Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

0580/02
0581/02

Paper 2

October/November 2003

1 hour 30 minutes

Candidates answer on the Question Paper.
Additional Materials: Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
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. Answers in degrees should be given to one decimal place.
For π, use either your calculator value or 3.142.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

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This document consists of **10** printed pages and **2** blank pages.

University of Cambridge
Local Examinations Syndicate

[Turn over

For Examiner's use

1 Work out $\dfrac{2+12}{4+3\times 8}$.

Answer ..... [1]

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2 The altitude of Death Valley is −86 metres.
The altitude of Mount Whitney is 4418 metres.
Calculate the difference between these two altitudes.

Answer ..... m [1]

---

3 The first five terms of a sequence are 4, 9, 16, 25, 36, …
Find

(a) the 10th term,

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

(b) the *n*th term.

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

---

4 Rearrange the quantities in order with the smallest first.

$\frac{1}{8}\%$, $\frac{3}{2500}$, 0.00126

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

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5 $\mathscr{E} = \{-2\frac{1}{2},\ -1,\ \sqrt{2},\ 3.5,\ \sqrt{30},\ \sqrt{36}\}$
$X = \{\text{integers}\}$
$Y = \{\text{irrational numbers}\}$
List the members of

(a) X,

Answer (*a*) $X = \{$ .....$\}$ [1]

(b) Y.

Answer (*b*) $Y = \{$.....$\}$ [1]

For Examiner's use

6 Abdul invested \$240 when the rate of simple interest was $r\%$ per year.
After m **months** the interest was \$$I$.
Write down and simplify an expression for I, in terms of m and r.

Answer $I =$ ..... [2]

---

7 A baby was born with a mass of 3.6 kg.
After three months this mass had increased to 6 kg.
Calculate the percentage increase in the mass of the baby.

Answer .....% [2]

---

8 **(a)** $3^x = \frac{1}{3}$.
Write down the value of x.

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

(b) $5^y = k$.
Find 5^{y+1}, in terms of k.

Answer (*b*) $5^{y+1} =$ .....[1]

---

9 **(a)** 32 493 people were at a football match.
Write this number to the nearest thousand.

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

(b) At another match there were 25 500 people, to the nearest hundred.
Complete the inequality about n, the number of people at this match.

Answer (*b*).....$\leqslant n <$ .....[2]

---

10 When cars go round a bend there is a force, F, between the tyres and the ground.
F varies directly as the square of the speed, v.
When $v = 40$, $F = 18$.
Find F when $v = 32$.

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

---

11 In April 2001, a bank gave the following exchange rates.
1 euro = 0.623 British pounds.
1 euro = 1936 Italian lire.

(a) Calculate how much one pound was worth in lire.

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

(b) Calculate how much one million lire was worth in pounds.

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

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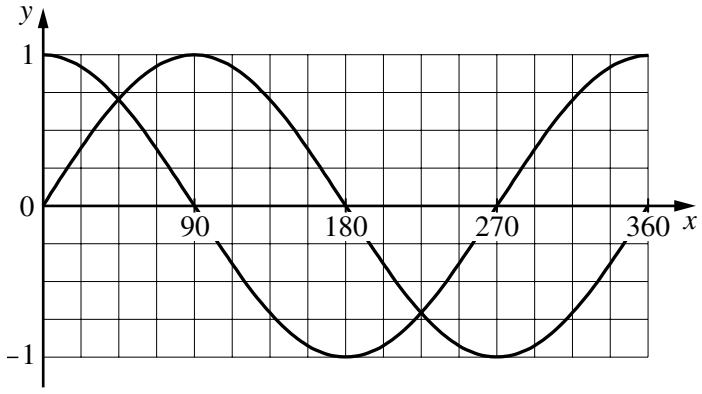
12 The diagram shows the graphs of $y = \sin x°$ and $y = \cos x°$.



Find the values of x between 0 and 360 for which

(a) $\sin x° = \cos x°$,

Answer (*a*) $x =$ ..... or $x =$ ..... [2]

(b) $\sin x° = \sin 22.5°$ ($x \neq 22.5$).

