	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

Tuesday **8 JUNE 1999** Morning 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, 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 11 printed pages and 1 blank page.

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1 Work out $\dfrac{\frac{1}{8}+\frac{1}{2}}{\frac{5}{6}}$.

Answer .... [1]

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2 The speed of light is 300 000 kilometres per second.

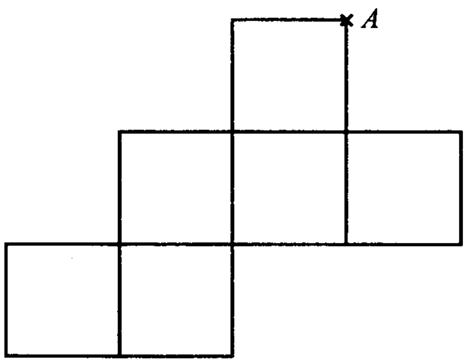
(a) Write 300 000 in standard form.

Answer (a) .... [1]

(b) The nearest star, Proxima Centauri, is 4.2 light years from the Sun. One light year is the distance light travels in 365 days. Calculate the distance of Proxima Centauri from the Sun.
Give your answer in kilometres in standard form.

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

3



The diagram shows a net of a cube. One corner is marked and labelled A.
Mark and label A' the two points on the diagram which will touch the point A when the net is folded to make the cube. [2]

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4 In a 1500 m race, Fernando came second in a time of 3 minutes 58.2 seconds.
Eduardo came first, 0.9 seconds ahead of Fernando.
Henri was third, 3.1 seconds behind Fernando.
Write down

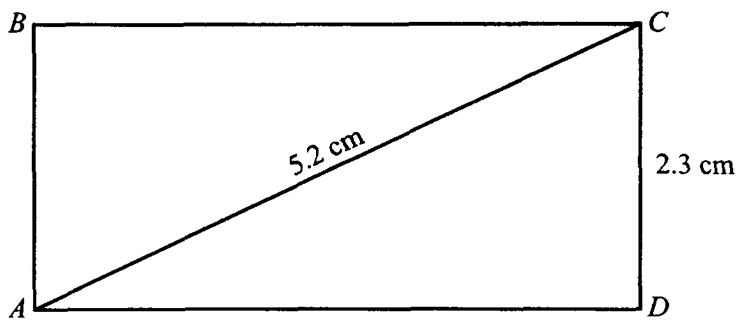
(a) Eduardo's time,

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

(b) Henri's time.

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

5



ABCD is a rectangle with $AC = 5.2$ cm and $CD = 2.3$ cm, **both** measured to the nearest millimetre. Complete the following statements.

(a) .... cm $\leqslant AC <$ .... cm. [1]

(b) The **least** value of *AD* is $\sqrt{(\ldots\ldots\ldots\ldots)^2 - (\ldots\ldots\ldots\ldots)^2}$ cm. [1]

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6 An organisation spends 10% of its income on administration and uses the rest for charitable work.
In 1998 it used \$234 000 for charitable work.
Calculate its income in 1998.

Answer \$ .... [2]

---

7 The volume of the planet Uranus is 64 times the volume of the planet Earth.
Assuming that Uranus and Earth are geometrically similar, calculate the ratio of

Surface area of Uranus : **Surface area** of Earth in the form n : 1.

Answer .... : 1 [2]

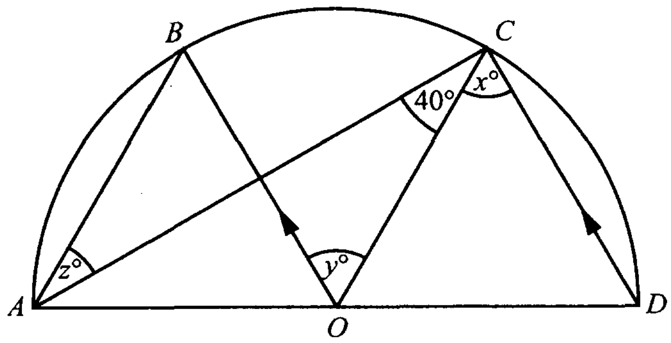
[Turn over

For Examiner's Use

8 Make y the subject of the formula $x = \sqrt{(y^3 + 3)}$.

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

9



NOT TO SCALE

AOD is the diameter of semicircle $ABCD$. Angle $ACO = 40°$ and DC is parallel to radius OB.
Find the values of x, y and z.

Answer $x =$ ....

