

Write your name here

Surname

Other names

Centre Number

Candidate Number

**Edexcel IGCSE**

**Mathematics B**

**Paper 1**



Monday 6 June 2011 – Afternoon

**Time: 1 hour 30 minutes**

Paper Reference

**4MB0/01**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**

### Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ►

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**Answer all TWENTY NINE questions**

**Write your answers in the spaces provided**

**You must write down all stages in your working**

- 1 Write down the first four terms of the sequence whose  $n$ th term is  $5n - 3$

.....  
**(Total for Question 1 is 2 marks)**

- 2 A straight line is drawn through the points with coordinates  $(-3, 26)$  and  $(5, 2)$ .  
Calculate the gradient of the line.

.....  
**(Total for Question 2 is 2 marks)**

- 3  $\mathcal{E} = \{\text{positive even integers}\}$ ,  
 $A = \{x : x \leq 14\}$ ,  
 $B = \{x : x > 8\}$ .  
List the members of the set  $A \cap B$ .

.....  
**(Total for Question 3 is 2 marks)**



4 Solve the equation  $\frac{3}{2x-5} = 4$

.....  
**(Total for Question 4 is 2 marks)**

5 Find the highest common factor (HCF) of 147, 42 and 252

.....  
**(Total for Question 5 is 2 marks)**

6 Factorise fully  $x^2 - xy + xz - zy$ .

.....  
**(Total for Question 6 is 2 marks)**



- 7 A bookcase was sold for £55.43  
This price included a tax of 15%.  
Calculate the price of the bookcase before the tax was added.

£ .....

(Total for Question 7 is 2 marks)

- 8 Express  $\frac{x}{2} - \frac{x}{x+2}$  as a single fraction. Simplify your answer.

.....

(Total for Question 8 is 2 marks)

- 9  $y = 2x^3 - 3x^{-4}$   
Find  $\frac{dy}{dx}$ .

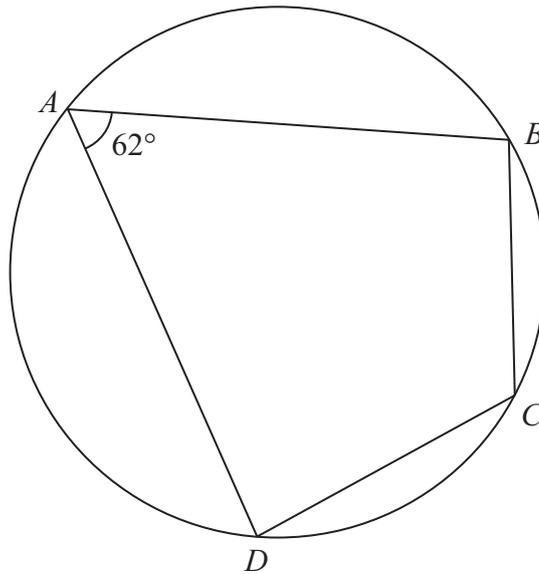
$\frac{dy}{dx} =$  .....

(Total for Question 9 is 2 marks)



10

Diagram NOT  
accurately drawn



$A, B, C$  and  $D$  are points on a circle such that  $\angle BAD = 62^\circ$  and  $\angle BCA = 59^\circ$ .

Show that  $\triangle ABD$  is isosceles.

Give full reasons for your answer.

(Total for Question 10 is 3 marks)



11 Find the smallest integer value of  $x$  such that  $6 - \frac{3x}{4} < 5$

.....  
**(Total for Question 11 is 3 marks)**

12  $\pounds N$  is shared between three people in the ratio 2 : 3 : 7  
The largest share is  $\pounds 540$  more than the smallest share.

Calculate the value of  $N$ .

