

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						5	5	2	5	/	0	6	Signature	

Paper Reference(s)

**5525/06**

**Edexcel GCSE**

**Mathematics A – 1387**

**Paper 6 (Calculator)**

**Higher Tier**

**Friday 11 November 2005 – Morning**

**Time: 2 hours**

Examiner's use only

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Team Leader's use only

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ND001836207



**Materials required for examination**

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

**Items included with question papers**

Nil

**Instructions to Candidates**

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer **ALL** the questions in the spaces provided in this question paper.

**You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.**

If you need more space to complete your answer to any question, use additional answer sheets.

**Information for Candidates**

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 19 questions in this question paper. The total mark for this paper is 100.

There are 20 pages in this question paper. Any blank pages are indicated.

**Calculators may be used.**

If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be 3.142 unless the question instructs otherwise.

**Advice to Candidates**

Show all stages in any calculations.

Work steadily through the paper. Do not spend too long on one question.

If you cannot answer a question, leave it and attempt the next one.

Return at the end to those you have left out.

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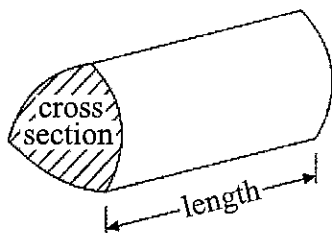
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Formulae: Higher Tier

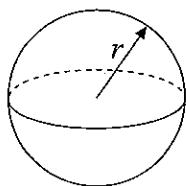
**You must not write on this formulae page.**  
**Anything you write on this formulae page will gain NO credit.**

**Volume of a prism** = area of cross section  $\times$  length



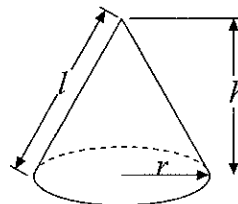
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

**Surface area of sphere** =  $4\pi r^2$

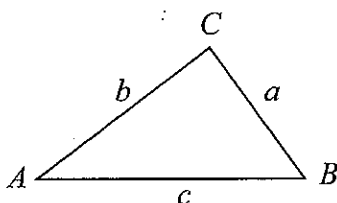


**Volume of cone** =  $\frac{1}{3} \pi r^2 h$

**Curved surface area of cone** =  $\pi r l$



**In any triangle ABC**



**The Quadratic Equation**

The solutions of  $ax^2 + bx + c = 0$   
 where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

**Sine Rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine Rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** =  $\frac{1}{2} ab \sin C$



Answer ALL NINETEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Use your calculator to work out the value of  $\frac{8.95 + \sqrt{7.84}}{2.03 \times 1.49}$

(a) Write down all the figures on your calculator display.

.....  
(2)

(b) Write down your answer to part (a) correct to 3 significant figures.

.....  
(1)

(Total 3 marks)

Q1

2. The equation  $x^3 + 10x = 21$   
has a solution between 1 and 2

Use a trial and improvement method to find this solution.  
Give your answer correct to one decimal place.  
You must show ALL your working.

$x =$  .....

(Total 4 marks)

Q2



3. Ann, Bill and Colin are travelling in a car from Glasgow to Poole.  
Ann, Bill and Colin share the driving so that the distances they drive are in the ratio 3:4:4  
Ann drives a distance of 210 km.

(a) Calculate the total distance they travelled from Glasgow to Poole.

..... km  
(3)

Ann drives the 210 km in 2 hours 40 minutes.

(b) Work out Ann's average speed.

.....  
(4)

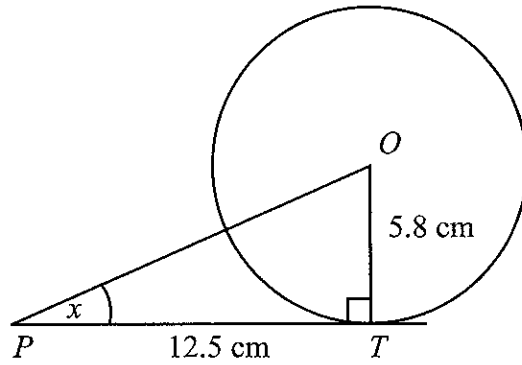
(Total 7 marks)

Q3



4.

