

Perpendicular Lines *extend*

ANSWERS

1



The line through $(k, 3)$ and $(2, 7)$ is perpendicular to $y = \frac{1}{2}x - 5$. Find k .

its gradient is -2

$$\frac{4}{2-k} = -2, \text{ so } 4 = -4 + 2k$$

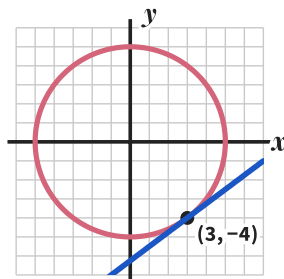
$$k = 4$$

Answer

2



Find the equation of the tangent to the circle $x^2 + y^2 = 25$ at the point $(3, -4)$.



$$\text{radius } -\frac{4}{3}, \text{ tangent } \frac{3}{4}; -4 = \frac{9}{4} + c$$

$$y = \frac{3}{4}x - \frac{25}{4}$$

Answer

3



ABCD is a rhombus with $A(1, 2)$ and $C(7, 6)$. Find the equation of the diagonal BD. Give it in the form $ax + by = c$.

diagonals cross at right angles at $(4, 4)$

$$\text{gradient } -\frac{3}{2}; y = -\frac{3}{2}x + 10$$

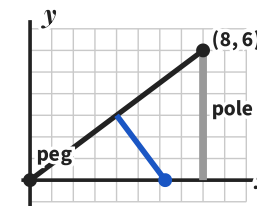
$$3x + 2y = 20$$

Answer

4



A tent rope runs from a peg at $(0, 0)$ to the top of a pole at $(8, 6)$. A strut meets the rope at right angles at its midpoint. Where does it meet the ground (the x axis)?



$$\text{through } (4, 3), \text{ gradient } -\frac{4}{3}$$

$$(6.25, 0)$$

Answer

5



Find the exact shortest distance from the origin to the line $3x + y = 10$.

$$\text{the perpendicular from } O \text{ is } y = \frac{x}{3}$$

$$\text{they meet at } (3, 1): \sqrt{3^2 + 1^2} = \sqrt{10}$$

$$\sqrt{10} \text{ units}$$

Answer

6



A circle passes through $(0, 0)$, $(8, 0)$ and $(2, 6)$. Use perpendicular bisectors to find its centre.

$$\text{bisector of the first two: } x = 4$$

$$\text{other: through } (1, 3), \text{ gradient } -\frac{1}{3}$$

$$(4, 2)$$

Answer

7



The lines $kx + 3y = 6$ and $(k+2)x - y = 1$ are perpendicular. Find the two possible values of k .

$$\text{gradients } -\frac{k}{3} \text{ and } k+2$$

$$k(k+2) = 3: (k+3)(k-1) = 0$$

$$k = 1 \text{ or } k = -3$$

Answer

8



Prove that $(-2, 1)$, $(1, 5)$, $(5, 2)$ and $(2, -2)$ are the corners of a square.

$$\frac{4}{3} \times -\frac{3}{4} = -1 \text{ at each corner}$$

$$\text{each side } \sqrt{3^2 + 4^2} = 5$$

$$\text{Four sides of } 5, \text{ each corner } 90^\circ$$

Proof