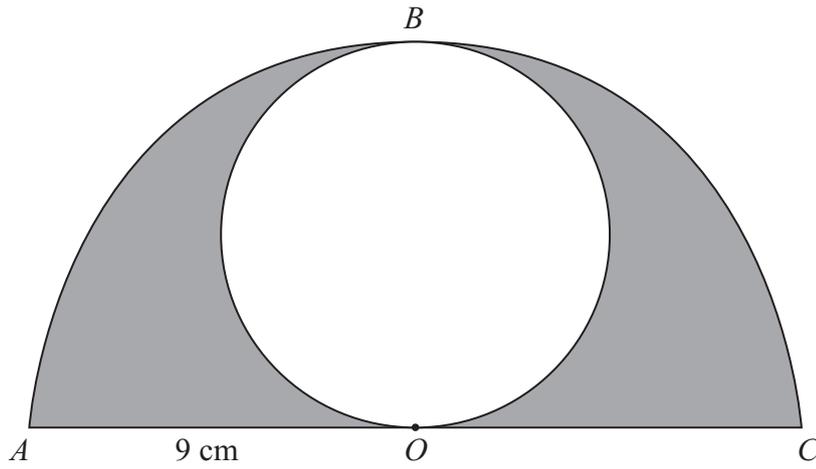
$N =$  .....

**(Total for Question 12 is 3 marks)**



13

Diagram **NOT**  
accurately drawn



The diagram shows a circle inside a semicircle. The semicircle  $ABC$  has centre  $O$  and radius 9 cm. The circle has diameter  $OB$ .

Calculate, in  $\text{cm}^2$ , the shaded area.  
Give your answer to 3 significant figures.

.....  $\text{cm}^2$

**(Total for Question 13 is 3 marks)**



14  $\vec{OA} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$  and  $\vec{OB} = \begin{pmatrix} 9 \\ -7 \end{pmatrix}$ .

Calculate the modulus of  $\vec{AB}$ .

.....  
**(Total for Question 14 is 3 marks)**

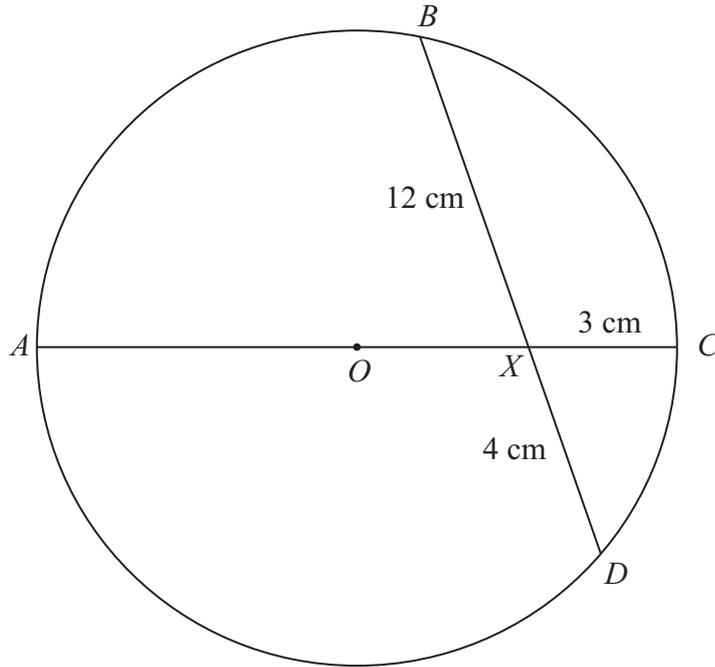
- 15 The mean of six numbers is 40  
Three of the numbers are 102, 60 and 30  
Each of the remaining three numbers is equal to  $x$ .  
Find the value of  $x$ .

$x =$  .....

**(Total for Question 15 is 3 marks)**



Diagram **NOT** accurately drawn



$O$  is the centre of a circle  $ABCD$  and  $AC$  is a diameter.  $AC$  and  $BD$  intersect at  $X$ , where  $XC = 3$  cm,  $BX = 12$  cm and  $XD = 4$  cm.

Calculate the radius, in cm, of the circle.

..... cm

**(Total for Question 16 is 3 marks)**

17 Showing all your working, simplify fully  $\frac{8^{\frac{1}{3}} + 27^{\frac{2}{3}}}{121^{\frac{1}{2}}}$

.....  
**(Total for Question 17 is 3 marks)**

18 The size of each interior angle of an  $n$ -sided regular polygon is eight times the size of each exterior angle.

Calculate the value of  $n$ .

