

# ADA PINPOINT TOPIC PACKS

- (1)Equation of a circle (4 Qns)
- (2)Perpendicular Lines and the equation of a tangent (1 Qns)
- (3)Circles and Squares Problems (1 Qns)
- (4)Midpoints (2 Qns)
- (5)Midpoints and endpoint problems (0 Qns)
- (6)Circle Theorems (5 Qns)

40\_to\_100\_Percent\_Pinpoint\_AI\_Pack

Time Allocation = 40mins , Max = 35 Marks

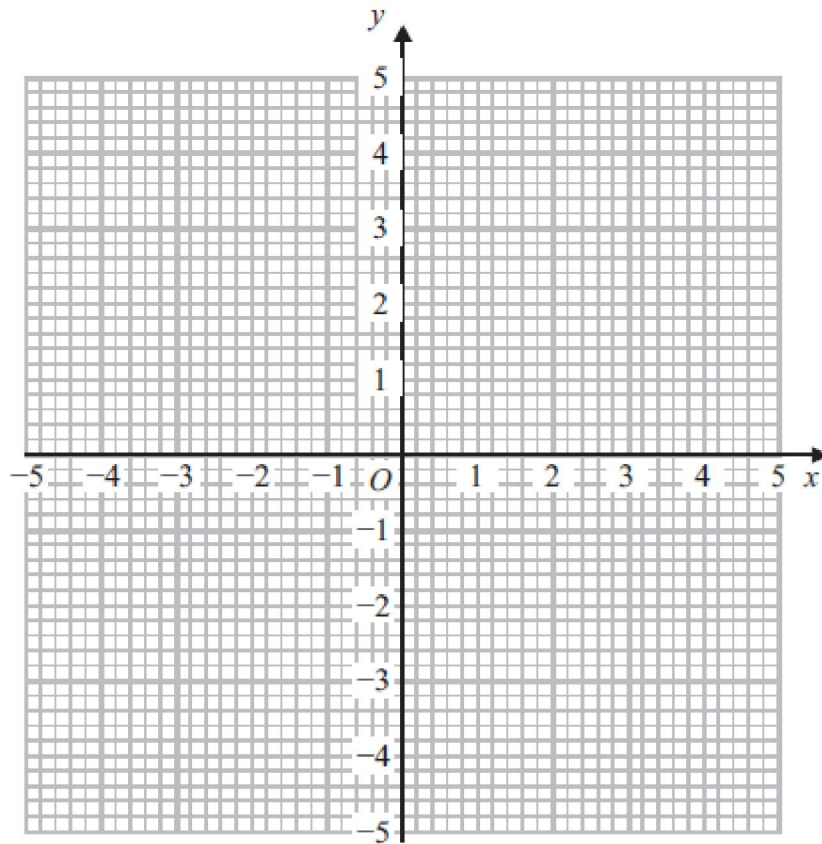
## Calculated Grade Boundaries:

Grade	Marks
4-	2
4	4
4+	6
5-	8
5	10
5+	12
6-	14
6	16
6+	18
7-	20
7	22
7+	24
8-	26
8	28

8+	30
9-	32
9	34
9+	35

Question 1 (AO1): (No Calc) 34% of students got this right (2 marks)

19.

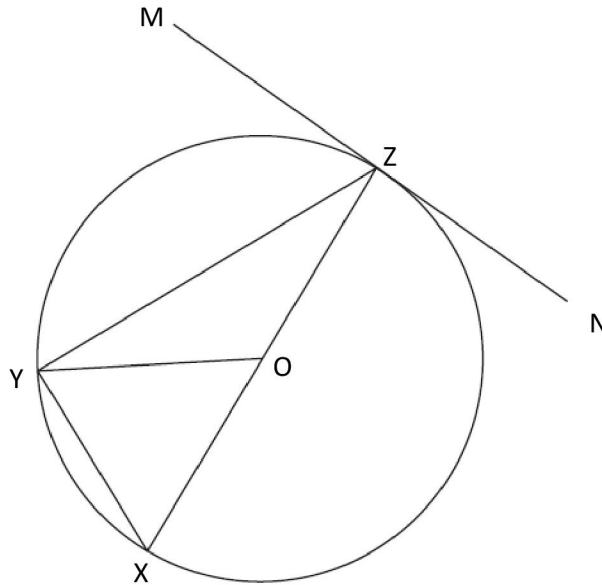


(a) On the grid, draw the graph of  $x^2 + y^2 = 4$

(2)