Answer (*b*) $x =$ ..... [1]

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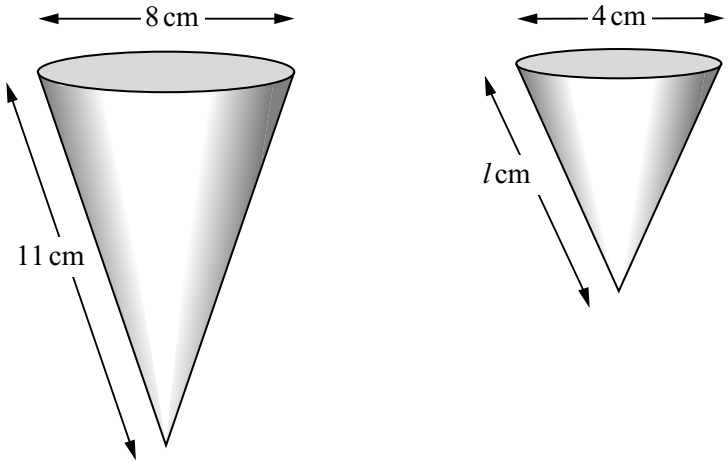
13



NOT TO SCALE

The two cones are similar.

(a) Write down the value of l.

Answer (*a*) $l =$ ..... [1]

(b) When full, the larger cone contains 172 cm^3 of water.
How much water does the smaller cone contain when it is full?

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

---

14 **(a)** Write $\frac{3}{x} - \frac{2}{x+1}$ as a single fraction in its simplest form.

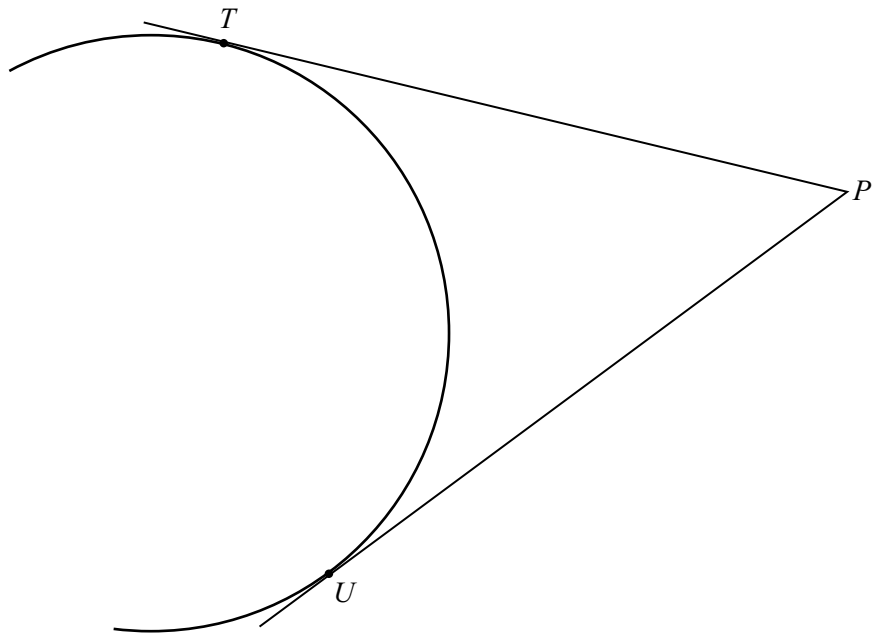
Answer (*a*) ..... [3]

(b) Solve the equation $\frac{3}{x} - \frac{2}{x+1} = 0$.

Answer (*b*) $x =$ ..... [1]

For Examiner's use

15



PT and *PU* are tangents to an arc of a circle at *T* and *U*.

(a) Using a straight edge and compasses only, construct the bisector of angle *TPU*. [2]

(b) By **drawing another line accurately**, find the centre of the circle and label it *O*. [2]

---

16 The straight line graph of $y = 3x - 6$ cuts the *x*-axis at *A* and the *y*-axis at *B*.

(a) Find the coordinates of *A* and the coordinates of *B*.

Answer (*a*) *A* (....., ...)

B (....., ...) [2]

(b) Calculate the length of *AB*.