$n =$  .....

**(Total for Question 18 is 4 marks)**

19 Show that  $\sqrt{512} - \sqrt{72}$  can be written in the form  $a\sqrt{2}$  and find the value of  $a$ .

$a = \dots\dots\dots$

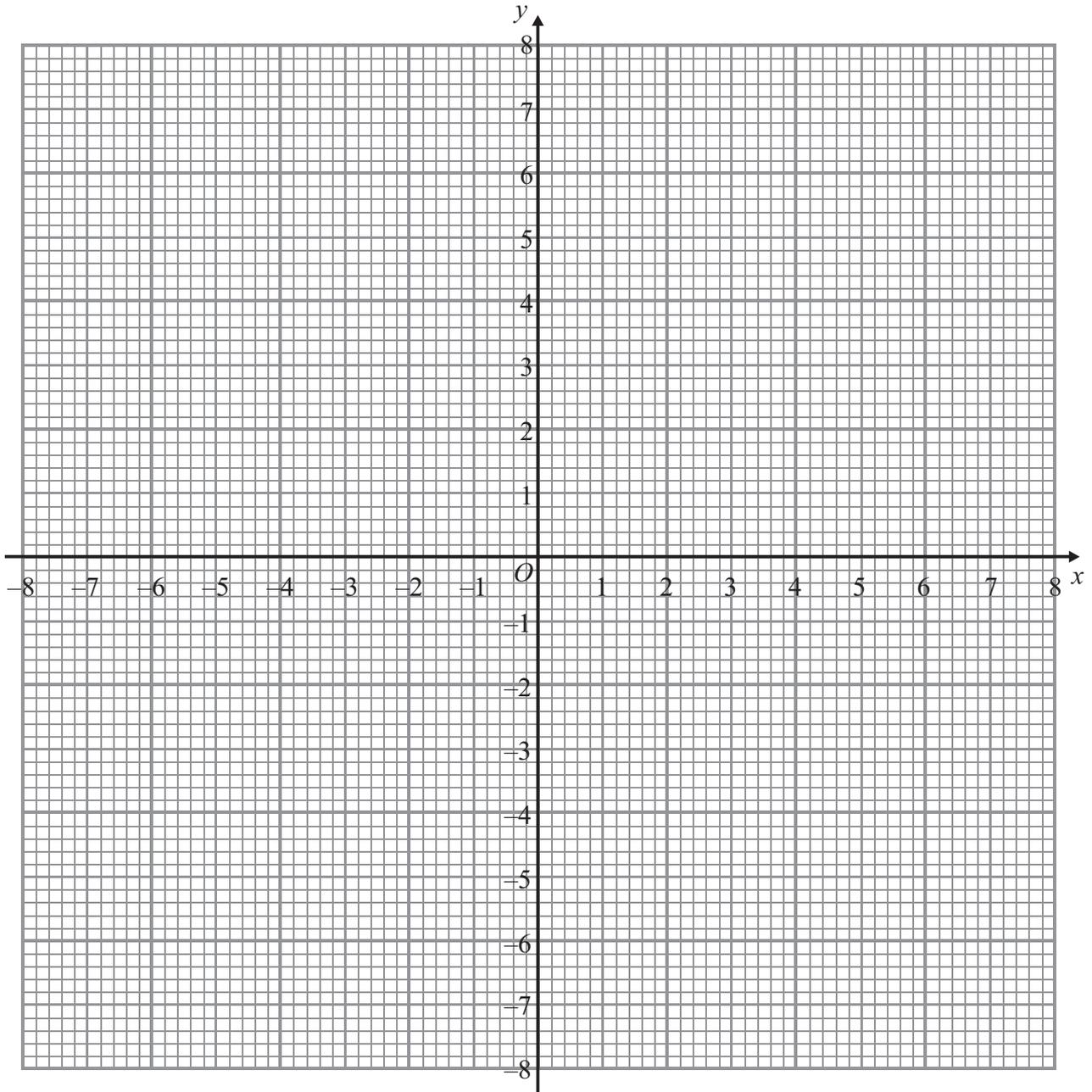
**(Total for Question 19 is 4 marks)**

20 Given that  $a^2 = b^2 + c^2 - 2bc \cos A^\circ$  and  $a = 7$ ,  $b = 4$  and  $c = 5$ , find the value, to the nearest integer, of  $A$ .

