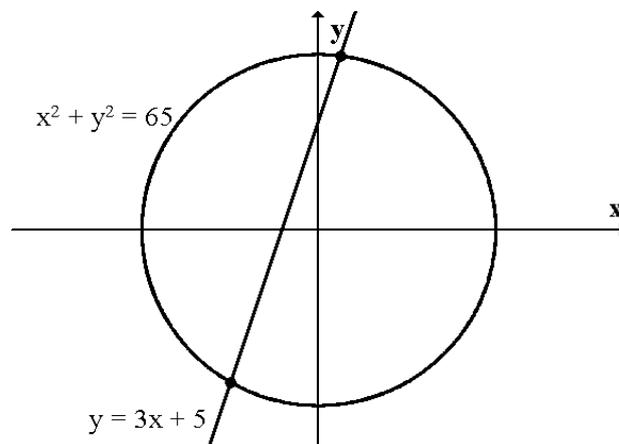# Intersection of lines and circles

1. The circle with equation $x^2 + y^2 - 5x - 6y - 14 = 0$ cuts the x-axis at two points. Find the coordinates of these points.

2. The circle with equation $x^2 + y^2 + 10x + 4y - 60 = 0$ cuts the y-axis at two points. Find the coordinates of these points.

3. Find the points of intersection of the circle $x^2 + y^2 = 65$ and the line $y = 3x + 5$.
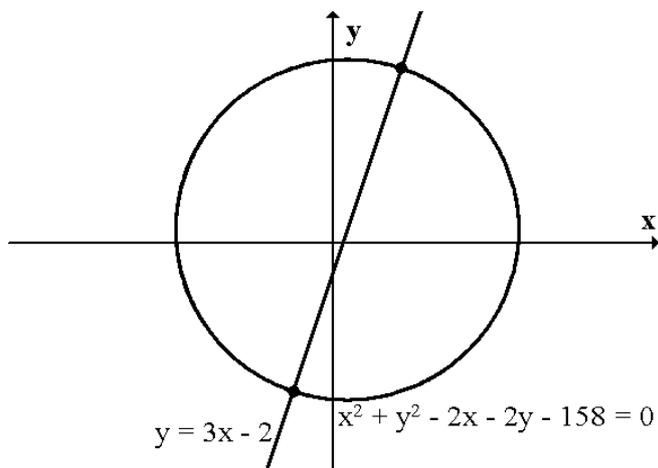

x² + y² = 65

y = 3x + 5

4. Show that the line $y = 2x - 10$ is a tangent to the circle with equation $x^2 + y^2 = 20$ and find the point of contact.

5. Show that the line $y = 3x + 2$ is a tangent to the circle $x^2 + y^2 - 14x - 6y + 18 = 0$ and find the point of contact.

6. Find the points of intersection of the circle $x^2 + y^2 - 3x - 4y + 5 = 0$ and the line $y = 2x - 1$.

x² + y² + 4x - 32 = 0

y = x - 4

7. Find the points of intersection of the line $y = x - 4$ and the circle $x^2 + y^2 + 4x - 32 = 0$.
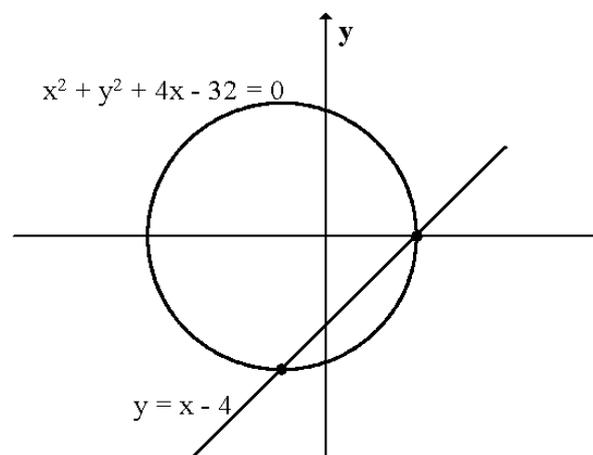
8. Show that the line $y = x - 1$ is a tangent to the circle $x^2 + y^2 - 2x - 4y + 3 = 0$ and find the point of contact.

