

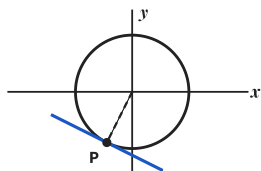
Equation of a Tangent to a Circle *extend*

ANSWERS

1



P is on the circle $x^2 + y^2 = 20$, with x coordinate -2 , below the x axis. The tangent at P meets the axes at A and B. Find the area of triangle OAB.



$$P(-2, -4): y = -\frac{1}{2}x - 5$$

$$A(-10, 0), B(0, -5), \frac{1}{2} \times 10 \times 5$$

$$25 \text{ square units}$$

Answer

2



The line $y = x + c$ is a tangent to the circle $x^2 + y^2 = 8$. Find the possible values of c .

$$2x^2 + 2cx + c^2 - 8 = 0$$

$$\text{one point: } 4c^2 - 8(c^2 - 8) = 0, c^2 = 16$$

$$c = 4 \text{ or } c = -4$$

Answer

3



The line $y = 2x + 10$ is the tangent to a circle $x^2 + y^2 = r^2$ at the point P. Find P and r^2 .

$$OP \text{ has gradient } -\frac{1}{2}: y = -\frac{1}{2}x$$

$$-\frac{1}{2}x = 2x + 10, x = -4$$

$$P(-4, 2), r^2 = 20$$

Answer

4



Find the equation of the tangent to $x^2 + y^2 = 7$ at $(\sqrt{3}, 2)$. Give it in the form $ax + by = c$.

$$\text{radius } \frac{2}{\sqrt{3}}, \text{ tangent } -\frac{\sqrt{3}}{2}$$

$$2 = -\frac{\sqrt{3}}{2} \times \sqrt{3} + c, c = \frac{7}{2}$$

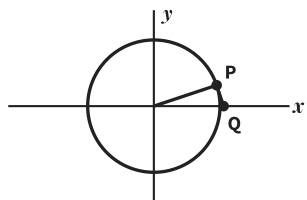
$$\sqrt{3}x + 2y = 7$$

Answer

5



The tangent to $x^2 + y^2 = 10$ at P(3, 1) meets the x axis at Q. Find the area of triangle OPQ.



$$y = -3x + 10: Q(\frac{10}{3}, 0)$$

$$\frac{1}{2} \times \frac{10}{3} \times 1 = \frac{5}{3}$$

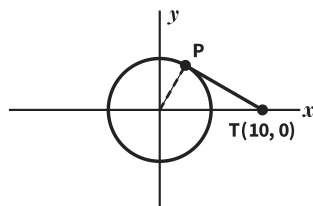
$$\frac{5}{3} \text{ square units}$$

Answer

6



A tangent from T(10, 0) touches the circle $x^2 + y^2 = 25$ at P, above the x axis. Find the exact coordinates of P.



$$\cos POT = 5 \div 10, \text{ so } POT = 60^\circ$$

$$P = (5 \cos 60^\circ, 5 \sin 60^\circ)$$

$$(\frac{5}{2}, \frac{5\sqrt{3}}{2})$$

Answer

7



Two tangents to $x^2 + y^2 = 50$ meet at right angles at T(10, 0). Find the points where they touch the circle.

$$OPTQ \text{ is a square with diagonal } OT = 10$$

$$\text{the corners are at } (5, 5) \text{ and } (5, -5)$$

$$(5, 5) \text{ and } (5, -5)$$

Answer

8



Prove that the tangent to $x^2 + y^2 = r^2$ at the point (a, b) has equation $ax + by = r^2$.

$$\text{radius } \frac{b}{a}, \text{ tangent } -\frac{a}{b}$$

$$y - b = -\frac{a}{b}(x - a)$$

$$by - b^2 = -ax + a^2$$

$$ax + by = a^2 + b^2 = r^2$$

Reason