$A = \dots\dots\dots$

**(Total for Question 20 is 4 marks)**





- (a) Draw and label the line with equation  $y = 2x - 5$  on the grid. (1)
- (b) Draw and label the line with equation  $y + x = 4$  on the grid. (1)
- (c) From your diagram, write down the solution of the two simultaneous equations  
 $y = 2x - 5$  and  $y + x = 4$

.....  
(2)

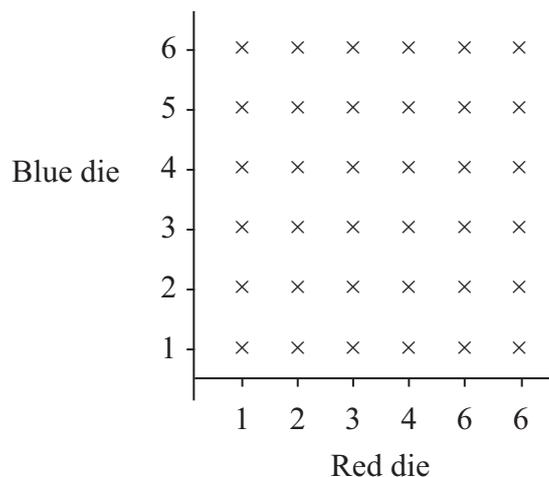
**(Total for Question 21 is 4 marks)**

22 A six sided die, coloured red, is numbered 1, 2, 3, 4, 6, 6  
 When rolled, each face of the die is equally likely to be facing uppermost.  
 The die is to be thrown once.

(a) Write down the probability that the score on the die will be an odd number.

.....  
 (1)

A second six sided die, coloured blue, is numbered 1, 2, 3, 4, 5, 6  
 When this die is rolled, each face of the die is equally likely to be facing uppermost.  
 The two dice are to be rolled and their scores added together.  
 The possible outcomes are shown in the diagram below.



(b) Write down the possible prime number totals when the scores on the two dice are added together.

.....  
 (1)

(c) On the diagram, circle all outcomes where the sum of the scores of the two dice is a prime number.

(1)

(d) Write down the probability that the sum of the scores of the two dice is a prime number.

.....  
 (1)

**(Total for Question 22 is 4 marks)**



23 Given that  $\mathbf{A} = \begin{pmatrix} 3 & 4 \\ 2 & a \end{pmatrix}$ , where  $a$  is constant,

(a) find, in terms of  $a$ ,  $\mathbf{A}^2$

$\mathbf{A}^2$  .....  
(2)

Given that  $\mathbf{A}^2 = \lambda \mathbf{I}$ , where  $\mathbf{I} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ ,

(b) find the value of  $a$  and the value of  $\lambda$ .