Diagram NOT accurately drawn



In the diagram,  $T$  is a point on a circle, centre  $O$ .  
 $PT$  is the tangent to the circle at  $T$ .

- (a) Angle  $OTP$  is a right angle.  
 Give a reason why.

..... (1)

The radius of the circle is 5.8 cm.  
 $PT = 12.5$  cm.

- (b) Calculate the size of angle  $x$ .  
 Give your answer correct to 1 decimal place.

$x = \dots\dots\dots^\circ$  (3)

$C$  is the point on the circle where the straight line  $OP$  crosses the circle.

- (c) Calculate the length of  $PC$ .  
 Give your answer correct to 3 significant figures.

..... cm (4)

(Total 8 marks)

Q4



5. (a)  $4x + 3y < 12$

$x$  and  $y$  are both integers.

Write down two possible pairs of values that satisfy this inequality.

$x = \dots\dots\dots$  ,  $y = \dots\dots\dots$

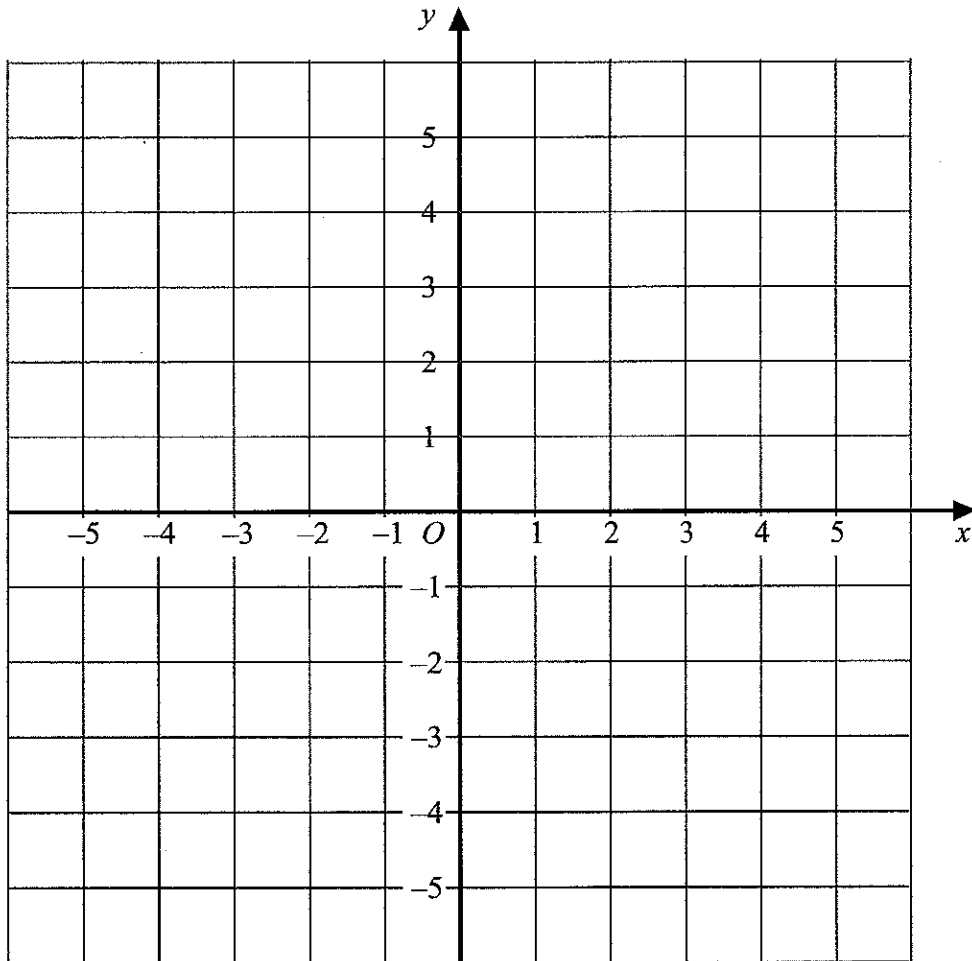
and  $x = \dots\dots\dots$  ,  $y = \dots\dots\dots$

(2)

(b)  $4x + 3y < 12$ ,  $y < 3x$ ,  $y > 0$ ,  $x > 0$

$x$  and  $y$  are both integers.

