UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

Paper 2 (Extended)

0580/02 0581/02

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

October/November 2005

1hour 30 minutes

Candidate Name

Centre Number

Candidate Number

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.
DO **NOT** WRITE IN THE BARCODE.
DO **NOT** WRITE IN THE GREY AREAS BETWEEN THE PAGES.

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.

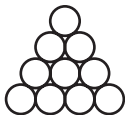
For Examiner's Use

The total number of 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. Given answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

This document consists of **11** printed pages and **1** blank page.

For Examiner's Use

1



The number of tennis balls (T) in the diagram is given by the formula

$$T = \tfrac{1}{2}n(n+1),$$

where n is the number of rows.
The diagram above has 4 rows.
How many tennis balls will there be in a diagram with 20 rows?

Answer ..... [1]

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2 Calculate the value of $2(\sin 15°)(\cos 15°)$.

Answer ..... [1]

---

3 Calculate $(4 \quad 6 \quad 2)\begin{pmatrix} 3 \\ 2 \\ -12 \end{pmatrix}$.

Answer ..... [2]

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4 Write down the next term in each of the following sequences.

(a) 8.2, 6.2, 4.2, 2.2, 0.2, …

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

(b) 1, 3, 6, 10, 15, …

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

---

5 Celine invests $ 800 for 5 **months** at 3 % simple interest per year.
Calculate the interest she receives.

Answer $ ..... [2]

For Examiner's Use

6 $(0.8)^{\frac{1}{2}}$, 0.8, $\sqrt{0.8}$, $(0.8)^{-1}$, $(0.8)^2$.

From the numbers above, write down

(a) the smallest,

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

(b) the largest.

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

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7 $f(x) = 10^x$.

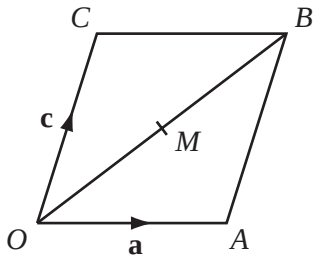
(a) Calculate f(0.5).

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

(b) Write down the value of $f^{-1}(1)$.

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

8



OABC is a parallelogram. $\overrightarrow{OA}$ = **a** and $\overrightarrow{OC}$ = **c**.
M is the mid-point of *OB*.
Find $\overrightarrow{MA}$ in terms of **a** and **c**.

Answer $\overrightarrow{MA}$ = ... [2]

---

9 Write the number 2381.597 correct to

(a) 3 significant figures,

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

(b) 2 decimal places,

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

(c) the nearest hundred.

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

[Turn over

For Examiner's Use

10 The mass of the Earth is $\frac{1}{95}$ of the mass of the planet Saturn.

The mass of the Earth is 5.97×10^{24} kilograms.
Calculate the mass of the planet Saturn, giving your answer in standard form, correct to 2 significant figures.

Answer ..... kg [3]

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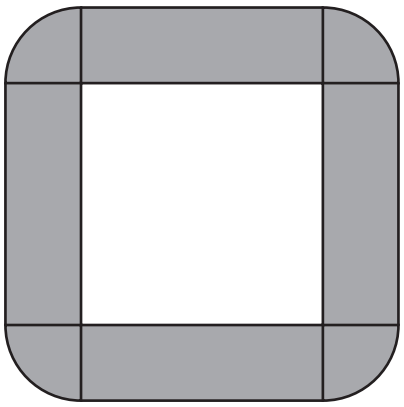
11 A large conference table is made from four rectangular sections and four corner sections.
Each rectangular section is 4 m long and 1.2 m wide.
Each corner section is a quarter circle, radius 1.2 m.



NOT TO SCALE

Each person sitting at the conference table requires one metre of its outside perimeter.
Calculate the greatest number of people who can sit around the **outside** of the table.
Show all your working.

Answer ..... [3]

For Examiner's Use

12 Make d the subject of the formula

$$c = \frac{d^3}{2} + 5 .$$

Answer $d =$ ..... [3]

---

13 The force of attraction (F) between two objects is inversely proportional to the square of the distance (d) between them.
When $d = 4$, $F = 30$.
Calculate F when $d = 8$.