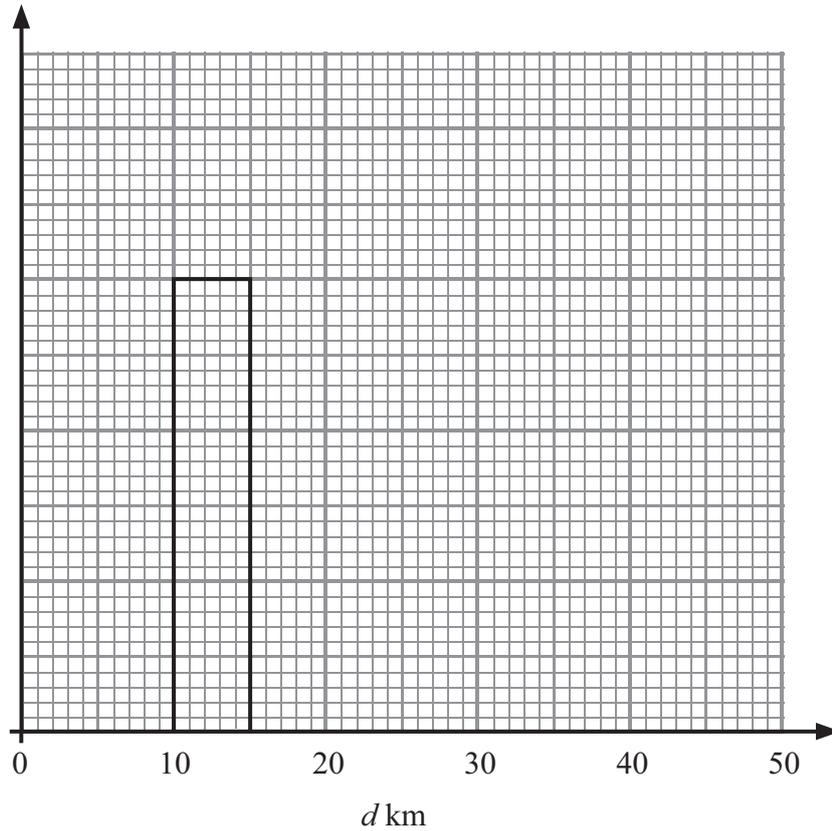
$a =$  .....  
 $\lambda =$  .....  
(2)

**(Total for Question 23 is 4 marks)**

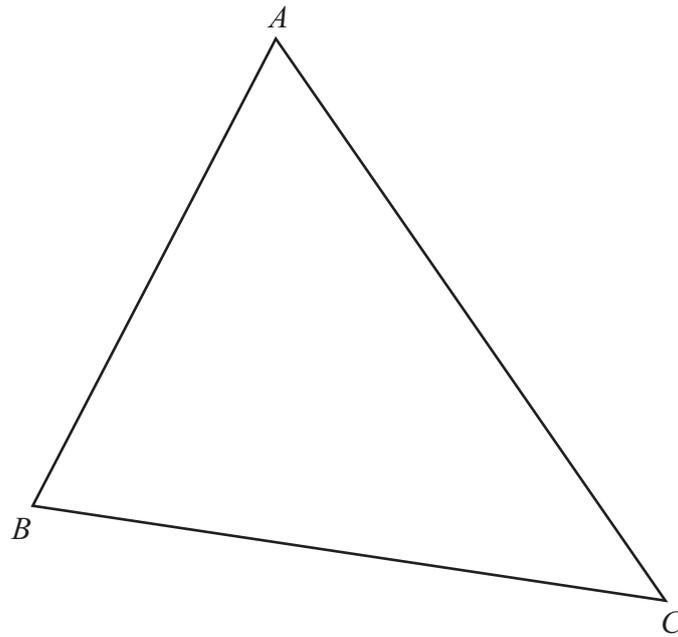
24 200 rail passengers were asked how far they had travelled by train that day. Information about the distances travelled,  $d$  km, is shown in the table.

Distance travelled ( $d$ km)	$0 < d \leq 10$	$10 < d \leq 15$	$15 < d \leq 20$	$20 < d \leq 30$	$30 < d \leq 50$
Frequency	48	30	36	64	22

Complete the histogram.



(Total for Question 24 is 4 marks)



In  $\triangle ABC$  the bisector of  $\angle BAC$  meets the perpendicular bisector of  $AB$  at the point  $D$ .

Construct

- (a) the bisector of  $\angle BAC$ , (2)
- (b) the perpendicular bisector of  $AB$ . (2)
- (c) Find, to the nearest mm, the distance  $CD$ .

