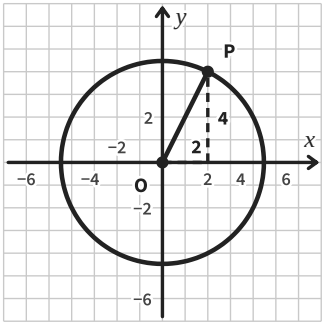
Equation of a tangent to a circle

ANSWERS

1

P **(2, 4)** is on the circle $x^2 + y^2 = 20$.
Find the gradient of the radius OP.

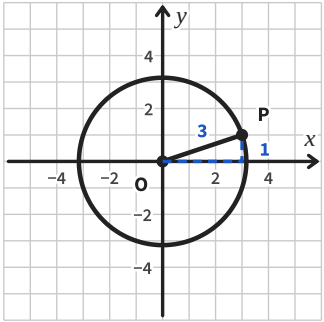


$4 \div 2$

Answer 2

2

P **(3, 1)** is on the circle $x^2 + y^2 = 10$.
Find the gradient of the radius OP.

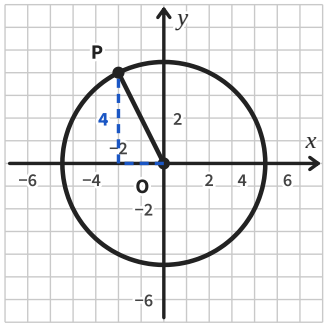


$1 \div 3 = \frac{1}{3}$

Answer $\frac{1}{3}$

3

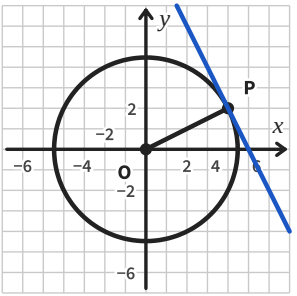
P **(−2, 4)** is on the circle $x^2 + y^2 = 20$.
Find the gradient of the radius OP.



Answer −2

4 *Notice the change!*

P **(4, 2)** is on the circle $x^2 + y^2 = 20$.
Find the gradient of the tangent at P.

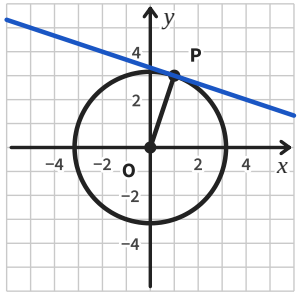


$2 \div 4 = \frac{1}{2}$

Answer −2

5

P **(1, 3)** is on the circle $x^2 + y^2 = 10$.
Find the gradient of the tangent at P.

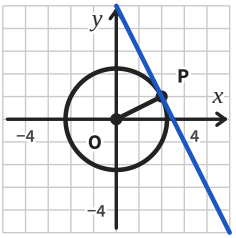


$3 \div 1 = 3$

Answer $-\frac{1}{3}$

6 *Notice the change!*

P **(2, 1)** is on the circle $x^2 + y^2 = 5$.
Find the equation of the tangent at P.



$1 \div 2 = \frac{1}{2}$

−2

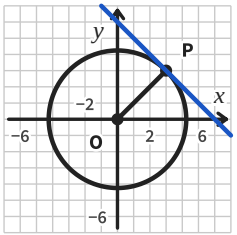
$1 = -2 \times 2 + c$

$c =$ 5

Answer $y = -2x + 5$

7

P **(3, 3)** is on the circle $x^2 + y^2 = 18$.
Find the equation of the tangent at P.



$3 \div 3 = 1$

−1

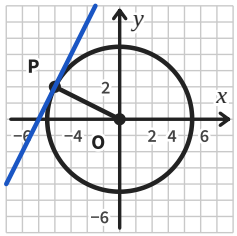
$3 = -1 \times 3 + c$

$c =$ 6

Answer $y = -x + 6$

8

P **(−4, 2)** is on the circle $x^2 + y^2 = 20$.
Find the equation of the tangent at P.



