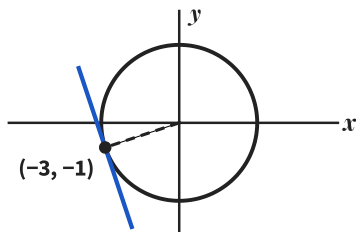


Equation of a Tangent to a Circle *stretch*

ANSWERS

1

Find the equation of the tangent to $x^2 + y^2 = 10$ at the point $(-3, -1)$.



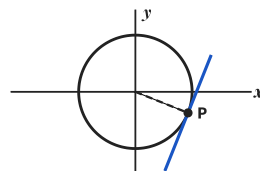
radius $\frac{1}{3}$, tangent -3

$$-1 = -3 \times (-3) + C, \text{ so } C = -10$$

Answer $y = -3x - 10$

2

P is on the circle $x^2 + y^2 = 29$. Its x coordinate is 5 and it is below the x axis. Find the tangent at P in the form $ax + by = c$.



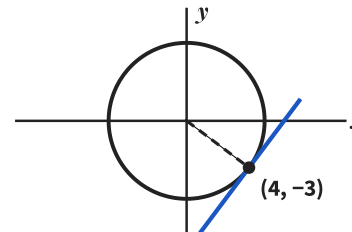
$P(5, -2)$, radius $-\frac{2}{5}$, tangent $\frac{5}{2}$

$$y = \frac{5}{2}x - \frac{29}{2}, \text{ then } \times 2$$

Answer $5x - 2y = 29$

3

The tangent to $x^2 + y^2 = 25$ at $(4, -3)$ crosses the y axis. Find where.



radius $-\frac{3}{4}$, tangent $\frac{4}{3}$

$$-3 = \frac{4}{3} \times 4 + C, C = -\frac{25}{3}$$

Answer $(0, -\frac{25}{3})$

4

Ola finds the gradient of the radius to $(2, -6)$ on $x^2 + y^2 = 40$ is -3 . She says the tangent's gradient is 3. Explain her mistake and find the tangent.

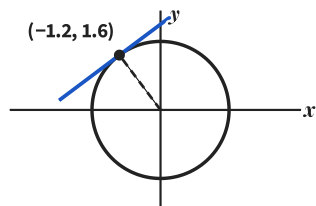
she must take the reciprocal too: $\frac{1}{3}$

$$-6 = \frac{2}{3} + C, C = -\frac{20}{3}$$

Answer $y = \frac{1}{3}x - \frac{20}{3}$

5

A ball on a string moves round the circle $x^2 + y^2 = 4$, in metres. The string breaks at $(-1.2, 1.6)$ and the ball flies off along the tangent. Where does it cross the y axis?



tangent $-\frac{4}{3}$, $1.6 = -0.9 + C$

Answer $(0, 2.5)$

6

The tangent to $x^2 + y^2 = 45$ at the point P has gradient -2 . P is in the first quadrant. Find the coordinates of P.

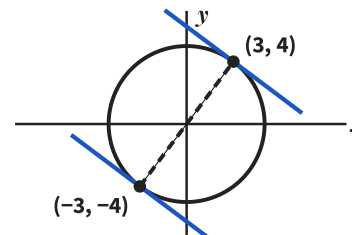
the radius has gradient $\frac{1}{2}$: P is $(2t, t)$

$$4t^2 + t^2 = 45, t = 3$$

Answer $(6, 3)$

7

Show that the tangents to $x^2 + y^2 = 25$ at $(3, 4)$ and $(-3, -4)$ are parallel.



both radii have gradient $\frac{4}{3}$

so both tangents have gradient $-\frac{3}{4}$

Reason both gradients are $-\frac{3}{4}$

8

Nia says the tangent to $x^2 + y^2 = 10$ at $(-1, 3)$ passes through the origin. Explain why she must be wrong.

the line through O and P is the radius

the tangent meets the y axis at $\frac{10}{3}$

Reason that line is the radius