## Question 2 (AO3): (No Calc) 29% of students got this right (4 marks)

17



$X$ ,  $Y$  and  $Z$  are points on the circumference of a circle centre  $O$ .

$NZM$  is a tangent to the circle.

Angle  $YZM = 54^\circ$

Find the size of angle  $XOY$ .

You must give a reason for each stage of your working.

### Question 3 (AO3): 26% of students got this right (4 marks)

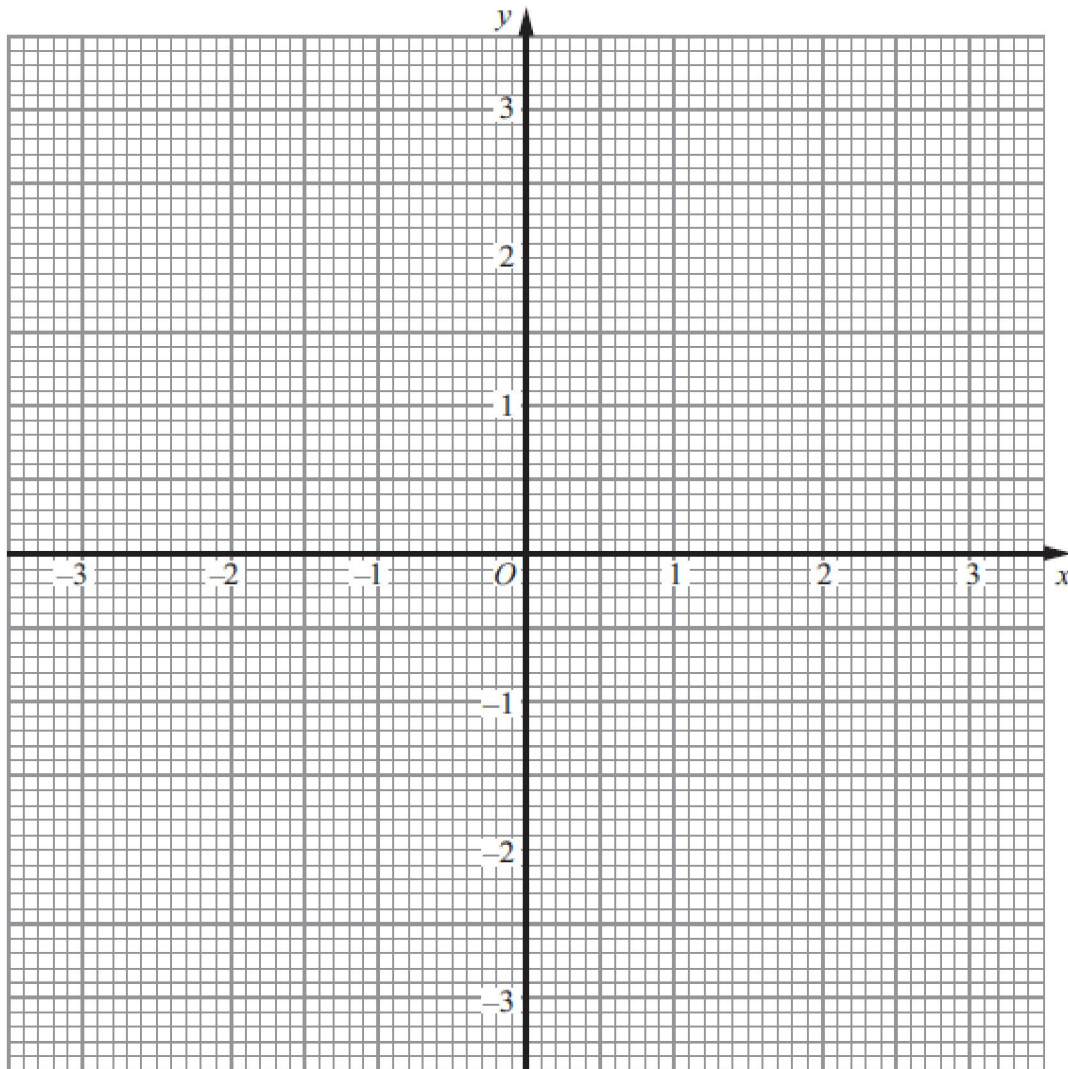
- 8** A square, with sides of length  $x$  cm, is inside a circle.  
Each vertex of the square is on the circumference of the circle.  
The area of the circle is  $49 \text{ cm}^2$ .  
Work out the value of  $x$ .  
Give your answer correct to 3 significant figures.

