Section 2.1 – Coordinate Plane Review and Slopes of Lines

Plot each point.

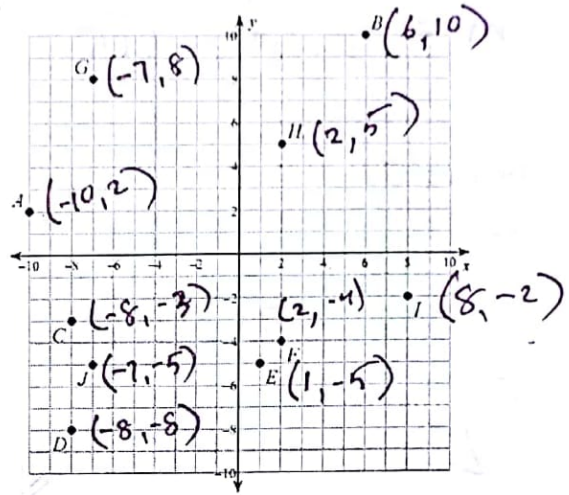**State the coordinates of each point.**

1) $J(5, 10)$ $I(1, 9)$ $H(6, -9)$ $K(0, 6)$
$G(-6, 8)$ $F(9, 0)$ $E(-6, 0)$
$D(-8, -4)$ $C(5, 0)$ $B(-1, -1)$
$A(-8, -1)$

3)

$G \cdot (-7, 8)$ $\cdot B (6, 10)$

$\cdot II (2, 5)$

$A \cdot (-10, 2)$

$\cdot (-8, -3)$ $(2, -4)$ $\cdot I (8, -2)$
C

$J \cdot (-7, -5)$ $\cdot E (1, -5)$

$\cdot D (-8, -8)$

Quadrants:

II	I
III	IV

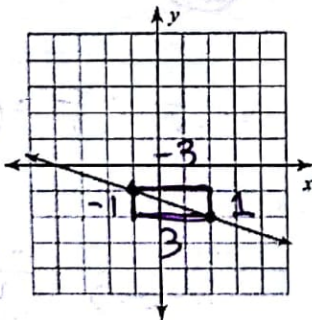**Slope** is a number that describes:

  a. How "steep" a graph of a line is.
  b. The **rate of change** of the function represented by the line.

The formula for computing slope is:

$$m = \frac{RISE}{RUN} = \frac{y_2 - y_1}{x_2 - x_1}$$
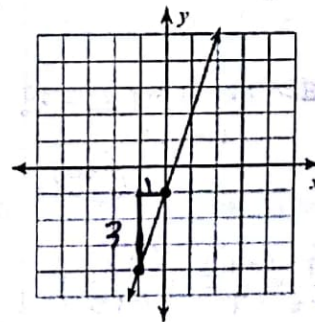
Find the slope of each line.

1)

$m = \frac{1}{-3}$

$m = \frac{-1}{3}$

$m = -\frac{1}{3}$

2)

$m = \frac{3}{1}$

$= 3$

3) (8, 10) (-7, 14)
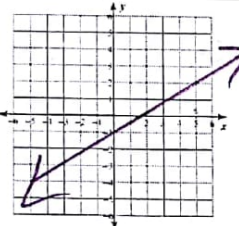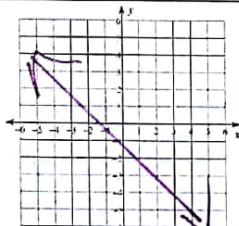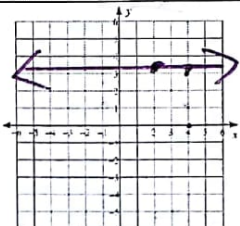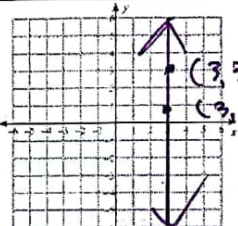
$$m = \frac{14-10}{-7+^-8} = \boxed{\frac{4}{-15}}$$