On the grid, mark with a cross (×), each of the **three** points which satisfy **all** these four inequalities.



(3)

(Total 5 marks)

Q5



6.

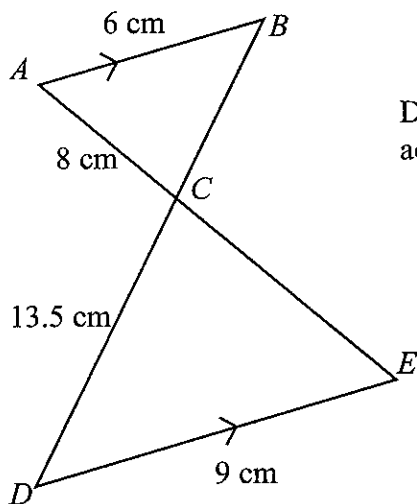


Diagram NOT accurately drawn

$AB$  is parallel to  $DE$ .  
 $ACE$  and  $BCD$  are straight lines.  
 $AB = 6$  cm,  
 $AC = 8$  cm,  
 $CD = 13.5$  cm,  
 $DE = 9$  cm.

(i) Work out the length of  $CE$ .

..... cm

(ii) Work out the length of  $BC$ .

..... cm

(Total 3 marks)

Q6



7. Solve the simultaneous equations

$$\begin{aligned} 3x + 7y &= 26 \\ 4x + 5y &= 13 \end{aligned}$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total 4 marks)

Q7

8. Lisa said that  $-2$  is the **only** value of  $x$  that satisfies the equation  $x^2 + 4x + 4 = 0$

Was Lisa correct?  
Show working to justify your answer.

Q8

(Total 2 marks)



9. Bytes is a shop that sells computers and digital cameras.

In 2003, Bytes sold 620 computers.

In 2004, Bytes sold 708 computers.

- (a) Work out the percentage increase in the number of computers sold.  
Give your answer to an appropriate degree of accuracy.

.....%  
(4)

In a sale, normal prices are reduced by 14 %.

The sale price of a digital camera is £129.86

- (b) Work out the normal price of the digital camera.

£ .....  
(3)

The table shows the number of digital cameras Bytes sold each month in the first six months of 2005.

Month	January	February	March	April	May	June
Number of digital cameras sold	30	19	20	15	27	39

The first 3-month moving average for this data is 23

- (c) Work out the **second** 3-month moving average for this data.

.....  
(2)

(Total 9 marks)

Q9



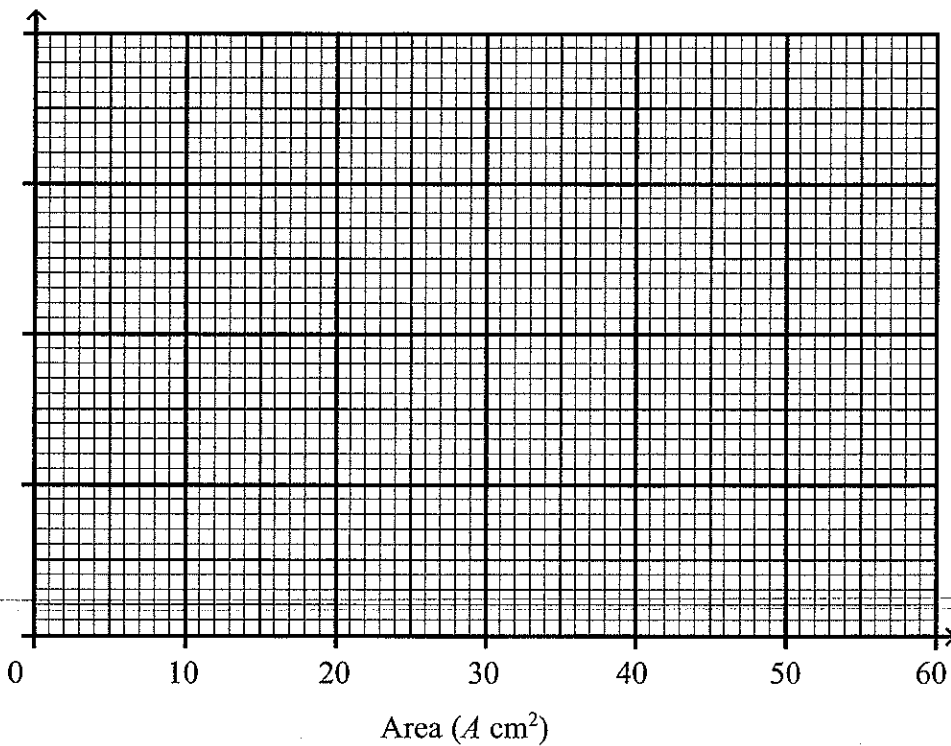
10. Fred did a survey on the areas of pictures in a newspaper. The table gives information about the areas.