**(Total for Question 8 is 4 marks)**

---

## Question 4 (AO1): (No Calc) 19% of students got this right (5 marks)

21. (a) Construct the graph of  $x^2 + y^2 = 9$



- (b) By drawing the line  $x + y = 1$  on the grid, solve the equations  $x^2 + y^2 = 9$   
 $x + y = 1$

## Question 5 (AO3): 17% of students got this right (3 marks)

21. The points  $A$ ,  $B$  and  $C$  lie in order on a straight line.

The coordinates of  $A$  are  $(2, 5)$

The coordinates of  $B$  are  $(4, p)$

The coordinates of  $C$  are  $(q, 17)$

Given that  $AC = 4AB$ , find the values of  $p$  and  $q$ .

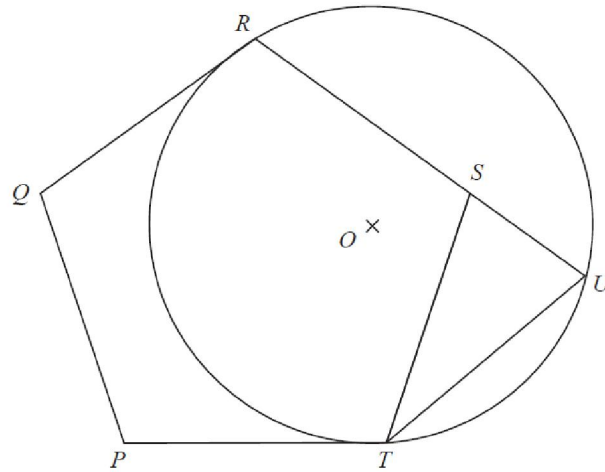
$p = \dots\dots\dots$

$q = \dots\dots\dots$

**(Total 3 marks)**

## Question 6 (AO3): 15% of students got this right (5 marks)

20



$PQRST$  is a regular pentagon.

$R$ ,  $U$  and  $T$  are points on a circle, centre  $O$ .

$QR$  and  $PT$  are tangents to the circle.

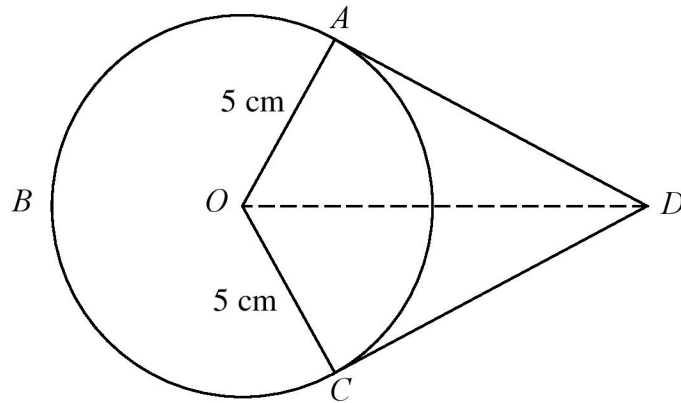
$RSU$  is a straight line.