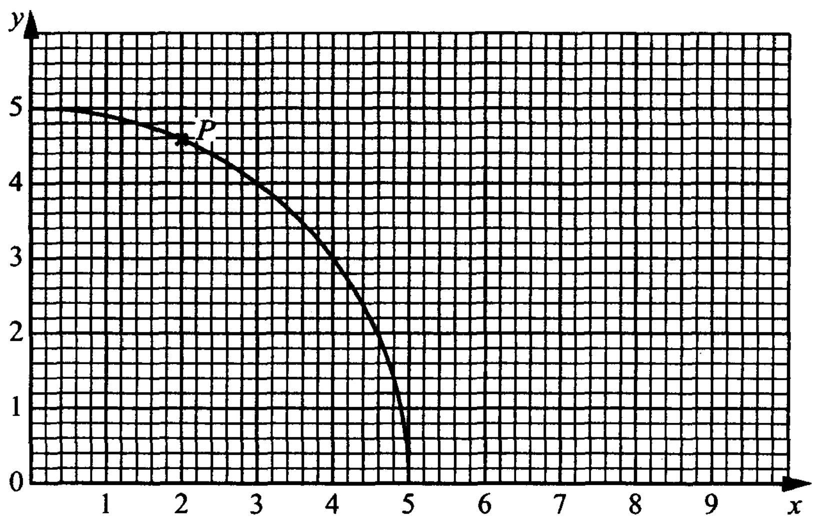
$y =$ ....

$z =$ .... [3]

10 Paula wishes to change 1000 francs into dollars. She has a choice of two methods.
Method A: exchange 1000 francs at a rate of \$1 = 4.15 francs.
Method B: pay 20 francs commission and then exchange the rest at a rate of \$1 = 4.00 francs.
Calculate which method gives her more dollars.
Write down, correct to two decimal places, how many **more** dollars she gets.

Answer Method .... gives \$ .... more. [3]

11



P is the point on the curve where $x = 2$. Draw a suitable line on the grid and use it to calculate the gradient of the curve at P.

Answer Gradient = ... [3]

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12 Three estimates for the volume of water in a bucket are given below.

9 litres, 7000 cm^3 and 0.0009 m^3.

(a) Arrange these in order of size, starting with the smallest.

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

(b) The actual volume is 3 litres. Which estimate is the closest?

Answer (b) .... [1]

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13 In a polygon with n sides, half the interior angles are each 150° and the other half are each 170°. Calculate the value of n.

Answer n = ... [3]

For Examiner's Use

14 $f(x) = 2x + 1$ and $g(x) = x^2 + 3$.

(a) Find

(i) $f(-5)$,

Answer (a)(i) $f(-5) =$ .... [1]

(ii) $g[f(-5)]$.

Answer (a)(ii) $g[f(-5)] =$ .... [1]

(b) Find and simplify $g[f(x)]$.

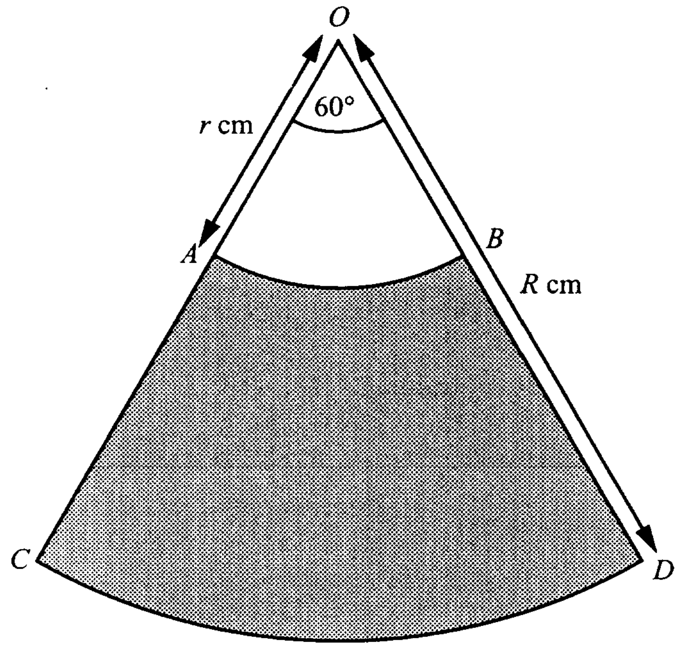
Answer (b) $g[f(x)] =$ .... [2]

15 Solve the equation $2x^2 + 4x - 3 = 0$, giving your answers correct to 2 decimal places.
Show all your working.

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

For Examiner's Use

16



The shaded part of the diagram is formed by removing the sector OAB, radius r cm, from the larger sector OCD, radius R cm. The angle at O is 60°.

