

Lesson 15, Section 2.4

A Slopes and Graphs of Vertical or Horizontal Lines

1. Slope of a horizontal line

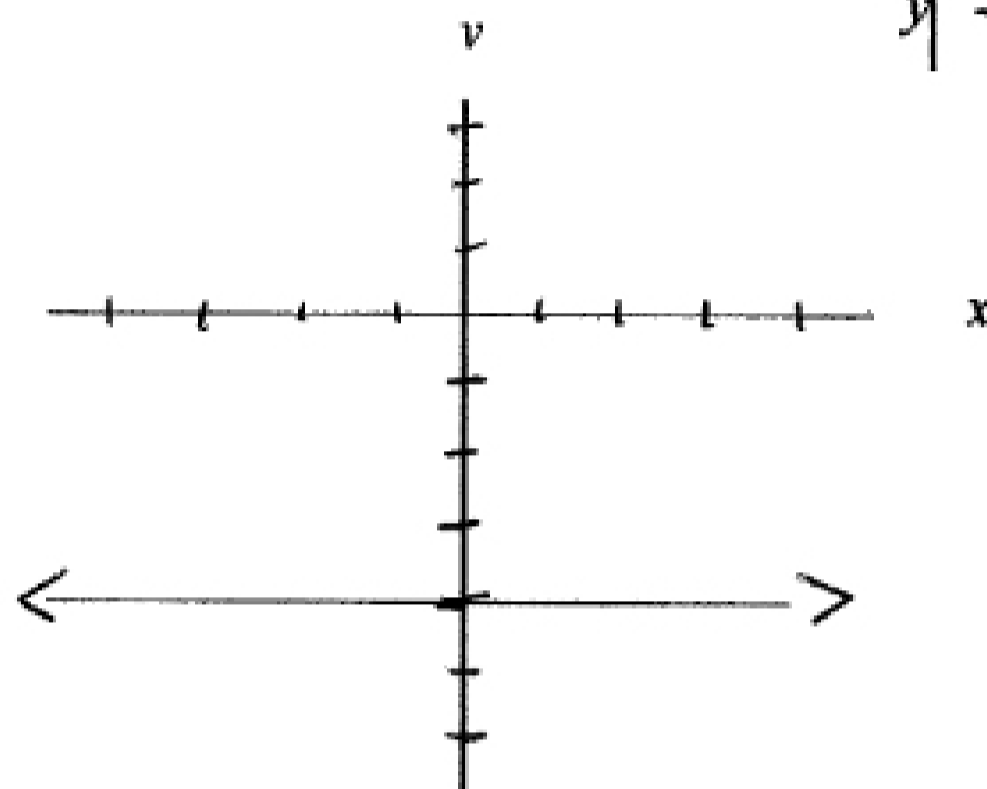
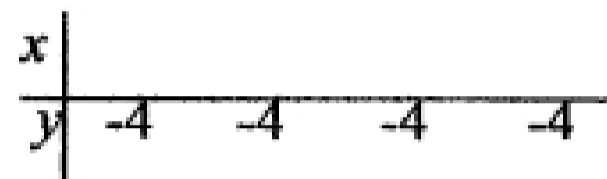


$$m = \frac{y - y}{x_2 - x_1} = \frac{0}{\#} \quad \text{Zero divided by any number is zero.}$$

The slope of a horizontal line is zero.

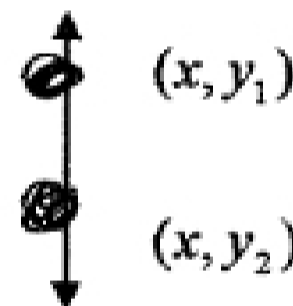
2. Graph of a horizontal line

Graph $f(x) = y = -4$



If a line is of the form $f(x) = y = b$, then the line is horizontal with a y -intercept at $(0, b)$ and the slope of this line is zero.

3. Slope of a vertical line

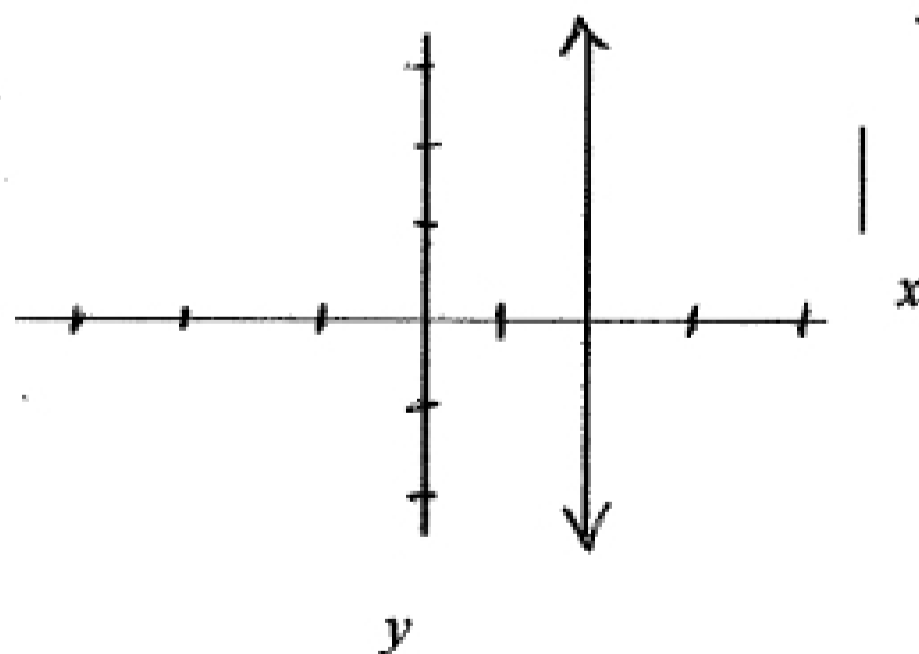
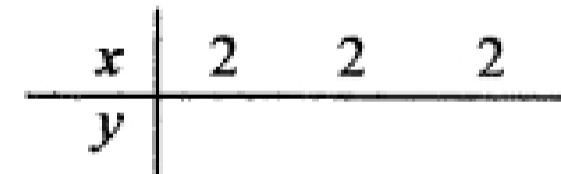


$$m = \frac{y_2 - y_1}{x - x} = \frac{\#}{0} \quad \text{A fraction with a 0 denominator is undefined.}$$

The slope of a vertical line is undefined.