Prove that  $ST = UT$ .



## Question 7 (AO3): 14% of students got this right (5 marks)

18



$A$ ,  $B$  and  $C$  are points on a circle of radius 5 cm, centre  $O$ .  
 $DA$  and  $DC$  are tangents to the circle.  
 $DO = 9$  cm

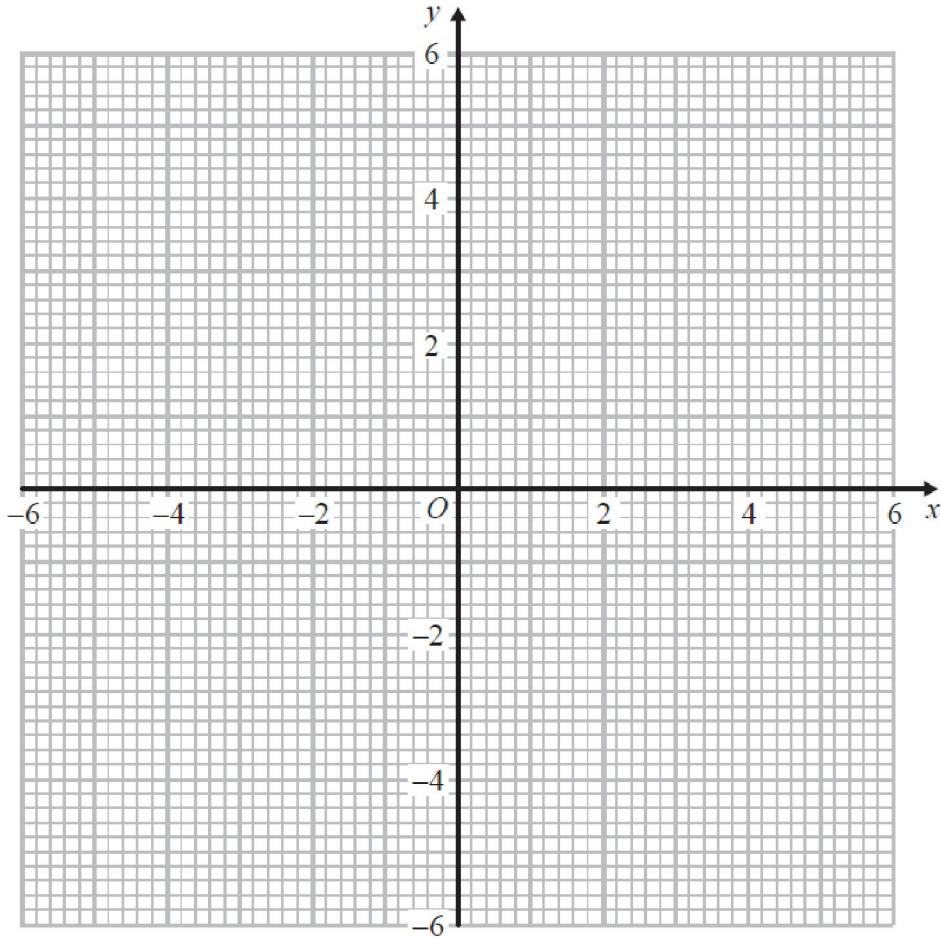
Work out the length of arc  $ABC$ .  
Give your answer correct to 3 significant figures.