$CD = \dots\dots\dots$  mm  
(1)

**(Total for Question 25 is 5 marks)**

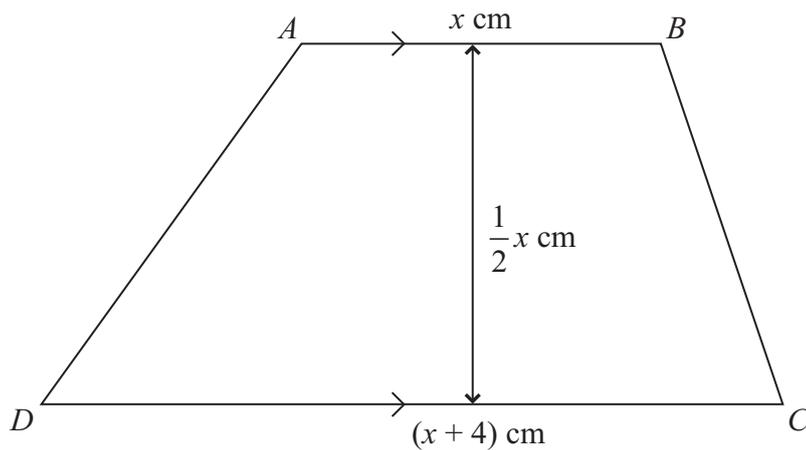


Diagram **NOT**  
accurately drawn

$ABCD$  is a trapezium with  $AB = x$  cm,  $DC = (x + 4)$  cm and the distance between the parallel sides,  $AB$  and  $DC$ , is  $\frac{1}{2}x$  cm.

(a) Find, and simplify, an expression in terms of  $x$  for the area of the trapezium.

.....  
(2)

The area of the trapezium is  $84$  cm<sup>2</sup>.

(b) Calculate the value of  $x$ .

$x =$  .....  
(4)

**(Total for Question 26 is 6 marks)**



27 A packet of *Tweeties* contains four colours of sweets of which  $\frac{1}{3}$  are red,  $\frac{1}{5}$  are yellow and  $\frac{1}{4}$  are green. There are also 26 blue sweets.

Complete the table below showing the number of sweets of each colour in the packet.

Colour	Red	Yellow	Green	Blue
Number				26

**(Total for Question 27 is 6 marks)**

28 A particle is moving along a straight line. The displacement,  $s$  metres, of the particle from a point  $O$  on the line at time  $t$  seconds is

$$s = 15t + 2t^2 - t^3 \quad t \geq 0$$

Find

(a) an expression for the velocity,  $v$  m/s, of the particle at time  $t$  seconds,

$$v = \dots\dots\dots \text{ m/s} \quad (2)$$

(b) the displacement of the particle from the point  $O$ , when the velocity of the particle is zero.

$$\dots\dots\dots \text{ m} \quad (4)$$

**(Total for Question 28 is 6 marks)**



29

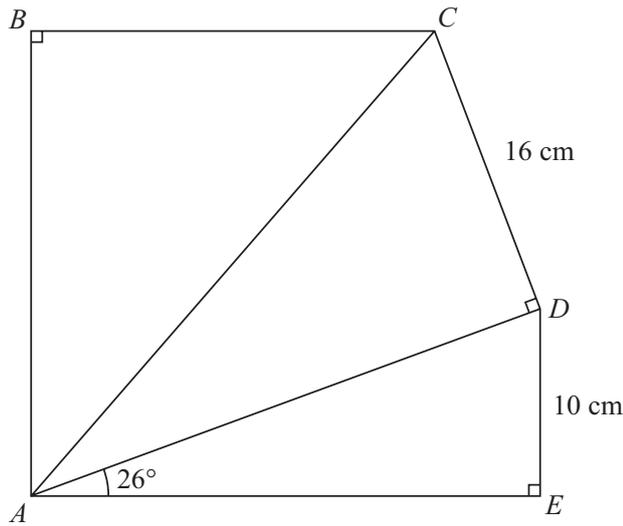


Diagram **NOT** accurately drawn

In the diagram,  $ABCDE$  is a pentagon in which  $BC$  is parallel to  $AE$ ,  
 $\angle ABC = \angle ADC = \angle AED = 90^\circ$ ,  $\angle DAE = 26^\circ$ ,  $DE = 10$  cm and  $CD = 16$  cm.

Calculate, giving your answers to 3 significant figures,

(a) the length, in cm, of  $AD$ ,

..... cm  
 (2)

(b) the size, in degrees, of  $\angle CAD$ ,

..... $^\circ$   
 (2)

(c) the length, in cm, of  $AB$ .

..... cm  
 (3)

(Total for Question 29 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS