

3.5D - Distance from a Point to a Line

(Remember: The distance from a point to a line is the length of the segment from the point that is perpendicular to the line)

Ex 1) Find the distance from the point (1, 0) to the line $y = -x + 3$.

$$\perp m = 1, (1, 0)$$

$$y = mx + b$$

$$0 = (1)(1) + b$$

$$0 = 1 + b$$

$$-1 = b$$

$$y = 1x - 1$$

$$|x-1| = -x+3$$

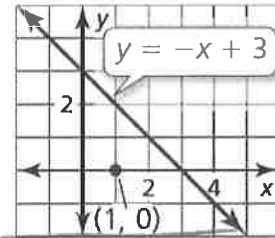
$$2x = 4$$

$$x = 2$$

$$y = -(2) + 3$$

$$y = 1$$

$$(2, 1)$$



$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(2-1)^2 + (1-0)^2}$$

$$d = \sqrt{(1)^2 + (1)^2} = \sqrt{2}$$

Example 5

Ex 2) Find the distance from the point (6, 4) to the line $y = x + 4$.

$$\perp m = -1; (6, 4)$$

$$4 = -1(6) + b$$

$$4 = -6 + b$$

$$10 = b$$

$$y = -x + 10$$

$$x + 4 = -x + 10$$

$$2x = 6$$

$$x = 3$$

$$y = (3) + 4$$

$$y = 7$$

$$(3, 7)$$

$$d = \sqrt{(3-6)^2 + (7-4)^2}$$

$$d = \sqrt{(-3)^2 + (3)^2} = \sqrt{18}$$

$$\sqrt{18} = \sqrt{9\sqrt{2}} = \boxed{3\sqrt{2}}$$

Ex 3) Find the distance from the point (-1, 6) to the line $y = -2x$.

$$\perp m = \frac{1}{2}; (-1, 6)$$

$$6 = \frac{1}{2}(-1) + b$$

$$6 = -\frac{1}{2} + b$$

$$\frac{13}{2} = b$$

$$y = \frac{1}{2}x + \frac{13}{2}$$

$$\frac{1}{2}x + \frac{13}{2} = -2x$$

$$\frac{13}{2} = -\frac{5}{2}x$$

$$-\frac{13}{5} = x$$

$$y = -2\left(-\frac{13}{5}\right)$$

$$y = \frac{26}{5}$$

$$d = \sqrt{(-1 + 2.6)^2 + (6 - 5.2)^2}$$

$$d = \sqrt{2.56 + 0.64}$$

$$d = \sqrt{3.2}$$

$$\boxed{d = 1.79}$$

Monitoring Progress 6-7

$$\left(-\frac{13}{5}, \frac{26}{5}\right) \rightarrow (-2.6, 5.2)$$

Homework:

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Oct 18-12:30 PM