

# C.E.M. TUITION

Name : \_\_\_\_\_

**Review Topic : Locus & the parabola**

**Year 11 - Mathematics**

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**For corrections refer to pages:**

1. Find the equation of the locus of a point that moves so that it is always 5 units from  $(-1, 3)$ . Describe the shape of this locus.

2. Find the equation of the locus of a point P that moves so that it is 3 times as far from the point  $A(3, -4)$  as from the point  $B(-1, -5)$ .

3. Find the equation of the locus of a point moving so that it is equidistant from the points (3, 3) and (-2, 1).

4. Point P moves so that

$$PA^2 + PB^2 = 10$$

where A and B are (2, 0) and (-2, 0) respectively. Find the equation of the locus and sketch it on the number plane.

5. Find the equation of the locus of a point that moves so that its distance from the line  $3x - 4y + 9 = 0$  is always 5.

6. Find the equation of the locus of a point moving so that it is equidistant from the point  $(-1, 5)$  and the line  $x = 3$ .

7. Find the equation of the locus of a point that is equidistant from the point  $(2, -2)$  and the line  $y = 5$ .

8. Show that the equation of the locus of a point moving so that it is equidistant from the point  $(0, b)$  and the line  $y = -b$  is given by  $x^2 = 4by$ .

**Locus**

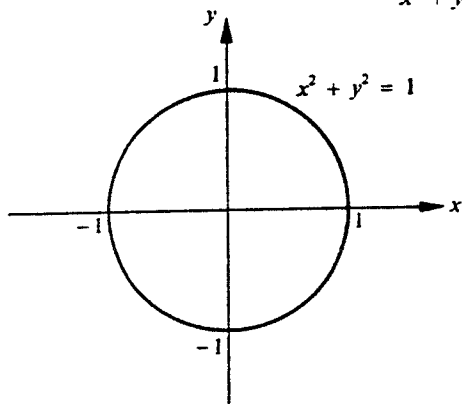
1.  $(x + 1)^2 + (y - 3)^2 = 25$   
 or  $x^2 + 2x + y^2 - 6y - 15 = 0$   
 Circle with radius 5 units and centre  $(-1, 3)$ .

2.  $PA = 3PB$   
 $\therefore PA^2 = 9PB^2$  (squaring both sides)

$(x - 3)^2 + (y + 4)^2 = 9[(x + 1)^2 + (y + 5)^2]$   
 $x^2 - 6x + 9 + y^2 + 8y + 16 = 9(x^2 + 2x + 1 + y^2 + 10y + 25)$   
 $= 9x^2 + 18x + 9 + 9y^2 + 90y + 225$   
 $0 = 8x^2 + 24x + 8y^2 + 82y + 209$

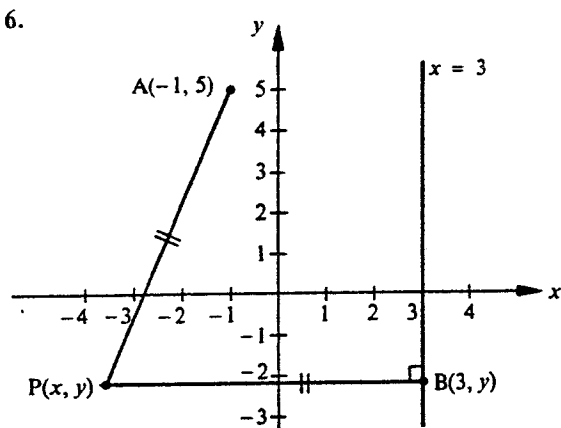
3.  $10x + 4y - 13 = 0$

4.  $PA^2 + PB^2 = 10$   
 $\therefore [(x - 2)^2 + (y - 0)^2] + [(x + 2)^2 + (y - 0)^2] = 10$   
 $x^2 - 4x + 4 + y^2 + x^2 + 4x + 4 + y^2 = 10$   
 $2x^2 + 2y^2 + 8 = 10$   
 $2x^2 + 2y^2 = 2$   
 $x^2 + y^2 = 1$



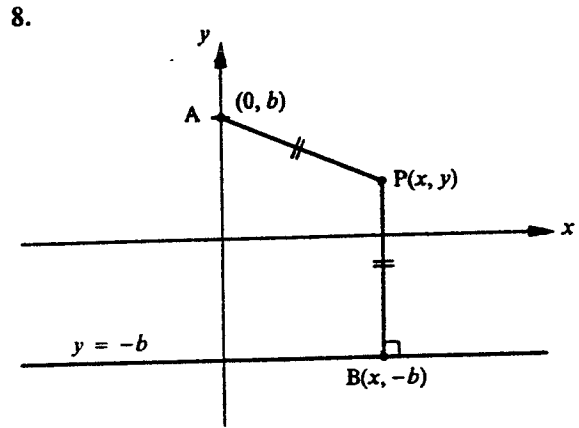
5.  $3x - 4y - 16 = 0$  and  $3x - 4y + 34 = 0$   
 (use perpendicular distance)

**Parabola as a locus**



$B = (3, y)$   
 $PA = PB$   
 $\therefore PA^2 = PB^2$   
 $(x + 1)^2 + (y - 5)^2 = (x - 3)^2 + (y - y)^2$   
 $x^2 + 2x + 1 + y^2 - 10y + 25 = x^2 - 6x + 9$   
 $y^2 - 10y + 8x + 17 = 0$

7.  $x^2 - 4x + 14y - 17 = 0$



$B = (x, -b)$   
 $PA = PB$   
 $\therefore PA^2 = PB^2$   
 $(x - 0)^2 + (y - b)^2 = (x - x)^2 + (y + b)^2$   
 $x^2 + y^2 - 2by + b^2 = y^2 + 2by + b^2$   
 $x^2 - 2by = 2by$   
 $\therefore x^2 = 4by$