(Total for Question 18 is 5 marks)

---

## Question 8 (AO1): 13% of students got this right (2 marks)

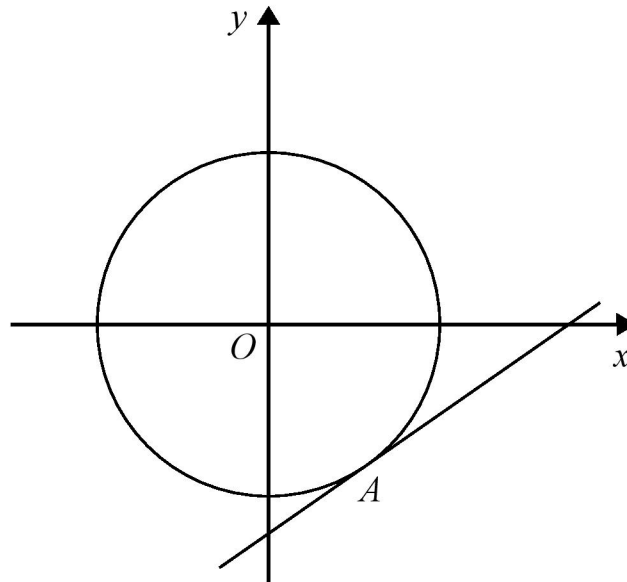
28 (a) Construct the graph of  $x^2 + y^2 = 25$ .



(2)

## Question 9 (AO2): 9% of students got this right (5 marks)

- 22 The diagram shows the circle with equation  $x^2 + y^2 = 261$



A tangent to the circle is drawn at point  $A$  with coordinates  $(p, -15)$ , where  $p > 0$

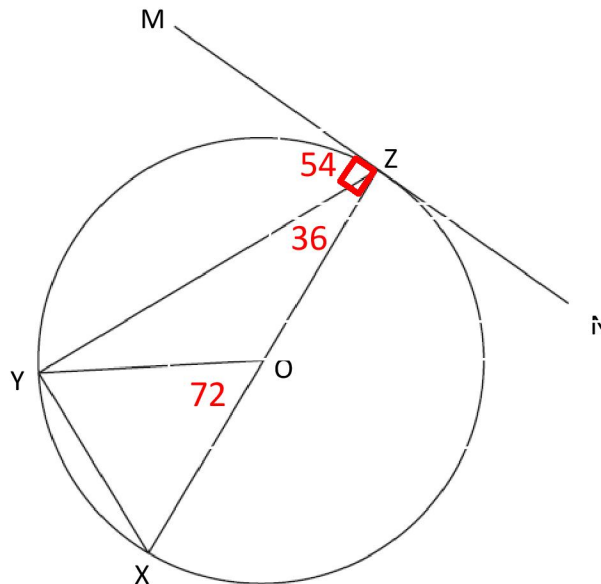
Find an equation of the tangent at  $A$ .

## Answers to Qn 1 (AO1): (No Calc) 34% of students got this right

Question		Working	Answer	Mark	Notes
19.	(a)		Circle, centre $O$ ,  radius 2	2	B2 cao  (B1 for a circle radius 2 any centre or for a circle or part of a circle centre $(0, 0)$ any radius)

## Answers to Qn 2 (AO3): (No Calc) 29% of students got this right

17



$X$ ,  $Y$  and  $Z$  are points on the circumference of a circle centre  $O$ .

$NZM$  is a tangent to the circle.

Angle  $YZM = 54^\circ$

Find the size of angle  $XOY$ .

You must give a reason for each stage of your working.

**Diameter intersects tangent at  $90^\circ$**

**So  $YZO = 90 - 54 = 36^\circ$**

**Angle subtended to center double that at circumference**

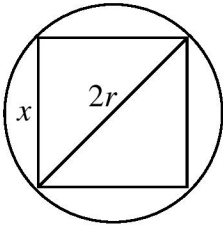
**So  $XOY = 2 \times 36 = 72^\circ$**

(Total for Question 17 is 4 marks)

---

## Answers to Qn 3 (AO3): 26% of students got this right

## Question 8 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Square with side $x$ and circle with radius $r$ $\pi r^2 = 49, r^2 = \frac{49}{\pi}$	M1	This mark is given for a method to find $r$
	$(2r)^2 = x^2 + x^2,$ $4r^2 = 2x^2$ $2r^2 = x^2$ 	M1	The mark is given for use of Pythagoras to set up an equation in $x^2$
	$\frac{98}{\pi} = x^2$	M1	This mark is given for a method to rearrange to find a value for $x^2$
	5.59	A1	5.5 to 5.6

