

2.2 SLOPE AND RATE OF CHANGE

DEFINITION: slope = $\frac{\text{rise}}{\text{run}}$

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

ALWAYS SIMPLIFY FRACTIONS!

a) $\frac{10}{4} \begin{matrix} \div 2 \\ \div 2 \end{matrix}$
 $\frac{5}{2}$

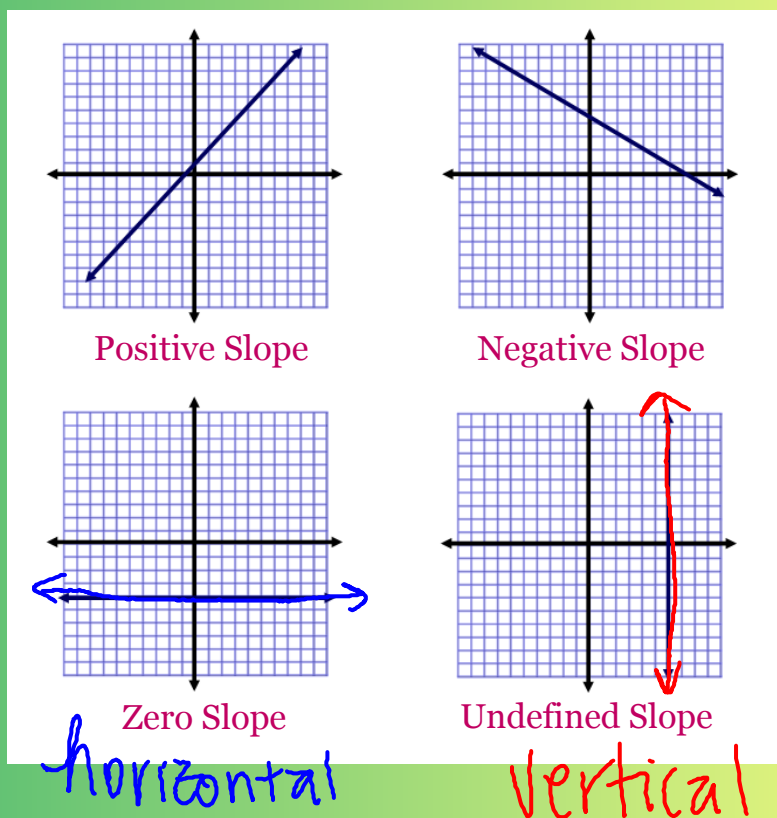
b) $\frac{3}{0}$
Undefined

c) $\frac{0}{4}$
0

d) $\frac{-6}{-5} \begin{matrix} \div -1 \\ \div -1 \end{matrix}$
 $\frac{6}{5}$

e) $\frac{1.25}{3} = \frac{1 \frac{25}{100}}{3} = \frac{1 \frac{1}{4}}{3}$
 $= \frac{5/4}{3} = \frac{5 \cdot 3}{4 \cdot 1}$
 $= \frac{5}{4} \cdot \frac{1}{3} = \frac{5}{12}$

CLASSIFICATION OF LINES BY SLOPE



Examples: Find the slope of the line passing through the given points. Then tell whether the line rises, falls, is horizontal, or is vertical.

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

1. $(-3, 5)$ & $(2, 1)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 5}{2 + 3} = \boxed{\frac{-4}{5}} \text{ fall}$$

2. $(-2, -4)$ & $(-2, -1)$

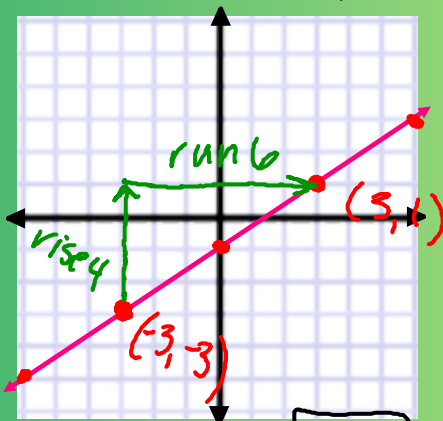
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 + 4}{-2 + 2} = \frac{3}{0} = \boxed{\text{undefined}} \text{ vertical}$$

3. $(-6, -1)$, $(0, 9)$

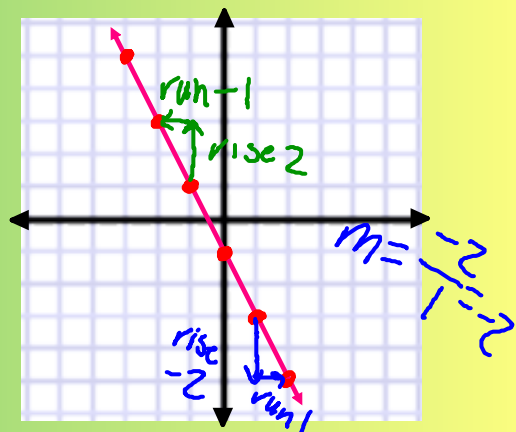
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 + 1}{0 + 6} = \frac{10 \div 2}{6 \div 2} = \boxed{\frac{5}{3}} \text{ rise}$$

Examples: Find the slope of each line graphed below.

4. $\text{Slope} = \frac{\text{rise}}{\text{run}}$



$$m = \frac{4}{6} = \boxed{\frac{2}{3}}$$



$$m = \frac{-2}{1} = \boxed{-2}$$

Two lines in a plane are **parallel**
if they do not intersect.

The slopes of parallel lines are

_____.

Two lines in a plane are **perpendicular**
if they intersect to form a right angle.

The slopes of perpendicular lines are

_____.

Examples

6. If $m = \frac{2}{5}$, then the m of the \perp line is _____.

7. If $m = -3$, then the m of the \perp line is _____.

8. Tell whether the lines through the following points are parallel, perpendicular, or neither. Also, tell which line is steeper.

Line 1: $(-3,3)$ and $(3,-1)$

Line 2: $(-2,-3)$ and $(2,3)$

Examples

9. Tell whether the lines through the following points are parallel, perpendicular, or neither. Also, tell which line is steeper.

Line 1: $(-3,1)$ and $(3,4)$

Line 2: $(-4,-3)$ and $(4,1)$

Examples

10. Tell whether the lines through the following points are parallel, perpendicular, or neither. Also, tell which line is steeper.

Line 1: $(\frac{1}{2}, -\frac{15}{8})$ and $(-4,-3)$

Line 2: $(8,6)$ and $(-12,1)$