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

---

14 Factorise completely

(a) $7ac + 14a$,

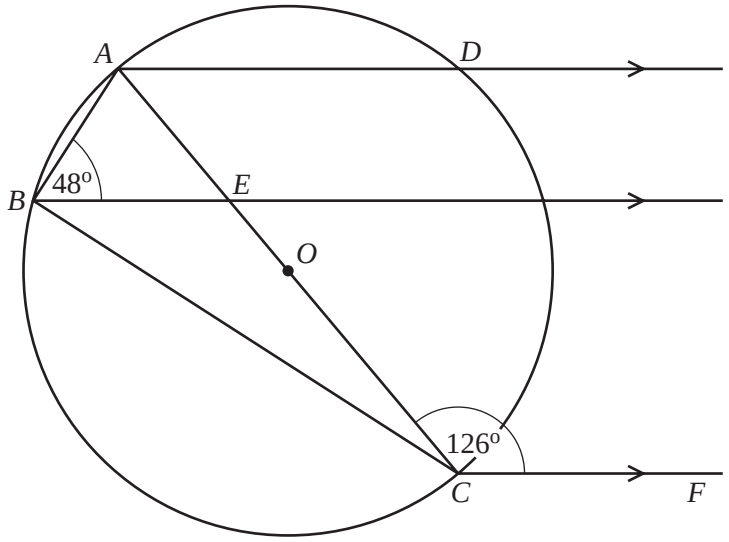
Answer(a) ..... [1]

(b) $12ax^3 + 18xa^3$.

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

[Turn over

15



NOT TO SCALE

A, *B*, *C* and *D* lie on a circle centre *O*. *AC* is a diameter of the circle.
AD, *BE* and *CF* are parallel lines. Angle *ABE* = 48° and angle *ACF* = 126°.
Find

(a) angle *DAE*,

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

(b) angle *EBC*,

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

(c) angle *BAE*.

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

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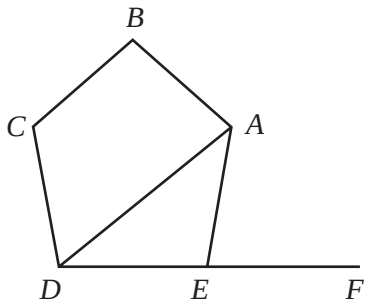
16 Solve the inequality

$$4 - 5x < 2(x + 4).$$

Answer ..... [3]

For Examiner's Use

17



NOT TO SCALE

ABCDE is a regular pentagon.
DEF is a straight line.
Calculate

(a) angle *AEF*,

Answer(a) Angle *AEF* = ... [2]

(b) angle *DAE*.

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

---

18 Simplify

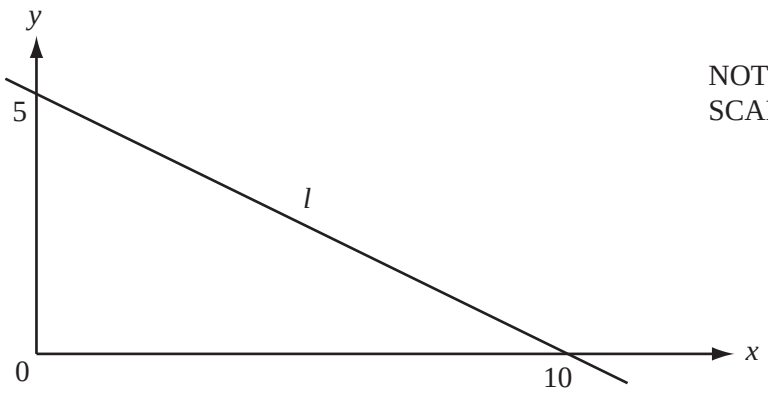
(a) $\left(\frac{x^{27}}{27}\right)^{\frac{2}{3}}$,

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

(b) $\left(\frac{x^{-2}}{4}\right)^{-\frac{1}{2}}$.