4. Graph of a vertical line

Graph $x + 2 = 4$
 $x = 2$

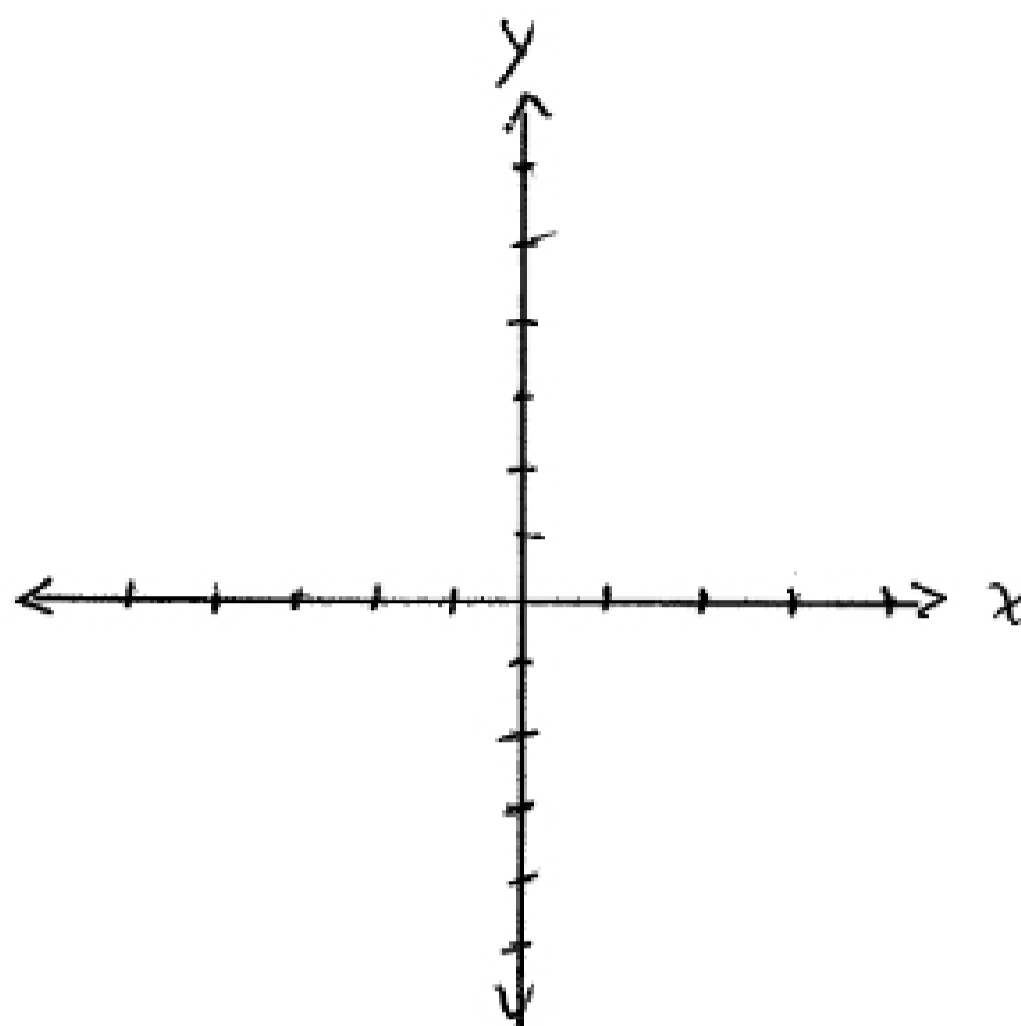


If a line is of the form $x = a$, then the line is vertical with an x -intercept at $(a, 0)$ and the slope of this line is undefined.

Find the slope and graph of each.