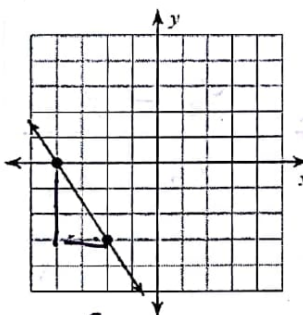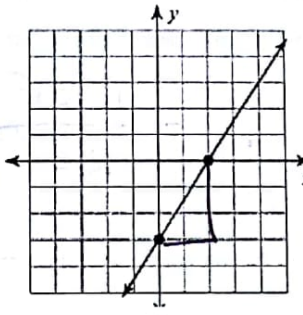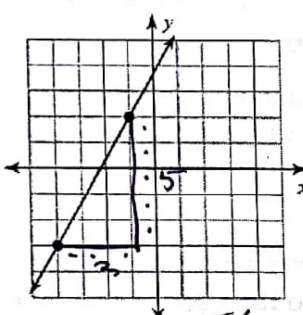$$m = \frac{10-14}{8+(+7)} = \boxed{\frac{-4}{15}}$$

4) (-3, 1) (-17, 2)

$$m = \frac{2-1}{-17+(+3)} = \boxed{\frac{1}{-14}}$$

$$m = \frac{1-2}{-3+(+17)} = \boxed{\frac{-1}{14}}$$

Types of Slopes

Positive Slope	Negative Slope	Slope = 0	Slope Undefined
		HORIZONTAL $(2,3)\ (4,3)$ $m = \frac{3-3}{4-2} = \frac{0}{2}$ $= 0$	(3,3) (3,1) VERTICAL $m = \frac{3-1}{3-3} = \frac{2}{0}$ UNDEFINED

Applications. For each of the following, find the slope of the line.

1.	2.	3.
$-\frac{3}{2}$	$\frac{3}{2}$	~~$\frac{3}{5}$~~ $\frac{5}{3}$
4. (12, -18) (11, 12) $\frac{12+(+18)}{11-12} = \frac{30}{-1}$ $\boxed{-30}$	5. (-18, -20) (-18, 15) $\frac{-20-15}{-18-(-18)} = \frac{-35}{0}$ $\boxed{\text{UNDEF}}$	6. (12, 5) (21, 5) $\frac{5-5}{21-12} = \frac{0}{9} = \boxed{0}$
7. (-6, 9) (7, -9) $\frac{9-(-9)}{-6-7} = \boxed{\frac{18}{-13}}$	8. (22, -5) (-10, 5) $\frac{-5-5}{22-(-10)} = \frac{-10}{32}$ $= \boxed{-\frac{5}{16}}$	9. (-1, 0) (0, -1) $\frac{-1-0}{0-(-1)} = \frac{-1}{1}$ $\boxed{= -1}$

Slopes of Parallel and Perpendicular Lines

Graph the line through (-2, 0) and (0, 4).

Find the slope of this line.

$$m = \frac{4}{2} = 2$$

Graph the line through (2, -2) and (4, 2).

Find the slope of this line.

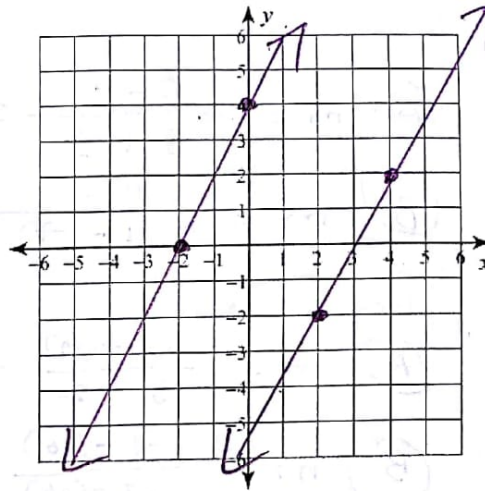$$m = \frac{4}{2} = 2$$

How do the lines on the graph compare?