Area ( $A \text{ cm}^2$ )	Frequency
$0 < A \leq 10$	38
$10 < A \leq 25$	36
$25 < A \leq 40$	30
$40 < A \leq 60$	46

(a) Work out an estimate for the mean area of a picture.

.....  $\text{cm}^2$   
(4)

(b) Draw a histogram for the information given in the table.



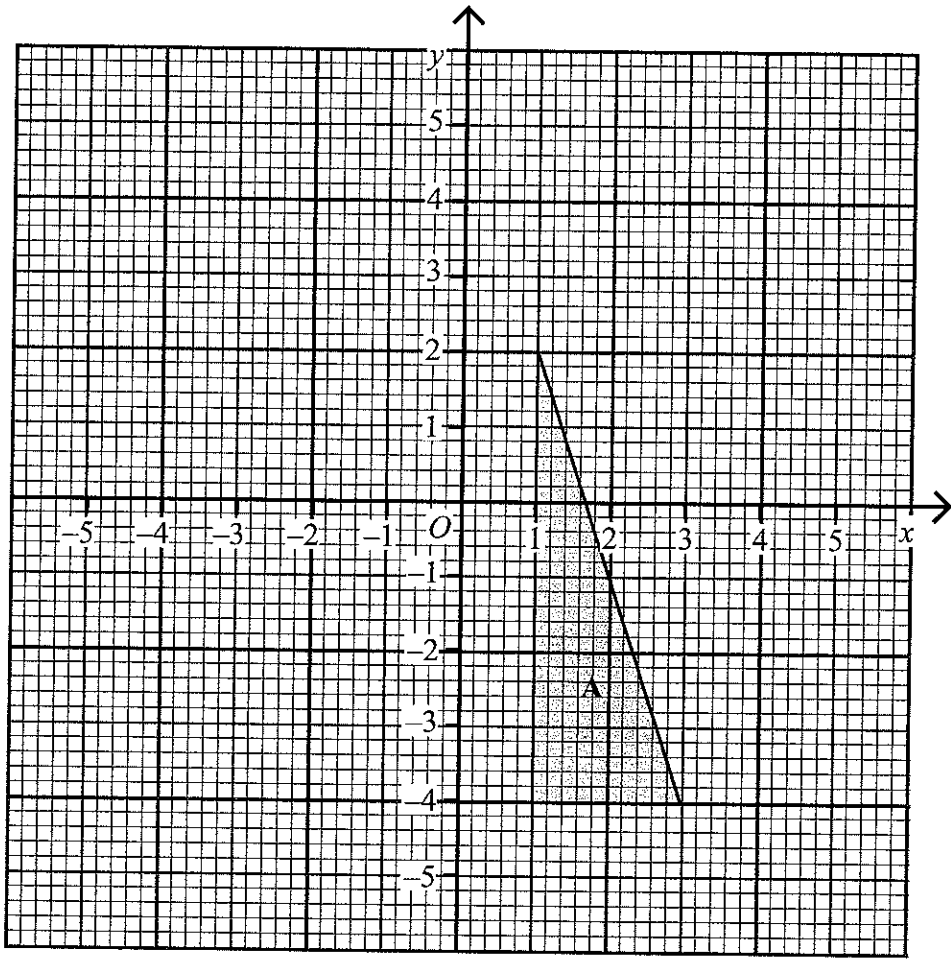
(3)

(Total 7 marks)

Q10



11.



Enlarge triangle A by scale factor  $-\frac{1}{2}$ , centre  $(-1, -2)$ .

Label your triangle B.