Ex 1 $3x + 4 = 10$

Ex 2 $\frac{y}{2} = -3$



B Intercepts

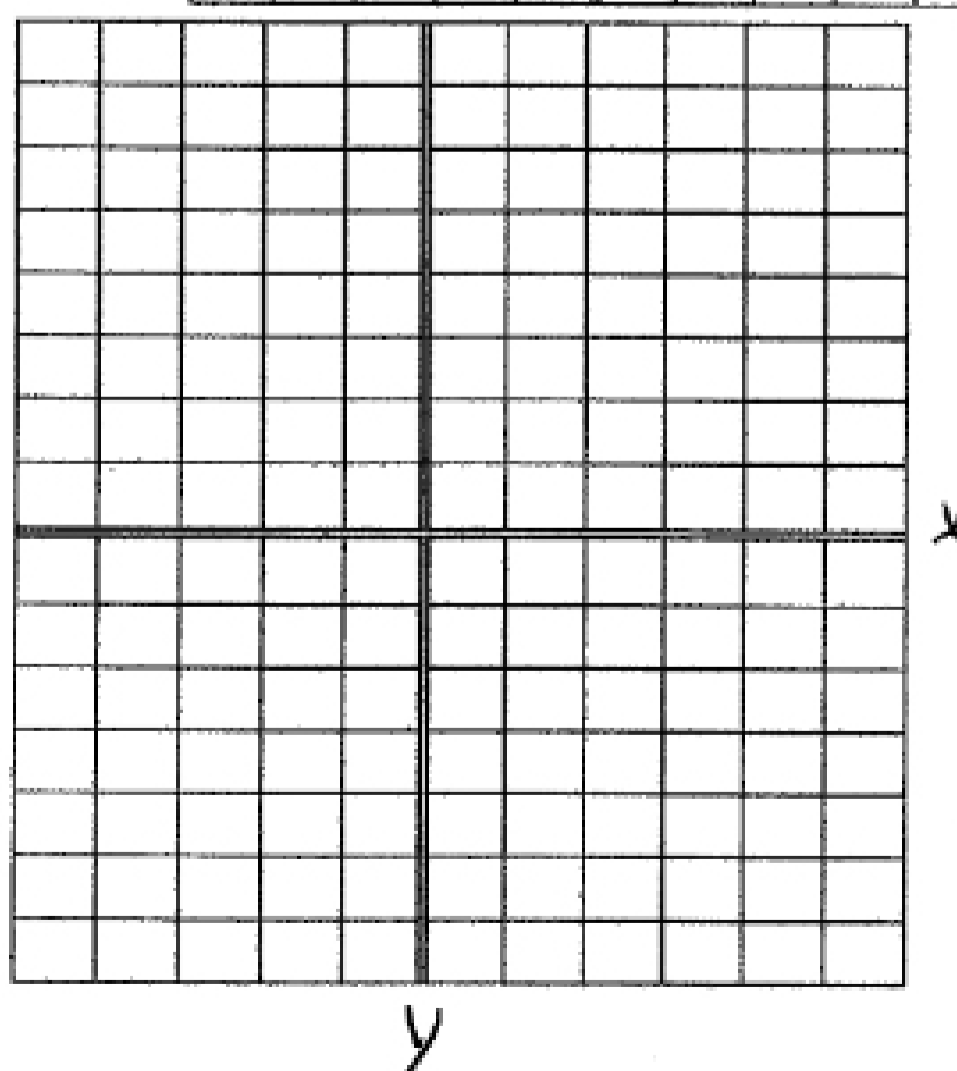
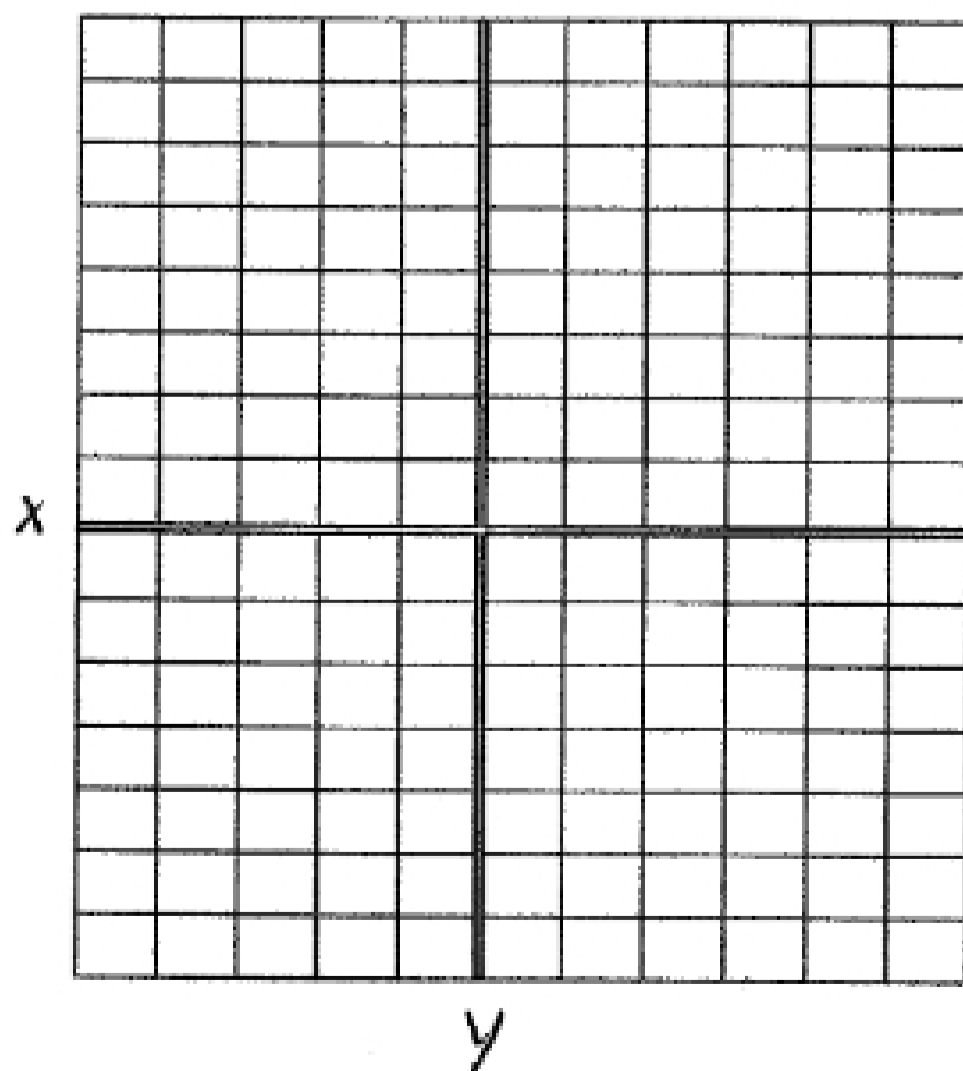
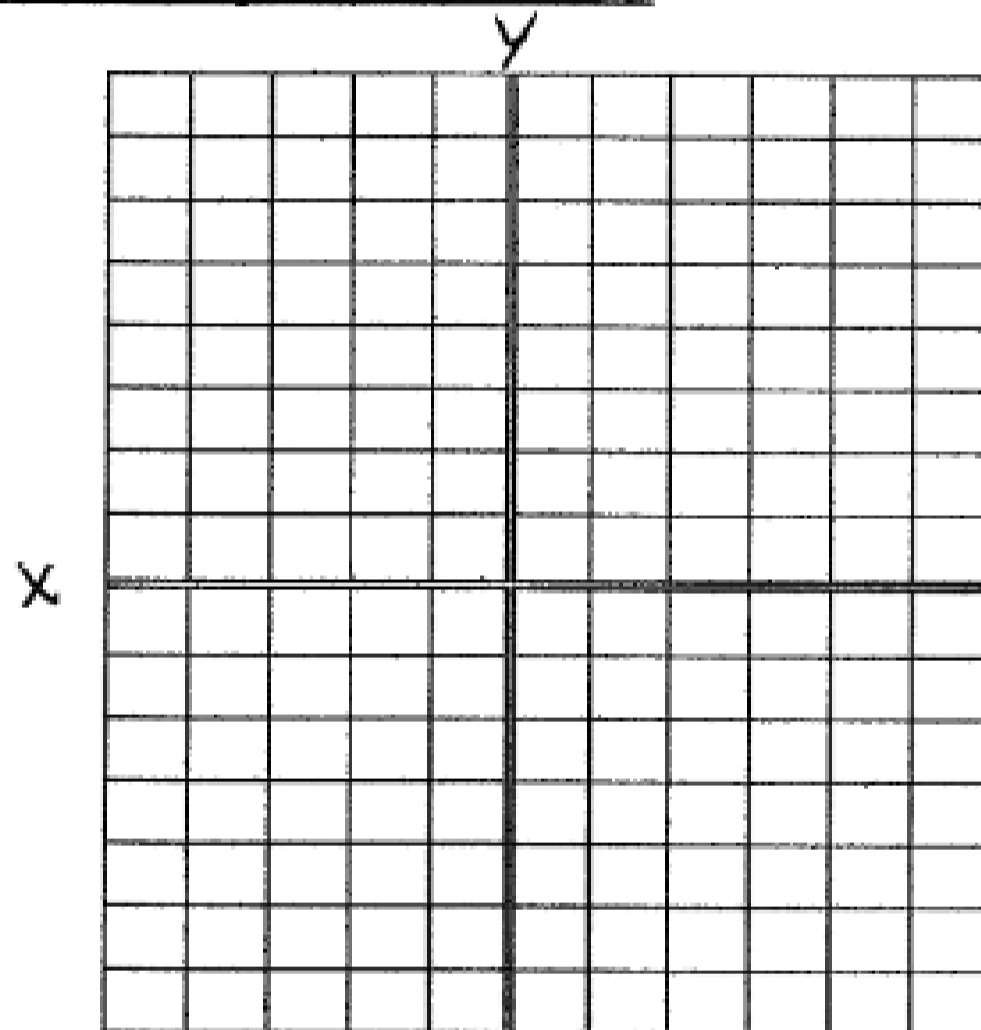
An ordered pair $(0, b)$ is the **y-intercept** of a line and an ordered pair $(a, 0)$ is the **x-intercept** of a line. Notice: One of the coordinates is zero. Lines are easily graphed using the intercepts.

