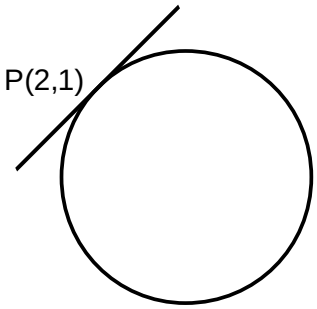
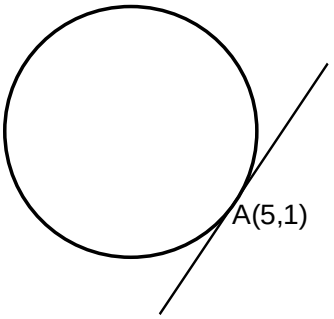
Tangents to circles

1. The diagram shows the circle with equation $(x - 4)^2 + (y + 5)^2 = 40$.

   Find the equation of the tangent to this circle at the point P(2,1).

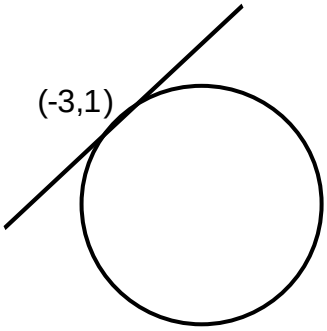


2. The diagram shows the circle $x^2 + y^2 - 6x - 4y + 8 = 0$.
   Find the equation of the tangent to this circle at the point A(5,1).



3. Find the equation of the tangent to the circle $x^2 + y^2 - 10y - 43 = 0$ at the point (2,-3).

4. A circle has equation $x^2 + y^2 - 6x + 8y - 36 = 0$.
   Find the equation of the tangent to this circle at the point (-3,1).

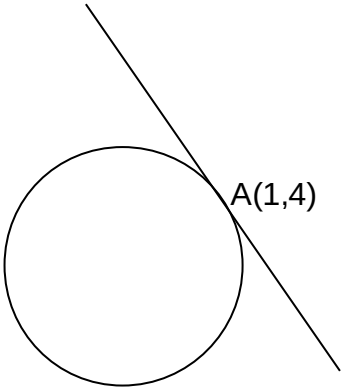


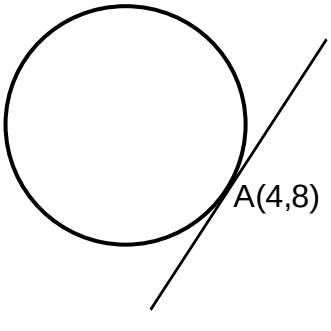
5. A circle has equation $x^2 + y^2 - 6x + 4 = 0$.
   Find the equation of the tangent to this circle at the point P(5,-1).

6. Find the equation of the tangent to the circle $x^2 + y^2 - 8x + 4y - 33 = 0$ at the point P(1,-4).

7. (a) Find the equation of the tangent to the circle $x^2 + y^2 + 10x - 2y - 19 = 0$ at the point A(1,4).

   (b) Show that this tangent is also a tangent to the parabola $y = 2x^2 - 10x + 14$ and find the point of contact.



8. (a) Find the equation of the tangent to the circle $x^2 + y^2 - 18y + 64 = 0$ at the point A(4,8).

   (b) Show that this tangent is also a tangent to the parabola $y = x^2 - 6x + 17$ and find the point of contact.