## Answers to Qn 4 (AO1): (No Calc) 19% of students got this right

Question		Working	Answer	Mark	Notes
21.	(a)		Circle, centre $O$ , radius 3	2	M1 for a complete circle centre $(0, 0)$ A1 for a correct circle within guidelines
	(b)		$x = 2.6, y = -1.6$ or $x = -1.6, y = 2.6$	3	M1 for $x + y = 1$ drawn M1 (dep) ft from (a) for attempt to find coordinates for any one point of intersection with a curve or circle A1 for $x = 2.6, y = -1.6$ <b>and</b> $x = -1.6, y = 2.6$ all $\pm 0.1$

## Answers to Qn 5 (AO3): 17% of students got this right

Question	Working	Answer	Mark	Notes
21		$p = 8, q = 10$	3	M1 for finding the difference between the $x$ or $y$ coordinates eg $4 - 2 (= 2)$ or $17 - 5 (= 12)$ M1 for a complete method to find the values of $p$ or $q$ A1 cao

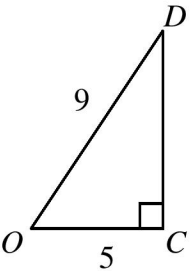


## Answers to Qn 6 (AO3): 15% of students got this right

Paper 1MA1: 2H			
Question	Working	Answer	Notes
20	$\angle TSU = 360 \div 5 (=72)$ Exterior angles of a polygon add up to $360^\circ$ $\angle QRO = \angle OTP = 90$ The tangent to a circle is perpendicular ( $90^\circ$ ) to the radius (diameter) $\angle ROT = 540 - 2 \times 90 - 2 \times 108 (= 144)$ $\angle RUT = 144 \div 2 (= 72)$ The angle at the centre of a circle is twice the angle at the circumference Base angles of an isosceles	proof	M1 for method to find interior or exterior angle of regular pentagon  M1 for using angle between tangent and radius  M1 for method to find angle $ROT$  C1 for method to find angle $RUT$ with reason  C1 for deduction that $ST = UT$ with

