

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

October/November 2004

Mathematical tables (optional)

Tracing paper (optional)

1 hour 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.

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.

For Examiner's Use

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



- 1 A pattern of numbers is shown below.

				1					
				1	2	1			
			1	3	3	1			
		1	4	6	4	1			
	1	5	10	10	5	1			
1	6	x	20	x	6	1			

Write down the value of x .

Answer [1]

- 2 Calculate $(3 + 3\sqrt{3})^3$ giving your answer correct to 1 decimal place.

Answer [2]

- 3 From the list of numbers $\frac{22}{7}$, π , $\sqrt{14}$, $\sqrt{16}$, 27.4, $\frac{65}{13}$ write down

(a) one integer,

Answer(a) [1]

(b) one irrational number.

Answer(b) [1]

- 4 Solve the inequality

$$5 - 3x < 17.$$

Answer [2]

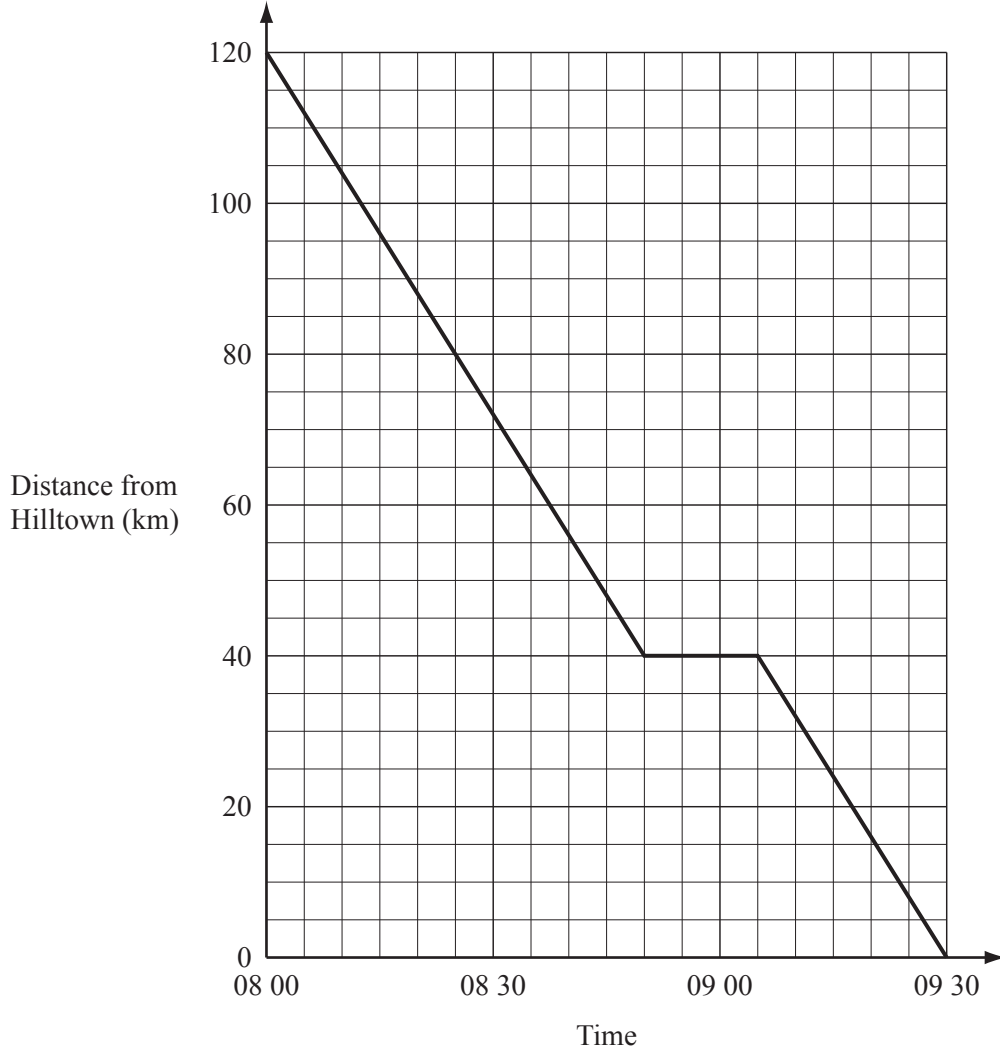
5 Solve the equation

$$\frac{3x - 2}{5} = 8.$$

For
Examiner's
Use

Answer $x =$ [2]

6



The graph shows the distance, in kilometres, of a train from Hilltown.