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

(c) *M* is the mid-point of *AB*.
Find the coordinates of *M*.

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

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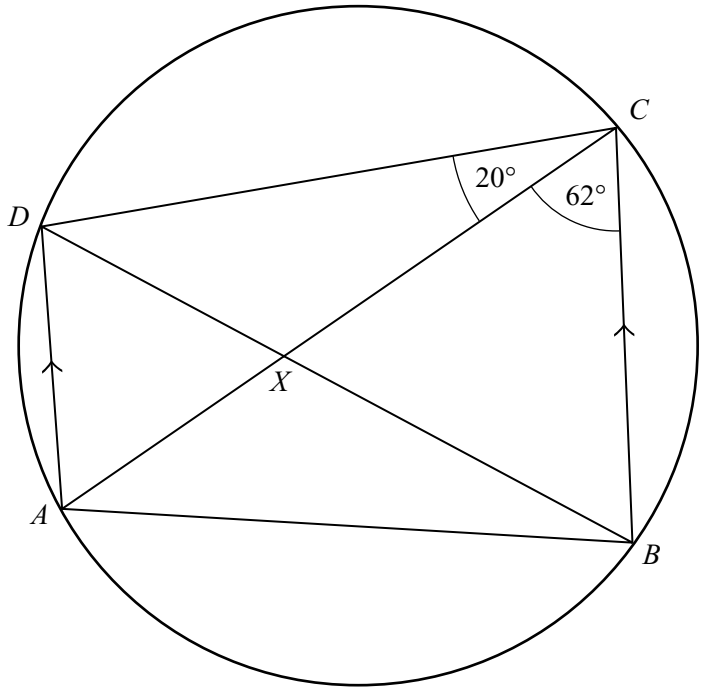
17



NOT TO SCALE

ABCD is a cyclic quadrilateral.
AD is parallel to *BC*. The diagonals *DB* and *AC* meet at *X*.
Angle *ACB* = 62° and angle *ACD* = 20°.
Calculate

(a) angle *DBA*,

Answer (*a*) Angle *DBA* = ... [1]

(b) angle *DAB*,

Answer (*b*) Angle *DAB* = ... [1]

(c) angle *DAC*,

Answer (*c*) Angle *DAC* = ... [1]

(d) angle *AXB*,

Answer (*d*) Angle *AXB* = ... [1]

(e) angle *CDB*.

Answer (*e*) Angle *CDB* = ... [1]

For Examiner's use

18 The population of Europe is 580 000 000 people.
The land area of Europe is 5 900 000 square kilometres.

(a) Write 580 000 000 in standard form.

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

(b) Calculate the number of people per square kilometre, to the nearest whole number.

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

(c) Calculate the number of square **metres** per person.

Answer (*c*) ..... m^2 [2]

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19 f: $x \rightarrow 1 - 2x$ and g: $x \rightarrow \frac{x}{2}$.

(a) Find fg(7).

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

(b) **(i)** Solve $f(x) = g(x)$.

Answer (*b*)(i) $x =$ ..... [2]

(ii) The graphs of $y = f(x)$ and $y = g(x)$ meet at M.
Find the coordinates of M.

Answer (*b*)(ii) (....., ...) [1]

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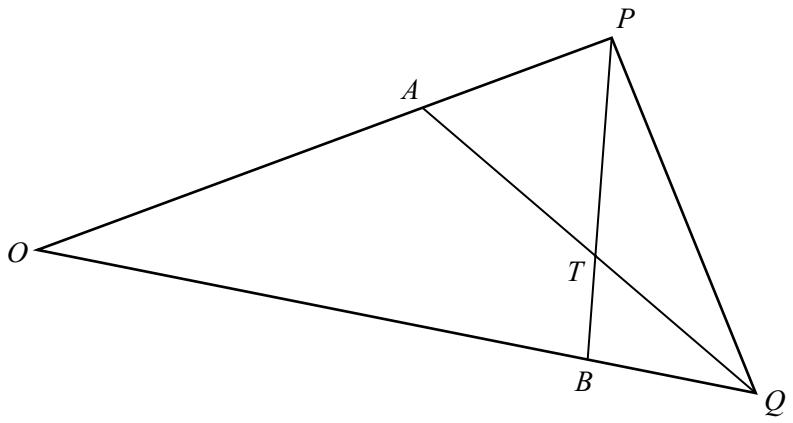
20



NOT TO SCALE

In the diagram $OA = \frac{2}{3}OP$ and $OB = \frac{3}{4}OQ$.
$\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.