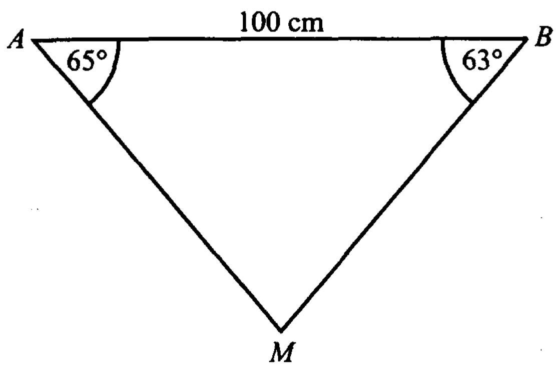
(a) Write down an expression for the shaded area in terms of π, R and r.

Answer (a) Shaded area = ... cm^2 [2]

(b) Factorise completely your answer to **part (a)**.

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

17



NOT TO SCALE

In triangle ABM, $AB = 100$ cm, angle $MAB = 65°$ and angle $ABM = 63°$.

(a) Write down with a reason, but no calculation, which is the shorter length, AM or BM.

Answer (a) .... is shorter because .... [1]

(b) Calculate the length of BM.

Answer (b) BM = ... cm [3]

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18 Richard is climbing a mountain. The temperature (T °C) is directly proportional to the height (h metres) **above the base camp.**
When he is 500 m above the base camp, the temperature is -5 °C.

(a) Find an equation connecting T and h.

Answer (a) .... [2]

(b) The base camp is 2500 m above sea level.

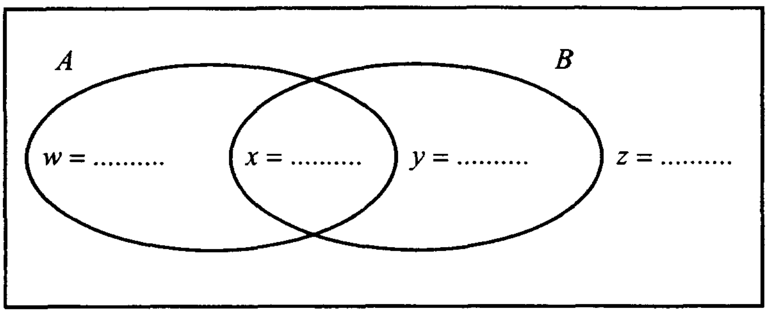
(i) The temperature at the top of the mountain is -18 °C.
Find the height of the top of the mountain **above sea level.**

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

(ii) Find the temperature at sea level.

Answer (b)(ii) .... °C [1]

19 $\mathscr{E}$



100 people were asked which magazines they read.
Half of those asked read neither magazine A nor magazine B.
27 read magazine A and 43 read magazine B.

(a) Calculate how many people read both magazines.
Write your answer in the appropriate place in the Venn diagram above.

[1]

(b) Fill in the other missing numbers in the Venn diagram. [2]

(c) In set notation, $w = n(A \cap B')$. Write down an expression for z in set notation.

Answer $z =$ .... [1]

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20 Simplify

(a) $(64x^8)^{\frac{1}{2}}$,

Answer (a) .... [2]

(b) $\dfrac{3x^2}{x^2 + 3x}$.

Answer (b) .... [2]

For Examiner's Use

21 $\mathbf{A} = \begin{pmatrix} 4 & x \\ -3 & 6 \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} 5 & -3 \\ -2 & 2 \end{pmatrix}$, $\mathbf{C} = \begin{pmatrix} 6 & 2 \\ y & 21 \end{pmatrix}$.

(a) If **AB** = **C**, find the value of x and the value of y.

