Ex. Determine the equation of
a line passing through $(-1,5)$ $\boxed{(y=mx+b)}$
and $(3,-4)$

···> Oh yeah ... do it $\underline{\underline{3}}$ different
ways !!

① Point-Slope Formula

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

(4)
$$y - 5 = \frac{-9}{4}(x+1)$$

$$4y - 20 = -9x - 9$$

$$\frac{4y}{4} = \frac{-9}{4}x + \frac{11}{4}$$

$$\boxed{y = -\frac{9}{4}x + \frac{11}{4}}$$

$m = \frac{9}{-4}$ $\quad (-1,5)$

$$\boxed{m = \frac{y_2 - y_1}{x_2 - x_1}}$$

1

② Use slope formula

$$m = \frac{y - y_1}{x - x_1}$$

$$-\frac{9}{4} = \frac{y+4}{x-3}$$

$$-9(x-3) = 4(y+4)$$

$$-9x+27 = 4y+16$$

$$\frac{-9}{4}x + \frac{11}{4} = \frac{4y}{4}$$

$$y = -\frac{9}{4}x + \frac{11}{4}$$

③ Slope y-Intercept

$$y = mx+b$$

$$y = -\frac{9}{4}x + b$$

$$(4)\,4 = -\frac{(4)}{4}9(3) + b(4)$$

$$-16 = -27 + 4b$$

$$\frac{11}{4} = \frac{4b}{4}$$

$$b = \frac{11}{4}$$

$$y = -\frac{9}{4}x + \frac{11}{4}$$

2

Example 3 — Writing an Equation of a Linear Function Given Two Points

The sum of the angles, s degrees, in a polygon is a linear function of the number of sides, n, of the polygon. The sum of the angles in a triangle is 180°. The sum of the angles in a quadrilateral is 360°.

$$(3, 180)$$
$$(n, s)$$

a) Write a linear equation to represent this function.

b) Use the equation to determine the sum of the angles in a dodecagon.

a) $(3, 180)$
$(4, 360)$

$m = \dfrac{360 - 180}{4 - 3}$

$m = 180$

$y - 180 = 180(x - 3)$

$y - 180 = 180x - 540$

$y = 180x - 360$

b) 12 sides $\Rightarrow n = 12$

$S = 180(12) - 360$

$= 1800°$

$S = 180n - 360$

$S = 180(n - 2)$

6.5 Slope-Point Form of the Equation for a Linear Function

3. A temperature in degrees Celsius, c, is a linear function of the temperature in degrees Fahrenheit, f. The boiling point of water is 100°C and 212°F. The freezing point of water is 0°C and 32°F.

a) Write a linear equation to represent this function.

b) Use the equation to determine the temperature in degrees Celsius at which iron melts, 2795°F.

$$\left(212, 100\right)$$

$$\left(32, 0\right)$$

$$\left(F, C\right)$$

$$M = \frac{100}{180} = \frac{5}{9}$$

$$y - 0 = \frac{5}{9}(x - 32)$$

$$y = \frac{5}{9}(x - 32)$$

$$\boxed{c = \frac{5}{9}(f - 32)}$$

$$c = \frac{5}{9}(2795 - 32)$$

$$\boxed{c = 1535°C}$$

Example 4 — Writing an Equation of a Line That Is Parallel or Perpendicular to a Given Line

Write an equation for the line that passes through R(1, −1) and is:

a) parallel to the line $y = \frac{2}{3}x - 5$ $m = \frac{2}{3}$

b) perpendicular to the line $y = \frac{2}{3}x - 5$ $m = -\frac{3}{2}$

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

$3y + 3 = 2(x-1)$

$3y + 3 = 2x - 2$

$3y = 2x - 5$

$y = \frac{2}{3}x - \frac{5}{3}$

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

$-1 = -\frac{3}{2}(1) + b$

$-1 = -\frac{3}{2} + b$

$b = -\frac{1}{1} + \frac{3}{2} = \frac{1}{2}$

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

6.5 Slope-Point Form of the Equation for a Linear Function

Practice problems...

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#4, 5, 6, 9, 10, 11, 12, 14, 17, 18, 20, 21, 22, 23, 24, 25

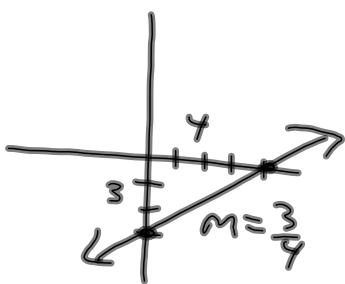# Examples... Finding the Equation of a Line

Determine the equation of the line given that...
(Put equations in STANDARD Form)

a) the line passes through the points (-3, 5) & (-2, -7)

b) the line passes through the point (-2, 3) has the same slope as the line $3x - 2y -5 = 0$

c) the line has an x-intercept of 4 and a y-intercept of -3

$$(4,0) \quad (0,-3)$$

$$M = \frac{-3}{-4} = \frac{3}{4}$$

$$y=mx+b$$

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

$$y + 3 = \frac{3}{4}(x - 0)$$

$$4y + 12 = 3x$$

$$4y = 3x - 12$$

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

BONUS!

#3. For each pair of equations, find a value for k so that the... $[4]$

a) graph of $4x + ky - 2 = 0$ is parallel to the graph of $3x - 2y = 5$

b) graph of $4x + ky = 6$ is perpendicular to the graph of $5x - 2y + 5 = 0$