

## THE CIRCLE (Q 3, PAPER 2)

### LESSON NO. 3: TANGENTS

**2007**

- 3 (c) The circle  $K$  has equation  $(x-5)^2 + (y+1)^2 = 34$ .
- (i) Write down the radius of  $K$  and the coordinates of the centre of  $K$ .
  - (ii) Verify that the point  $(10, -4)$  is on the circle.
  - (iii)  $T$  is a tangent to the circle at the point  $(10, -4)$ .  
 $S$  is another tangent to the circle and  $S$  is parallel to  $T$ .  
Find the coordinates of the point at which  $S$  is a tangent to the circle.

**2006**

- 3 (a) The circle  $C$  has equation  $x^2 + y^2 = 25$ .  
The line  $L$  is a tangent to  $C$  at the point  $(-3, 4)$ .
- (i) Verify that the point  $(-3, 4)$  is on  $C$ .
  - (ii) Find the slope of  $L$ .
  - (iii) Find the equation of  $L$ .
  - (iv) The line  $T$  is another tangent to  $C$  and is parallel to  $L$ .  
Find the coordinates of the point at which  $T$  touches  $C$ .

**2003**

- 3 (c) The circle  $K$  has equation  $(x+2)^2 + (y-3)^2 = 25$ .  
 $p$  and  $q$  are the endpoints of a diameter of  $K$  and  $pq$  is horizontal.
- (i) Find the co-ordinates of  $p$  and the co-ordinates of  $q$ .
  - (ii) Hence, or otherwise, write down the equations of the two vertical tangents to  $K$ .
  - (iii) Another circle also has these two vertical lines as tangents.  
The centre of this circle is on the  $x$ -axis.  
Find the equation of this circle.

**2001**

- 3 (b) Prove that the line  $x-3y=10$  is a tangent to the circle with equation  $x^2 + y^2 = 10$  and find the coordinates of the point of contact.

**2000**

- 3 (b) (i) Find the slope of the tangent to the circle  $x^2 + y^2 = 29$  at the point  $(2, 5)$ .
- (ii) Hence, find the equation of the tangent.

**1999**

- 3 (c) A circle  $K$  has equation  $x^2 + y^2 = 13$ .
- $T$  is a tangent to  $K$  at  $(-2, -3)$ .
- Find the equation of  $T$ .
- Find the equation of the other tangent to  $K$  which is parallel to  $T$ .

**1998**

- 3 (c) The line with equation  $3x - y + 10 = 0$  is a tangent to the circle which has equation  $x^2 + y^2 = 10$ .
- (i) Find the coordinates of  $a$ , the point at which the line touches the circle.
- (ii) The origin is the midpoint of  $[ab]$ .
- Find the equation of the tangent to the circle at  $b$ .

**1997**

- 3 (b) Prove that the line  $x - 2y + 10 = 0$  is a tangent to the circle whose equation is  $x^2 + y^2 = 20$ .

**1996**

- 3 (c) A circle  $K$  has equation  $x^2 + y^2 = 25$ .
- (i)  $T$  is a tangent to  $K$  at  $(3, 4)$ .
- Find the equation of  $T$ .
- (ii) Find the equation of the other tangent to  $K$  which is parallel to  $T$ .

**ANSWERS**

- 2007** 3 (c) (i)  $\sqrt{34}$ ,  $(5, -1)$  (iii)  $(0, 2)$
- 2006** 3 (a) (ii)  $\frac{3}{4}$  (iii)  $3x - 4y + 25 = 0$  (iv)  $(3, -4)$
- 2003** 3 (c) (i)  $p(-7, 3)$ ,  $q(3, 3)$  (ii)  $x = -7$ ,  $x = 3$  (iii)  $(x + 2)^2 + y^2 = 25$
- 2001** 3 (b)  $(1, -3)$
- 2000** 3 (b) (i)  $-\frac{2}{5}$  (ii)  $2x + 5y - 29 = 0$
- 1999** 3 (c)  $2x + 3y + 13 = 0$ ;  $2x + 3y - 13 = 0$
- 1998** 3 (c) (i)  $(-3, 1)$  (ii)  $3x - y - 10 = 0$
- 1996** 3 (c) (i)  $3x + 4y - 25 = 0$  (ii)  $3x + 4y + 25 = 0$