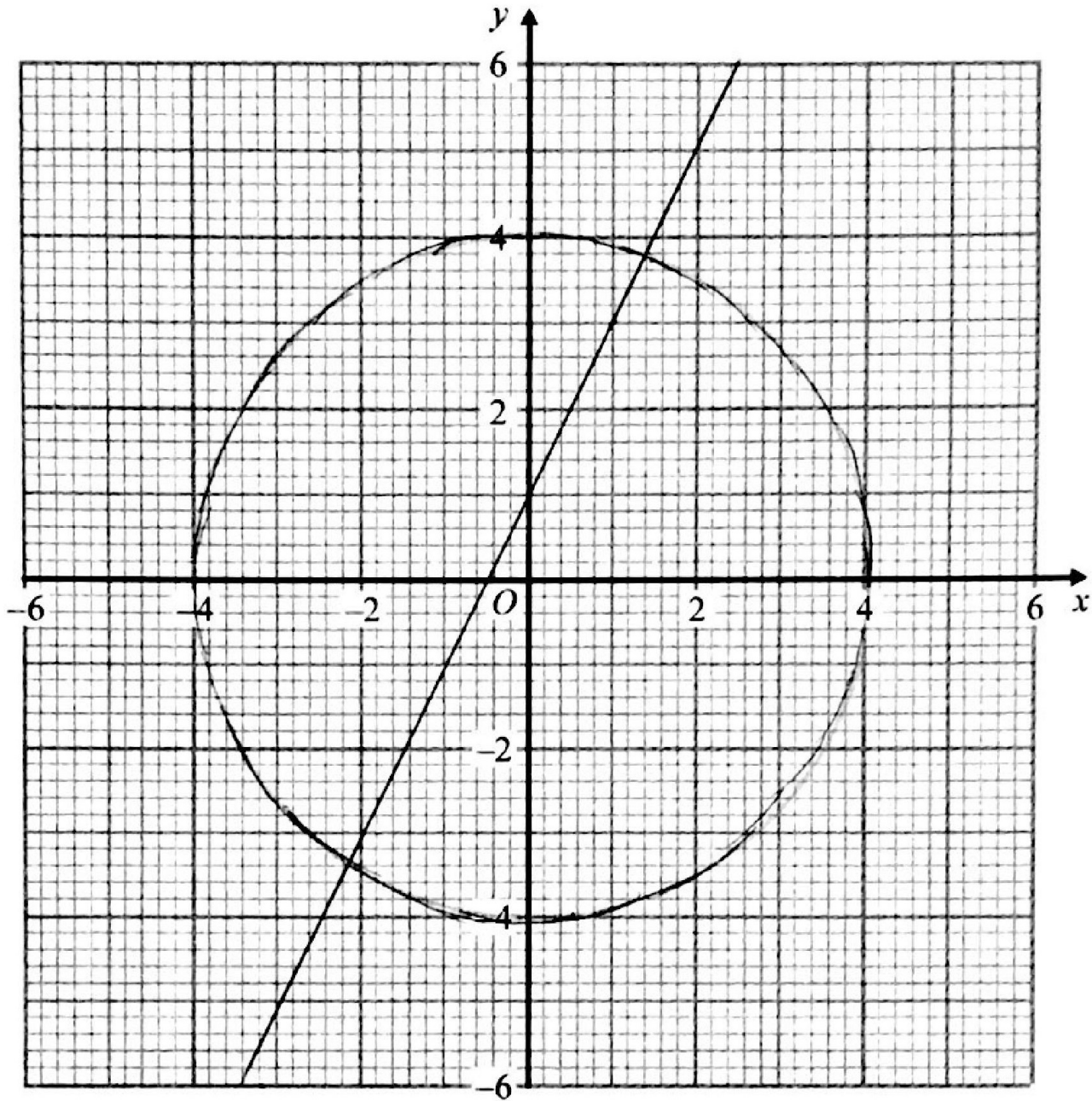
## Answers to Qn 7 (AO3): 14% of students got this right

## Question 18 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$OAD = OCD = 90^\circ$	P1	This mark is given for recognising that $OAD$ or $OCD$ is a right angle $90^\circ$ or right angle
	$\cos DOC = \cos DOA = \frac{5}{9}$ 	P1	This mark is given for using trigonometry to set up an equation in $DOA$ or $DOC$
	$DOC = DOA = \cos^{-1} \frac{5}{9} = 56.25^\circ$	P1	This mark is given for using inverse trigonometry to find the size of the angle $DOA$ or $ADO$
	$\frac{360 - (2 \times 56.25)}{360} \times 2\pi \times 5$	P1	This mark is given for a complete process to find the arc length $ABC$
	21.6	A1	This mark is given for an answer in the range 21.5 to 21.65

Answers to Qn 8 (AO1): 13% of students got this right

28 (a) On the grid, construct the graph of  $x^2 + y^2 = 16$



## Answers to Qn 9 (AO2): 9% of students got this right

Question	Working	Answer	Mark	Notes
22		$y = 0.4x - 17.4$	P1	for process to find $p$ , e.g. $\sqrt{261 - 15^2}$
			P1	for process to find gradient of $OA$ , e.g. $-15 \div 6 (= \frac{-5}{2})$
			P1	(dep on previous P1) for process to find the perpendicular gradient using $-\frac{1}{m}$ or states gradient as $\frac{2}{5}$
			P1	for process to find the y-intercept of the gradient, e.g. $-15 = \frac{2}{5} \times 6 + c$
			A1	oe