9. Find the points of intersection of the circle $x^2 + y^2 - 2x - 2y - 158 = 0$ and the line $y = 3x - 2$.

y = 3x - 2

x² + y² - 2x - 2y - 158 = 0

10. (a) Find the equation of the tangent to the curve $y = 2x^3 - 4x^2 - 7x + 12$
   at the point where $x = 2$.

  (b) Show that this tangent is also a tangent to the circle
     $x^2 + y^2 - 6x + 2y + 10 = 0$ and find the point of contact.

11. Find the points of intersection of the line
   $y = 2x + 8$ and the circle with equation
   $x^2 + y^2 + 4x + 2y - 20 = 0$.

$y = 2x + 8$

$x^2 + y^2 + 4x + 2y - 20 = 0$
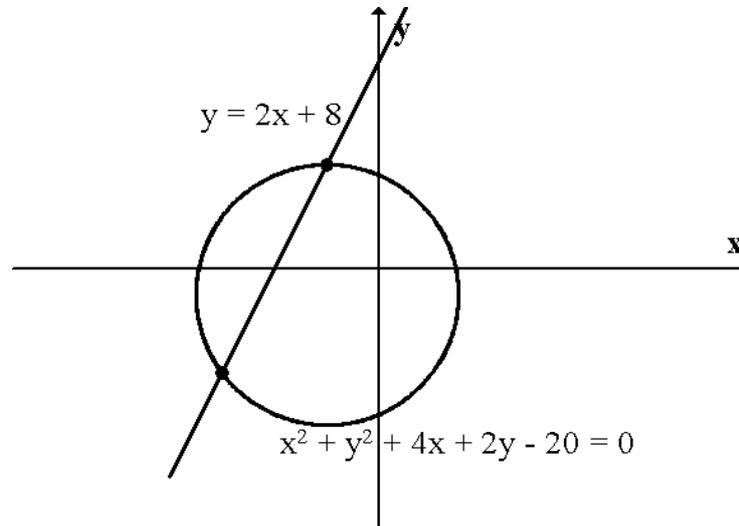
12. The straight line $y = x$ cuts the circle
    $x^2 + y^2 - 6x - 2y - 24 = 0$ at A and B.

    (a) Find the coordinates of A and B.
    (b) Find the equation of the circle which has
       AB as diameter.

$y = x$

A

B

$x^2 + y^2 - 6x - 2y - 24 = 0$
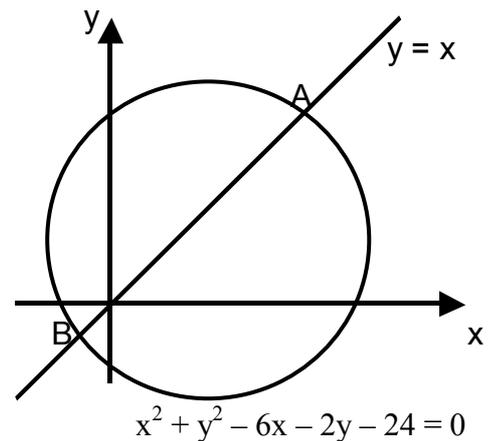
13. Show that the line $y = -3x - 10$ is a tangent to the circle $x^2 + y^2 - 8x + 4y - 20 = 0$,
    and find the point of contact.

14. (a) A circle has centre $(6,5)$ and radius $\sqrt{17}$. Show that the equation of this
     circle can be written in the form
$$x^2 + y^2 - 12x - 10y + 44 = 0$$

  (b) Show that the line $y = 4x - 2$ is a tangent to this circle and find the point of
     contact.