(Total 3 marks)

Q11

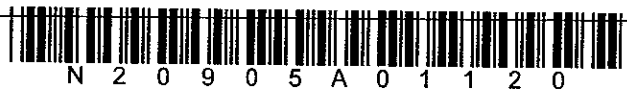
12. Make  $x$  the subject of

$$5(x-3) = y(4-3x)$$

$x = \dots\dots\dots$

(Total 4 marks)

Q12



13. The distance,  $D$ , travelled by a particle is directly proportional to the square of the time,  $t$ , taken.

When  $t = 40$ ,  $D = 30$

(a) Find a formula for  $D$  in terms of  $t$ .

$$D = \dots\dots\dots (3)$$

(b) Calculate the value of  $D$  when  $t = 64$

$$\dots\dots\dots (1)$$

(c) Calculate the value of  $t$  when  $D = 12$   
Give your answer correct to 3 significant figures.

$$\dots\dots\dots (2)$$

**(Total 6 marks)**

**Q13**



14. The diagram shows two circles.

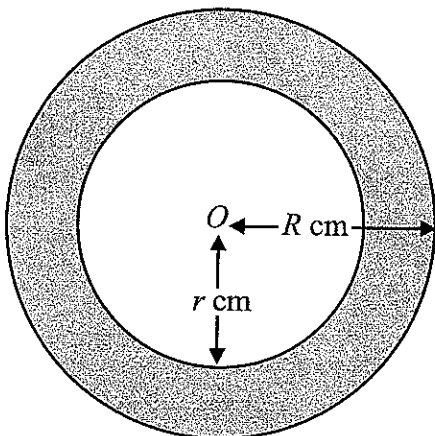


Diagram **NOT** accurately drawn

$O$  is the centre of both circles.  
 The radius of the outer circle is  $R$  cm.  
 The radius of the inner circle is  $r$  cm.  
 $R = 15.8$  correct to 1 decimal place.  
 $r = 14.2$  correct to 1 decimal place.

- (a) John says that the minimum possible diameter of the inner circle is 28.35 cm. Explain why John is wrong.

.....  
 .....  
 .....

(2)

The upper bound for the area, in  $\text{cm}^2$ , of the shaded region is  $k\pi$ .

- (b) Find the **exact** value of  $k$ .

$k = \dots\dots\dots$

(4)

(Total 6 marks)

Q14



15.

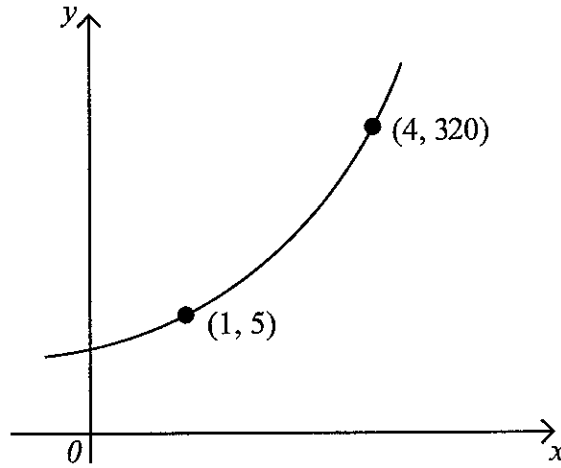


Diagram NOT accurately drawn

The sketch graph shows a curve with equation  $y = pq^x$ .

The curve passes through the points (1, 5) and (4, 320).

Calculate the value of  $p$  and the value of  $q$ .

$p = \dots\dots\dots$

$q = \dots\dots\dots$

(Total 3 marks)

Q15



16.  $ABCD$  is a straight line.

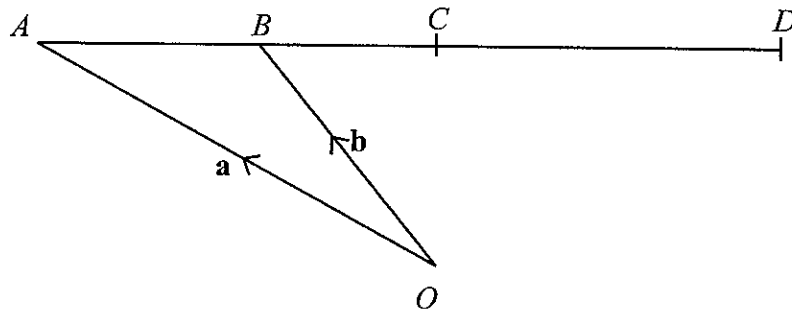


Diagram NOT accurately drawn

$O$  is a point so that  $\vec{OA} = \mathbf{a}$  and  $\vec{OB} = \mathbf{b}$ .