(a) Find in terms of **p** and **q**

(i) $\overrightarrow{AQ}$,

Answer (*a*)(i) $\overrightarrow{AQ}$ = ... [2]

(ii) $\overrightarrow{BP}$.

Answer (*a*)(ii) $\overrightarrow{BP}$ =..... [2]

(b) AQ and BP intersect at T.
$BT = \frac{1}{3}BP$.
Find $\overrightarrow{QT}$ in terms of **p** and **q**, in its simplest form.

Answer (*b*) $\overrightarrow{QT}$ = ... [2]

For Examiner's use

21 Marina goes to the shop to buy loaves of bread and cakes.
One loaf of bread costs 60 cents and one cake costs 80 cents.
She buys x loaves of bread and y cakes.

(a) She must not spend more than \$12.
Show that $3x + 4y \leqslant 60$.

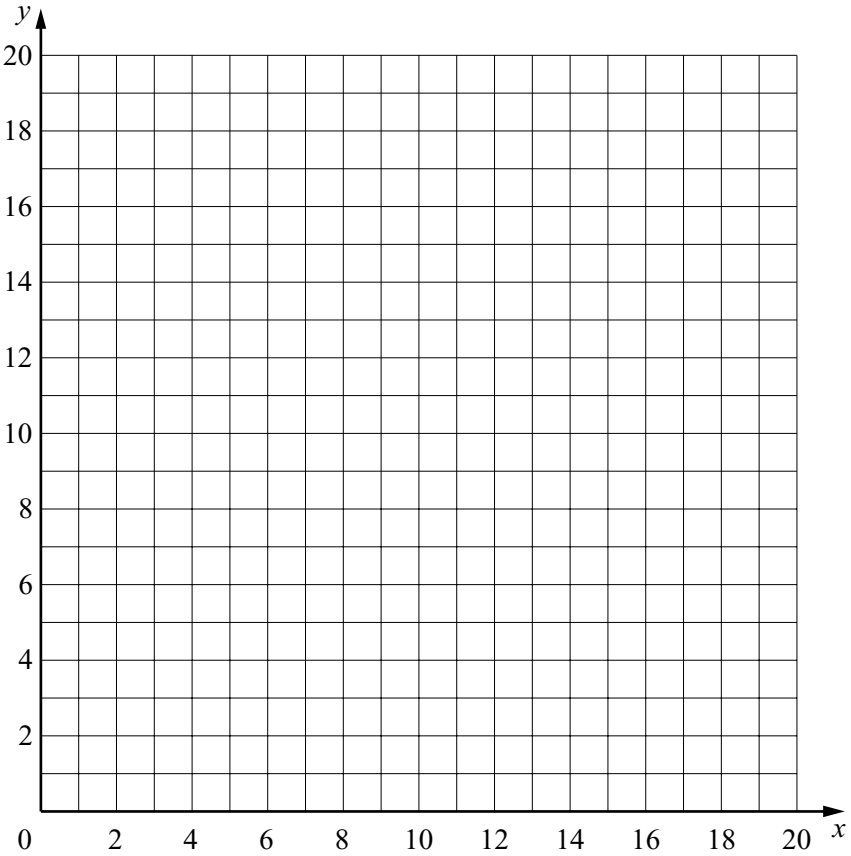
Answer (*a*)

[1]

(b) The number of loaves of bread must be greater than or equal to the number of cakes.
Write down an inequality in x and y to show this information.

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

(c) On the grid below show the two inequalities by shading the **unwanted** regions.
Write R in the required region.



[4]

(d) The **total** number of loaves of bread and cakes is $x + y$.
Find the largest possible value of $x + y$.

Answer (*d*) ..... [1]

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