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

19



NOT TO SCALE

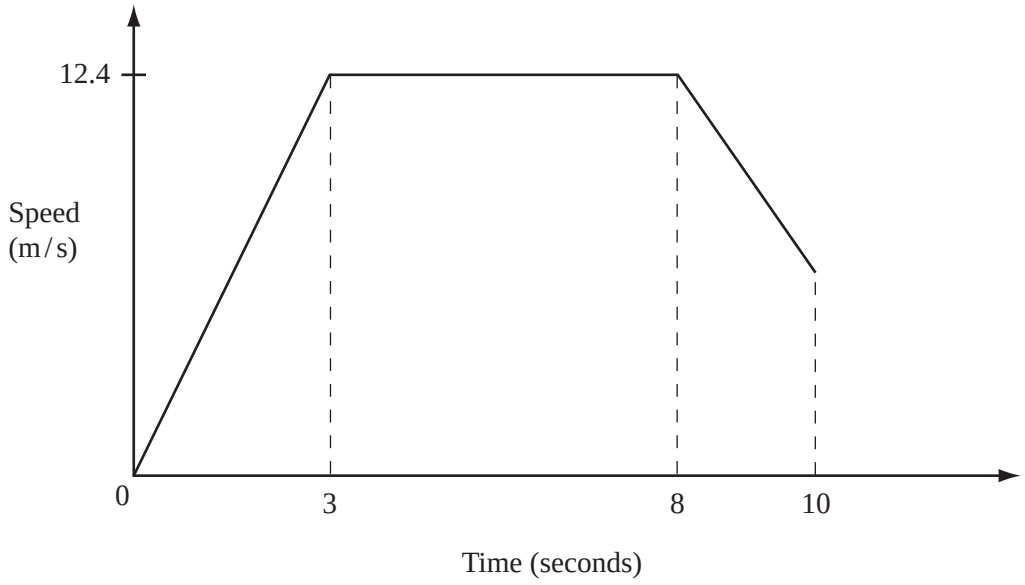
(a) Calculate the gradient of the line *l*.

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

(b) Write down the equation of the line *l*.

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

20



An athlete, in a race, accelerates to a speed of 12.4 metres per second in 3 seconds.
He runs at this speed for the next 5 seconds and slows down over the last 2 seconds as shown in the speed-time graph above.
He crosses the finish line after 10 seconds.
The total distance covered is 100 m.

(a) Calculate the distance he runs in the first 8 seconds.

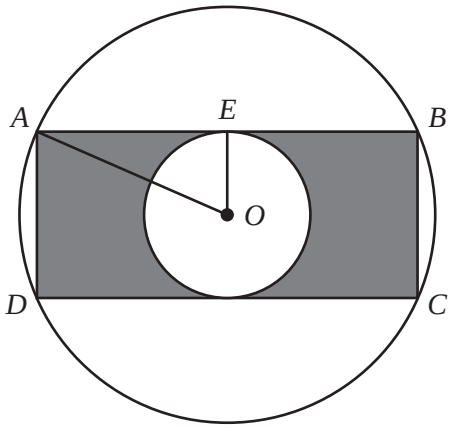
Answer(a) ..... m [2]

(b) Calculate his speed when he crosses the finish line.

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

[Turn over

21



NOT TO SCALE

A,B,C and *D* lie on a circle, centre *O*, radius 8 cm.
AB and *CD* are tangents to a circle, centre *O*, radius 4 cm.
ABCD is a rectangle.

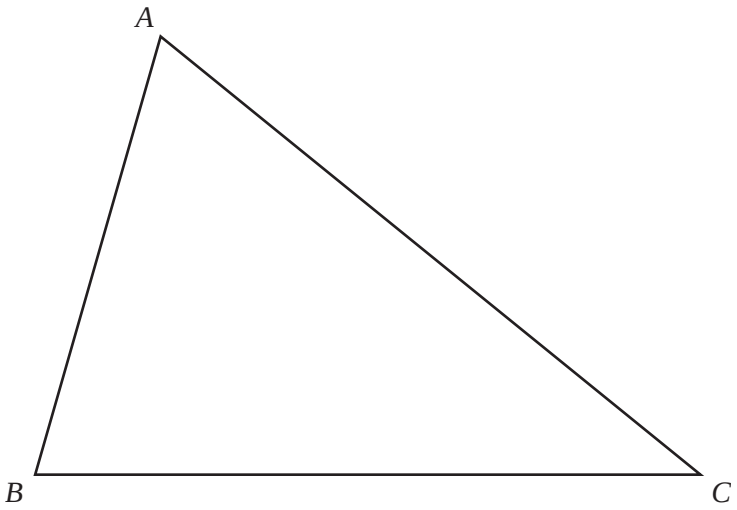
(a) Calculate the distance *AE*.

Answer(a) AE = ... cm [2]

(b) Calculate the shaded area.

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

22



(a) In this part of the question use a straight edge and compasses only.

Leaving in your construction lines,

(i) construct the angle bisector of angle ACB, [2]

(ii) construct the perpendicular bisector of AC. [2]

(b) Draw the locus of all the points inside the triangle ABC which are 7 cm from C. [1]

(c) Shade the region inside the triangle which is nearer to A than C, nearer to BC than AC and less than 7 cm from C. [1]

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23 **Showing all your working**, solve

(a) $\frac{5x}{2} - 9 = 0$,

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

(b) $x^2 + 12x + 3 = 0$, giving your answers correct to 1 decimal place.

Answer(b) $x =$ ..... or $x =$ ..... [4]

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