$B$  is the midpoint of  $AC$ .

$C$  is the midpoint of  $AD$ .

Express, in terms of  $\mathbf{a}$  and  $\mathbf{b}$ , the vectors

(i)  $\vec{AC}$

.....

(ii)  $\vec{OD}$

.....

Q16

(Total 3 marks)

17. Simplify fully  $\frac{25 - x^2}{25 + 5x}$

.....

Q17

(Total 3 marks)



18. (a) Solve the equation  $19x^2 - 124x - 224 = 0$

$$x = \dots\dots\dots, x = \dots\dots\dots \quad (3)$$

A bag contains red counters and blue counters and white counters.

There are  $n$  red counters.

There are 2 more blue counters than red counters.

The number of white counters is equal to the total number of red counters and blue counters.

(b) Show that the number of counters in the bag is  $4(n + 1)$

(1)

Bob and Ann play a game.

Bob will take a counter at random from the bag.

He will record the colour and put the counter back in the bag.

Ann will then take a counter at random from the bag.

She will record its colour.

The probability that Bob's counter is red and Ann's counter is **not** red is  $\frac{14}{81}$

(c) Prove that  $19n^2 - 124n - 224 = 0$

(5)



(d) Using your answer to part (a), or otherwise, show that the number of counters in the bag is 36

(1)

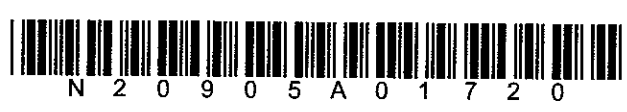
Bob and Ann play the game with all 36 counters in the bag.

(e) Calculate the probability that Bob and Ann will take counters with **different** colours.

.....  
(3)

Q18

(Total 13 marks)



19. The diagram shows some of the markings on a baseball field.

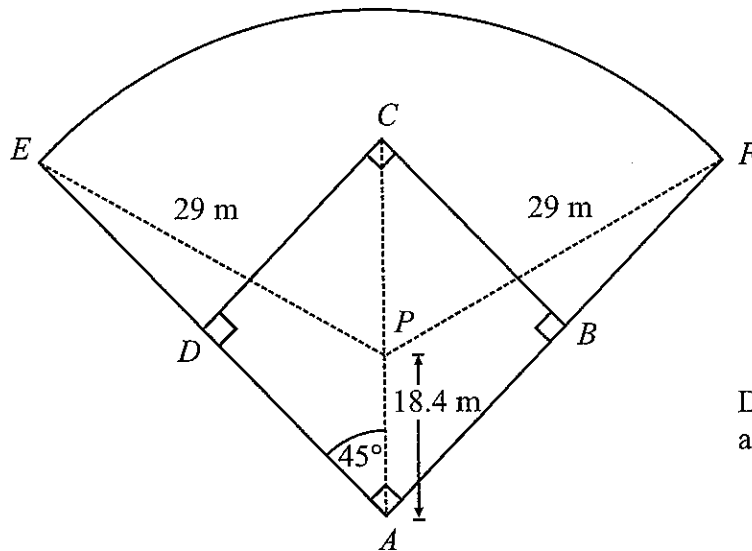


Diagram NOT accurately drawn

*ABCD* is a square.  
*AC* is a diagonal of *ABCD*.  
*P* is a point on *AC*.  
*ADE* and *ABF* are straight lines.

$AP = 18.4$  m.  
 Angle  $PAE = 45^\circ$ .

*EF* is an arc of the circle, centre *P* and radius 29 m.

- (a) By considering triangle *PAE*, calculate the size of angle *AEP*.  
 Give your answer correct to 3 significant figures.

.....  
 (3)



(b) Calculate the length of the arc  $EF$ .  
Give your answer correct to 3 significant figures.

..... m  
(4)

(Total 7 marks)

Q19

**TOTAL FOR PAPER: 100 MARKS**

**END**



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