Find the speed of the train in kilometres per hour at

(a) 08 30,

Answer(a) km/h [2]

(b) 09 00.

Answer(b) km/h [1]

- 7 The air resistance (R) to a car is proportional to the square of its speed (v).
When $R = 1800$, $v = 30$.
Calculate R when $v = 40$.

For
Examiner's
Use

Answer $R =$ [3]

- 8 In 1997 the population of China was 1.24×10^9 .
In 2002 the population of China was 1.28×10^9 .
Calculate the percentage increase from 1997 to 2002.

Answer % [2]

- 9 8, 15, 22, 29, 36,

A sequence of numbers is shown above.

- (a) Find the 10th term of the sequence.

Answer(a) [1]

- (b) Find the n th term of the sequence.

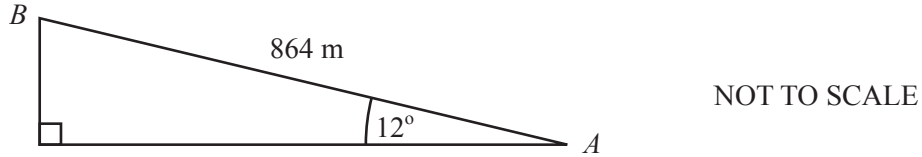
Answer(b) [1]

- (c) Which term of the sequence is equal to 260?

Answer(c) [1]

- 10 A mountain railway AB is of length 864 m and rises at an angle of 12° to the horizontal.
 A train is 586 m above sea level when it is at A .
 Calculate the height above sea level of the train when it reaches B .

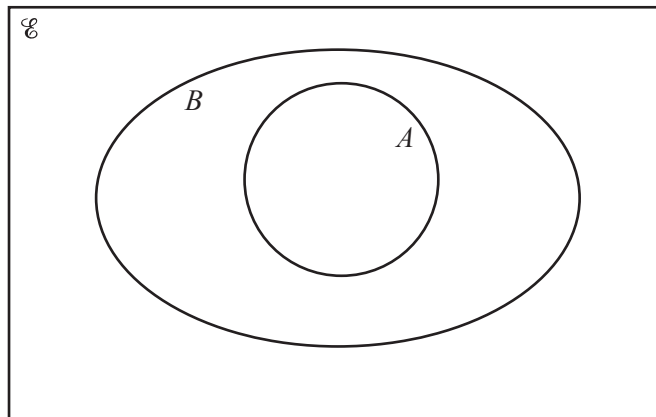
For
 Examiner's
 Use



Answer m [3]

- 11 $\mathcal{E} = \{40, 41, 42, 43, 44, 45, 46, 47, 48, 49\}$
 $A = \{\text{prime numbers}\}$
 $B = \{\text{odd numbers}\}$

(a) Place the 10 numbers in the correct places on the Venn diagram.



[2]

(b) State the value of $n(B \cap A')$.

Answer(b) [1]

- 12 Make c the subject of the formula

$$\sqrt{3c - 5} = b.$$

Answer $c =$ [3]

- 13 A square has sides of length d metres.
This length is 120 metres, correct to the nearest 10 metres.