Answer (a) x = ...

y = ... [3]

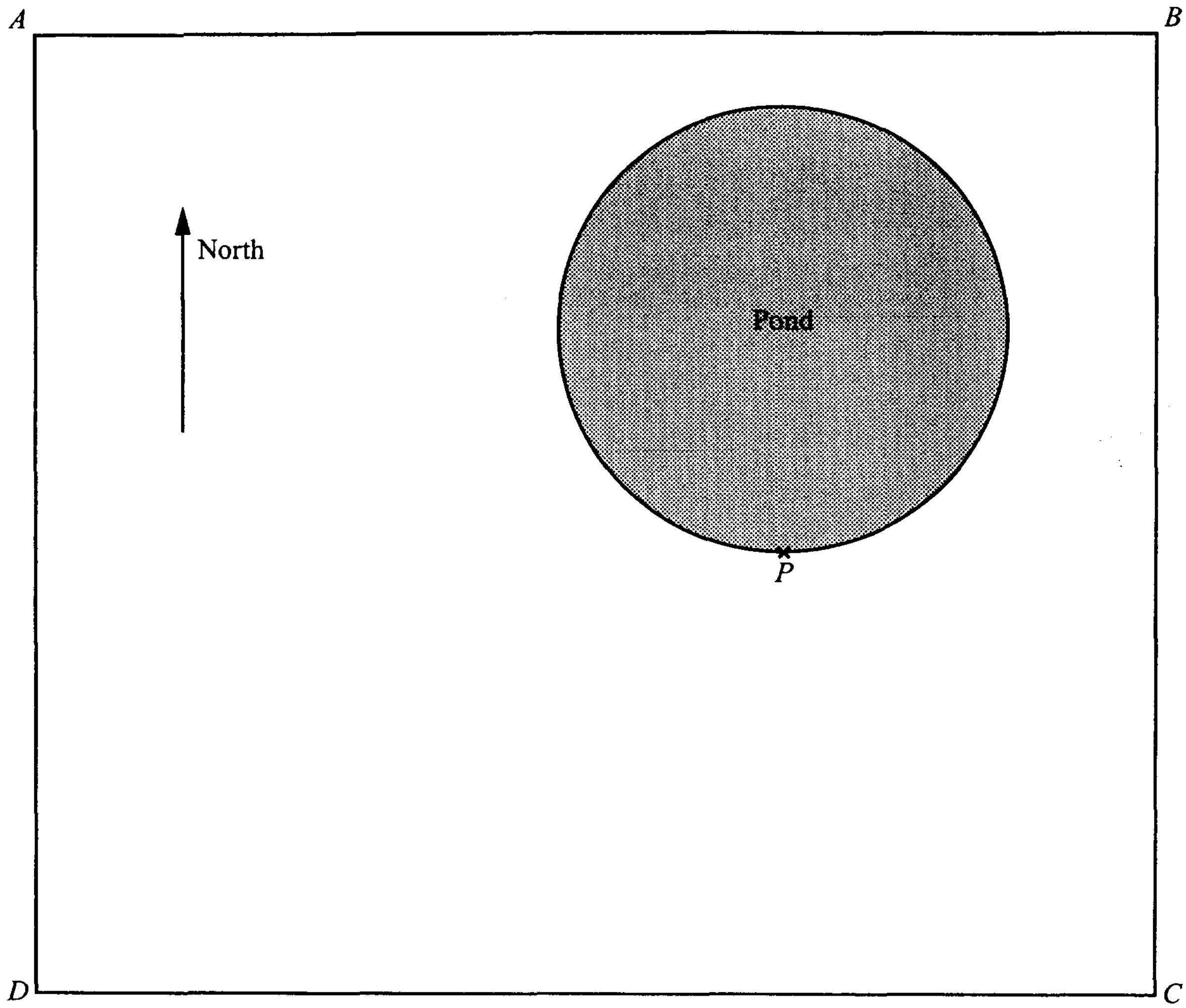
(b) Find $\mathbf{B}^{-1}$, the inverse of **B**.

Answer (b) $\mathbf{B}^{-1} = \begin{pmatrix} & \\ & \end{pmatrix}$

[2]

22

Scale 1 cm represents 10 m



A rectangular park *ABCD* contains a circular pond. The diagram above is a scale drawing where 1 cm represents 10 m. Petra and Martha have instructions for a treasure hunt.

(a) Petra walks from *C* to the point *P* at the edge of the pond.
Find, by measuring an appropriate angle, the bearing of *P* from *C*.

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

(b) Martha starts from *D* and walks for 80 m on a bearing of 055°.
Mark her position with a cross and label it *M*. [1]

(c) **(i)** Draw the locus of points 25 m from *M*. [1]

(ii) Draw the locus of points equidistant from *M* and *P*. [2]

(d) The treasure is hidden less than 25 m from *M* but nearer to *P* than *M*.
Shade the area where the treasure can be found. [1]