

EQUATIONS OF LINES

OBJECTIVES: 1) Write equations of lines.

LINEAR EQUATION FORMS

Point Slope: $y - y_1 = m(x - x_1)$

point
 (x_1, y_1)
 $\frac{\Delta y}{\Delta x} = m$

Slope Intercept: $y = mx + b$

Horizontal Lines vs. Vertical Lines

$$y = \#$$

$$x = \#$$

Parallel Lines vs. Perpendicular Lines

same
slope

opp. reciprocal slopes

EXAMPLES

1. Find the equation of the line through (2,6) that is:
a) parallel to the x axis.

$$y = 6$$

- b) has an x-intercept of 5.

$$(5,0)(2,6) \quad y - 0 = -2(x - 5) \quad \text{or}$$
$$\frac{6}{-3} = -2 \quad y - 6 = -2(x - 2)$$

- c) Perpendicular to the line $2x + 3y = 6$. (Use both forms)

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

$$\perp m = \frac{3}{2} \quad y - 6 = \frac{3}{2}(x - 2)$$

2. Find the equation of the perpendicular bisector of the segment with endpoints (2, 6) and (4, -5).

midpt: $(2,6)(4,-5)$
 $(3, \frac{1}{2})$

slope: $\frac{6 - (-5)}{2 - 4} = \frac{11}{-2}$

$$y - \frac{1}{2} = -\frac{11}{2}(x - 3)$$

3. If a line goes through (6,2) and has a slope -3 , find the area of the triangle bounded by the line and the coordinate axes.

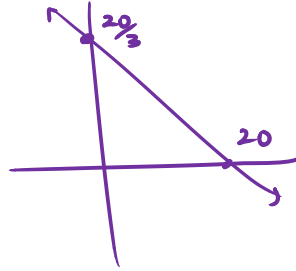
$$y - 2 = -3(x - 6)$$

$$y = -3x + 20$$

$$y \text{ int: } 20$$

$$x \text{ int: } 0 = -3x + 20$$

$$x = \frac{20}{3}$$



$$\frac{1}{2}(20)\left(\frac{20}{3}\right) = \boxed{\frac{200}{3}}$$

4. PHS sells 25 sweatshirts when the price of each is \$38. For each \$2 increase in price, the number sold will decrease by 7. Write an equation that models this situation for the price (p) and the number sold (n).

$$(38, 25)$$

$$(p, n) \quad m = \frac{\Delta n}{\Delta p} = \frac{-7}{2}$$

$$n - 25 = \frac{-7}{2}(p - 38)$$

$$n - 25 = \frac{-7}{2}p + 133$$

$$\boxed{n = \frac{-7}{2}p + 158}$$