For
Examiner's
Use

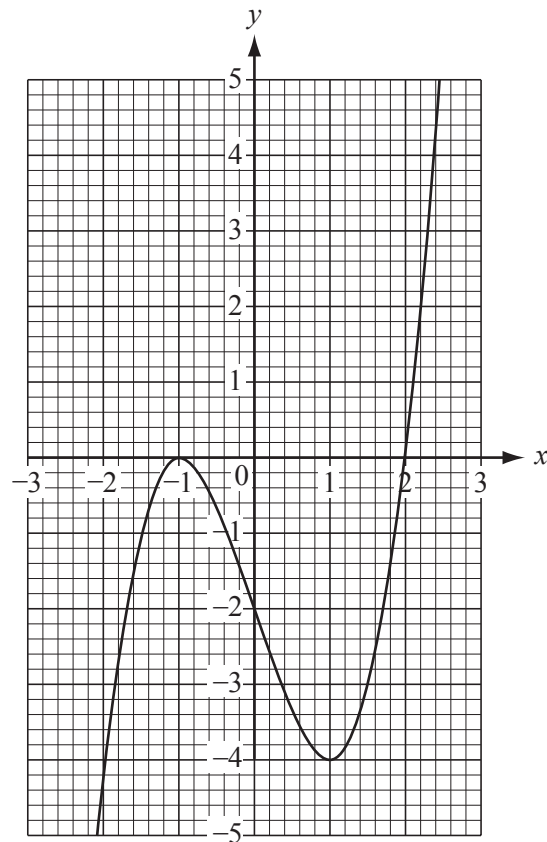
- (a) Complete the statement in the answer space.

Answer(a) $\leq d <$ [1]

- (b) Calculate the difference between the largest and the smallest possible areas of the square.

Answer(b) m^2 [2]

14



- (a) Write down the coordinates of the points where the gradient of the curve is zero.

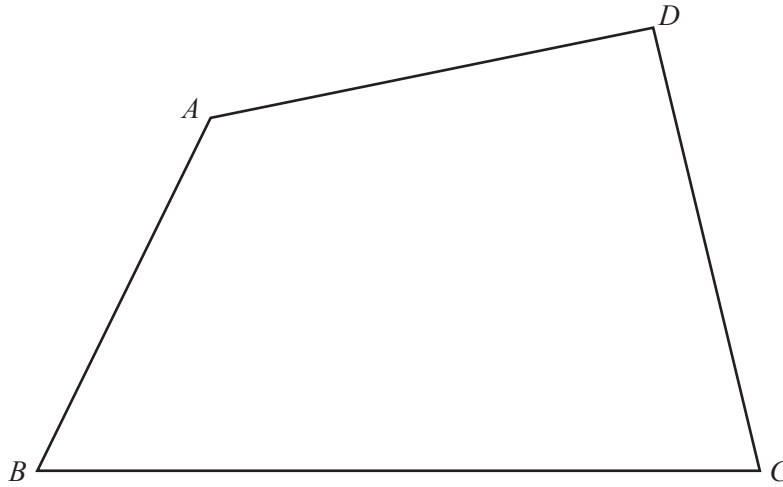
Answer(a) (.....,) and (.....,) [2]

- (b) Write down the range of values of x when the gradient of the curve is negative.

Answer(b) [1]

15

For
Examiner's
Use



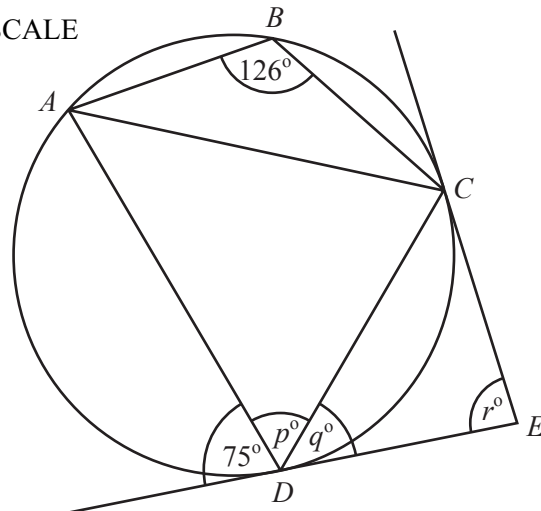
The diagram shows a quadrilateral $ABCD$.

- (a) Draw the locus of points in the quadrilateral which are 5 cm from A . [1]
- (b) Using a straight edge and compasses only, draw the locus of all points inside the quadrilateral which are equidistant from C and D .
Show all your construction lines. [2]
- (c) Shade the region which contains points in the quadrilateral that are more than 5 cm from A and nearer to D than to C . [1]

16

NOT TO SCALE

$ABCD$ is a cyclic quadrilateral.
The tangents at C and D meet at E .
Calculate the values of p , q and r .



