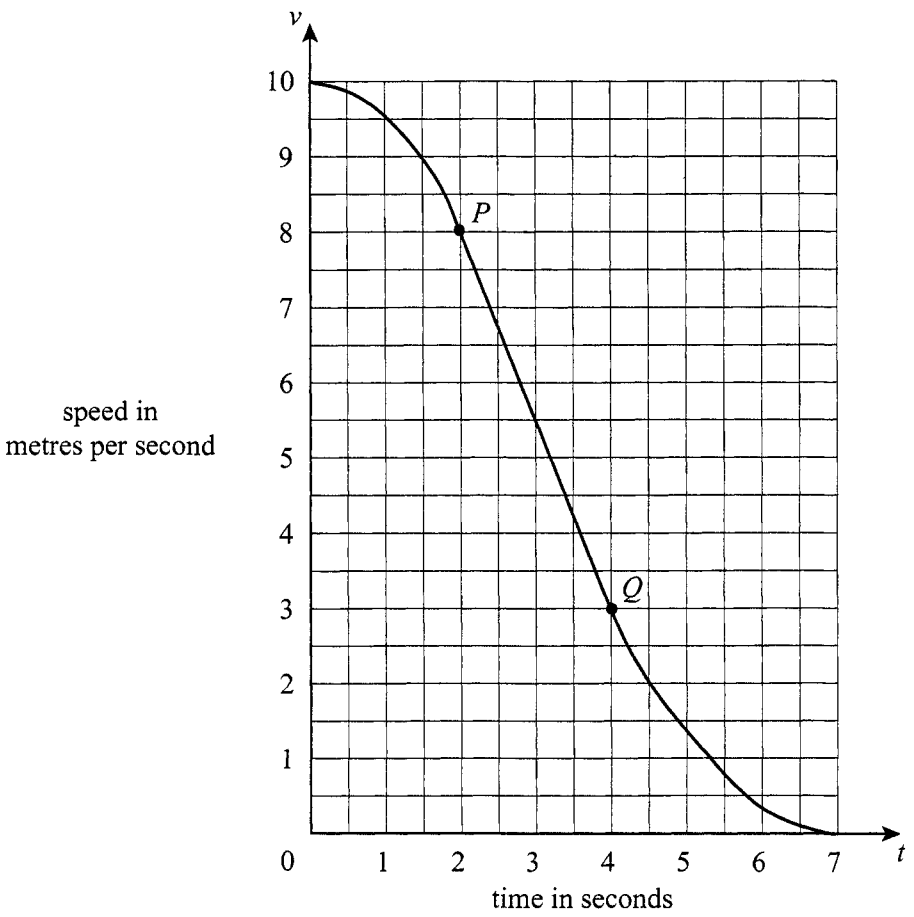
Answer (b) ..... [1]

(c) Find $\overrightarrow{OP}$, the position vector of *P*, in terms of **a** and **b**.

Answer (c) $\overrightarrow{OP} =$ ..... [2]

For Examiner's Use

22



The speed–time graph shows how a car comes to rest in 7 seconds.
The part of the graph labelled PQ is a straight line.
Work out

(a) the deceleration of the car between $t = 2$ and $t = 4$,

Answer (a) ..... m/s^2 [2]

(b) the distance travelled by the car between $t = 2$ and $t = 4$,

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

(c) the speed of the car in **kilometres per hour** when $t = 0$.

Answer (c) ..... km/h [2]

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