PARALLEL

How do the slopes of the lines compare?

SAME.

What does this mean?

PARALLEL LINES HAVE SAME SLOPE

The slopes of parallel lines are: $=$

Graph the line through (-2, 0) and (0, 4).

Find the slope of this line.

2          $(-2, 0)$ $(0, -1)$

Graph the line through (-4, -2) and (-2, 3).
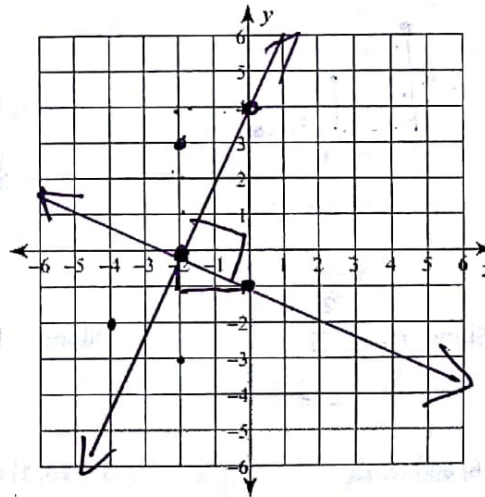
Find the slope of this line.

$$-\frac{1}{2}$$

How do the lines on the graph compare?

PERPENDICULAR ⊥

How do the slopes of the lines compare?

OPP RECIPROCALS

What does this mean?

The slopes of perpendicular lines are: OPPOSITE-RECIPROCALS.

Applications.

Find the slope of each line. Determine if the lines are parallel, perpendicular or neither. Show all work.

1) Line A: (3, 4) and (-5, 0)
   Line B: (-7, 1) and (1, 5)

(A) $m = \dfrac{0-4}{-5+3} = \dfrac{-4}{-8} = \dfrac{1}{2}$ $\Bigg\}$ **PARALLEL**

(B) $m = \dfrac{5-1}{1-(-7)} = \dfrac{4}{8} = \dfrac{1}{2}$

2) Line A: (2, -5) and (5, -2)
   Line B: (-6, -6) and (-2, -2)

(A) $m = \dfrac{-2+(+5)}{5-2} = \dfrac{3}{3} = 1$ $\Bigg\}$ **PARALLEL**

(B) $m = \dfrac{-2-(-6)}{-2-(-6)} = \dfrac{-2+6}{-2+6} = 1$

3) Line A: (1, 3) and (5, 7)
   Line B: (2, 4) and (6, 3)

(A) $m = \dfrac{7-3}{5-1} = \dfrac{4}{4} = 1$

(B) $m = \dfrac{3-4}{6-2} = \dfrac{-1}{4}$
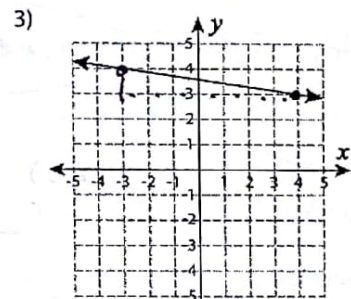
NEITHER

Find the slope for each.

1)

Slope = $-\dfrac{2}{3}$

2)

Slope = $\dfrac{4}{5}$

3)

Slope = $-\dfrac{1}{7}$

4) (-7, 8) and (4, 1)

$m = \dfrac{8-1}{-7-4}$

$= \dfrac{7}{-11}$

5) (-10, 1) and (-3, -4)

$m = \dfrac{1-(-4)}{-10-(-3)}$

$= \dfrac{5}{-7}$

$\dfrac{1-8}{4-(-7)} = \dfrac{-7}{11}$

6) (6, -1) and (8, 4)

$m = \dfrac{4-(-1)}{8-6}$

$= \dfrac{5}{2}$