- Answer $p =$ [1]
- $q =$ [1]
- $r =$ [2]

17 Solve the equation

$$x^2 + 4x - 22 = 0.$$

Give your answers correct to 2 decimal places.
Show all your working.

For
 Examiner's
 Use

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

18

$$\mathbf{C} = \begin{pmatrix} 5 & -2 \\ 1 & 4 \end{pmatrix} \quad \mathbf{D} = \begin{pmatrix} 4 & 2 \\ -1 & 5 \end{pmatrix}$$

(a) Write as a single matrix

(i) $\mathbf{C} - 3\mathbf{D}$,

Answer(a)(i) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

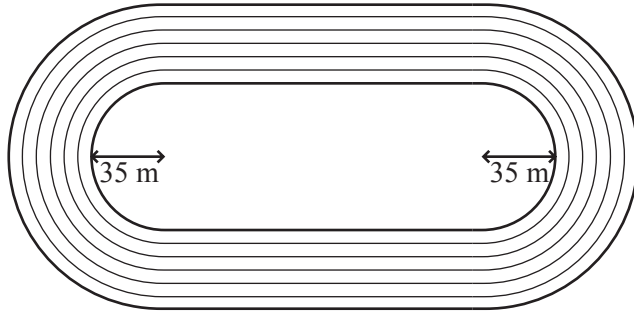
(ii) \mathbf{CD} .

Answer(a)(ii) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) Find \mathbf{C}^{-1} .

Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

19



NOT TO SCALE

For
Examiner's
Use

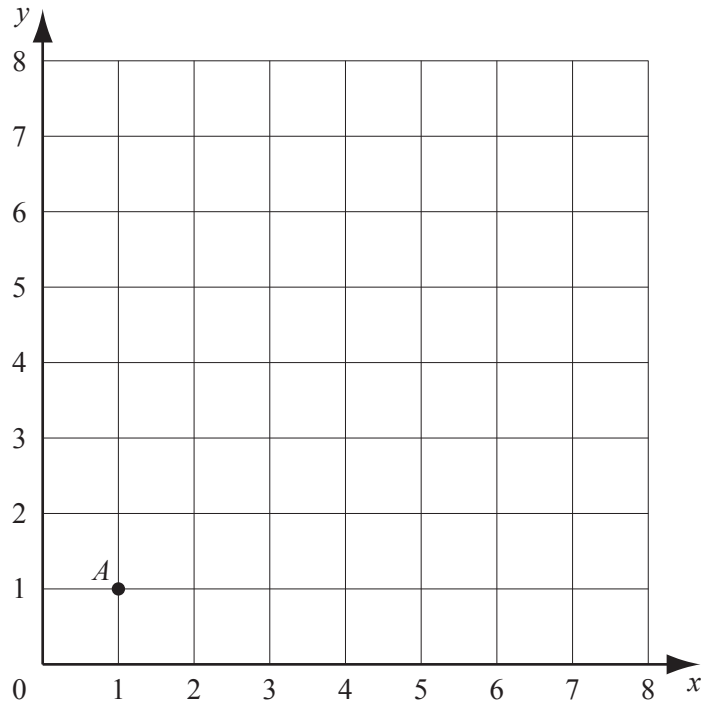
The diagram shows an athletics track with six lanes.
 The distance around the inside of the inner lane is 400 metres.
 The radius of each semicircular section of the inside of the inner lane is 35 metres.

- (a) Calculate the total length of the two straight sections at the inside of the inner lane.

Answer(a) m [3]

- (b) Each lane is one metre wide.
 Calculate the difference in the distances around the outside of the outer lane and the inside of the inner lane.

Answer(b) m [2]



(a) Using a scale of 1cm to represent 1 unit, draw the vectors

$\vec{AB} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$ and $\vec{BC} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$ on the grid above. [2]

(b) $ABCD$ is a parallelogram.
Write down the coordinates of D .

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

(c) Calculate $|\vec{AB}|$.

Answer(c) [2]

BLANK PAGE

Every reasonable effort has been made to trace all copyright holders where the publishers (i.e. UCLES) are aware that third-party material has been reproduced. The publishers would be pleased to hear from anyone whose rights they have unwittingly infringed.

University of Cambridge International Examinations is part of the University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.