$2 \div (-4) = -\frac{1}{2}$

2

$2 = 2 \times (-4) + c$

$c =$ 10

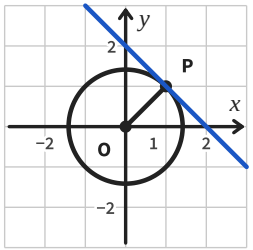
Answer $y = 2x + 10$

Equation of a tangent to a circle *further practice*

ANSWERS

9

P (1, 1) is on the circle $x^2 + y^2 = 2$.
Find the equation of the tangent at P.



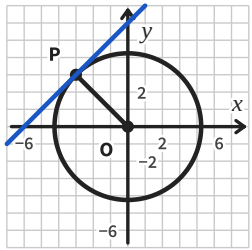
$1 \div 1 = 1$, so -1

$1 = -1 \times 1 + c$, $c = 2$

Answer $y = -x + 2$

10

P (−3, 3) is on the circle $x^2 + y^2 = 18$.
Find the equation of the tangent at P.



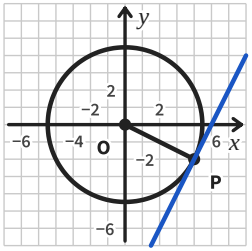
$3 \div (-3) = -1$, so 1

$3 = 1 \times (-3) + c$, $c = 6$

Answer $y = x + 6$

11

Where does the tangent to $x^2 + y^2 = 20$ at (4, −2) cross the y axis?



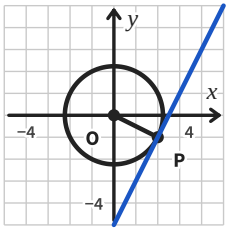
gradient 2

$-2 = 2 \times 4 + c$, $c = -10$

Answer (0, −10)

12

A bike wheel is the circle $x^2 + y^2 = 5$.
The road touches it at (2, −1).
Is the road the line $y = 2x - 5$?
Show how you know.



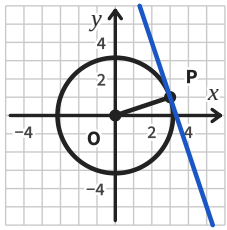
OP: $-1 \div 2 = -½$, so the tangent: 2

$-1 = 2 \times 2 + c$, $c = -5$

Answer Yes

13

A stone on a string goes round the circle $x^2 + y^2 = 10$, in metres. It is let go at (3, 1) and flies along the tangent.
Find the equation of its path.



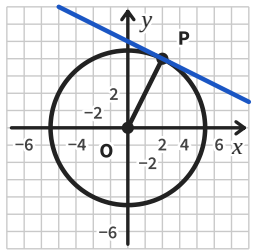
$1 \div 3 = \frac{1}{3}$, so -3

$1 = -3 \times 3 + c$, $c = 10$

Answer $y = -3x + 10$

14

P (2, 4) is on the circle $x^2 + y^2 = 20$.
Find the equation of the tangent at P.



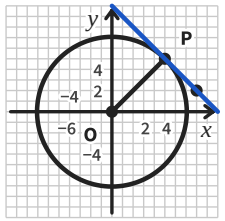
OP: $4 \div 2 = 2$, so the tangent: $-½$

$4 = -½ \times 2 + c$, $c = 5$

Answer $y = -\frac{1}{2}x + 5$

15

A race track is the circle $x^2 + y^2 = 50$.
A car skids off at (5, 5) along the tangent. Does it pass through the point (8, 2)? Show how you know.



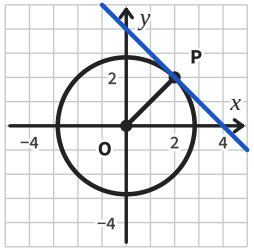
the tangent: $y = -x + 10$

$-8 + 10 = 2$

Answer Yes

16

Lily says the tangent to $x^2 + y^2 = 8$ at (2, 2) is $y = x$. Explain her mistake and find the right equation.



$y = x$ is the radius: gradient 1

the tangent: $-1, 2 = -2 + c$, $c = 4$

Answer $y = -x + 4$