Find the intercepts and graph.

Ex 3 $y = \frac{1}{4}x - 1$

Ex 4 $4x + 3y = 18$

Ex 5 $f(x) = 3x + 2$



C Applications

Many real life situations can be represented as a linear function (usually a function of time). The initial amount or number is the b and the rate of change is the m .

Ex 6 Molly Jones agrees to pay \$8000 down payment plus \$350 a month to pay for a car.

a) Write a linear function to illustrate her total payments as a function of the number of months.

Use this function to answer parts (b) and (c).

b) How much has Molly paid on the car in 5 months from purchase?

c) If the total (including any interest or fees) that Molly needs to pay is \$20,600, how many months will it take to pay off the car?

Ex 7 One plan from Jitterbug Phones charges a customer \$140 for a phone and fees to open an account plus payments of \$30 a month (for 30 minutes per month).

a) Write a cost function to represent the total paid for this plan from the beginning.

Use your function to find or predict the following.

b) How much has a customer with this plan paid in 9 months?

c) How long will it take before the customer has paid \$1640?

A Linear Function is one of the form $y = mx + b$. Notice that the x and y are only 1st powers. Any other type of function is called a **non-linear function**.

Ex 8 Identify each equation or function as linear or non-linear.

a) $3x + 4y = 9$

b) $g(t) = 3t - 4$

c) $f(x) = |2x - 3|$

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

e) $5y = 10$

f) $h(x) = \sqrt{x - 2}$