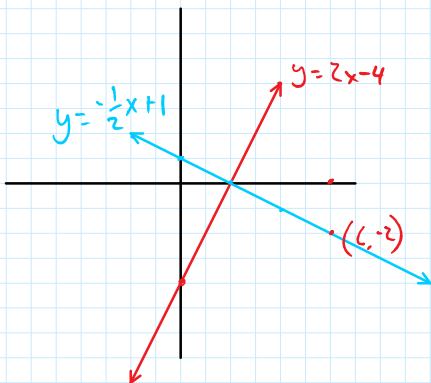# What You Will Learn

▶ Use slope to find the distance from a point to a line.

Slope-intercept form $y = mx + b$

Point-slope form $y - y_1 = m(x - x_1)$

Slope $\dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{Rise}{Run} = \dfrac{\Delta y}{\Delta x}$

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

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

$y = 2x - 4$

$\cdot (6, -2)$

find eqr.
of $\perp$ line

$m = 2 \quad \perp m = -\frac{1}{2}$

$(y - y_1) = m(x - x_1)$

$y - 2 = -\frac{1}{2}(x - 6)$

$y + 2 = -\frac{1}{2}x + 3$

$\underline{-2 \qquad -2}$

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

find x value
@ intersection

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

$y = 2x - 4$

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

$\underline{+\frac{1}{2}x \qquad +\frac{1}{2}x}$

$1 = \frac{5}{2}x - 4$

$\underline{+4 \qquad +4}$

$\left(\frac{2}{5}\right)\frac{5}{1} = \frac{5}{2}x\left(\frac{2}{5}\right)$

$2 = x$

find y value
@ intersection

$y = 2x - 4 \; ; \; x = 2$

$y = 2(2) - 4$

$4 - 4$

$y = 0$

$(2, 0)$

Distance fula

$(6, -2)(2, 0)$

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

$\sqrt{(6 - 2)^2 + (-2 - 0)^2}$

$\sqrt{4^2 + (-2)^2}$

$\sqrt{16 + 4}$

$\sqrt{20}$

$\boxed{2\sqrt{5}}$

20

2 10

2 5

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

$m = 1 \quad \perp m = -1$

$y = mx + b$

$y - 4 = -1(x - 6)$

$y - 4 = -1x + 6$
$ +4 \qquad +4$

$y = -1x + 10$

$y = x + 4$
$y = -1x + 10$

$x + 4 = -1x + 10$
$+1x \qquad +1x$

$2x + 4 = 10$
$ -4 \quad -4$

$\dfrac{2x}{2} = \dfrac{6}{2}$

$x = 3$

$y = x + 4 ; \quad x = 3$

$y = 3 + 4$

$y = 7$

$(3, 7)$

$(6, 4) \ (3, 7)$

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

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

$\sqrt{9 + 9}$

$\sqrt{18}$

$\boxed{3\sqrt{2}}$

18
$\wedge$
$2 \quad 9$
$\wedge$
33

$m = -1 \quad \perp m = 1$

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

$(y - y_1) = m(x - x_1)$

$y - 0 = 1(x - 1)$

$y = x - 1$

$y = -x + 3$

$y = x - 1$

$-x + 3 = x - 1$
$+x \qquad +x$

$3 = 2x - 1$
$+1 \qquad +1$

$\dfrac{4}{2} = \dfrac{2x}{2}$

$2 = x$

$y = x - 1 ; \quad x = 2$

$y = 2 - 1$

$y = 1$

$(2, 1)$

$(2, 1) \ (1, 0)$

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

$\sqrt{1^2 + 1^2}$

$\sqrt{1 + 1}$

$\boxed{\sqrt{2}}$

Practice *sec 3.5* **pg.**
160: 8-20EE,
21-24A, 27-30A