Slope

The slope of a line is the ratio of the difference in y-values to the difference in x-values between any two points on a line.

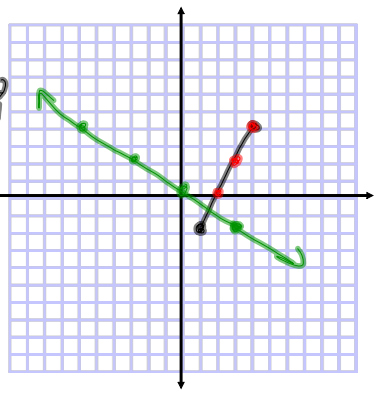
Find the slope between the following pair of points:

(4, 4) and (1, -2).

$\frac{-2-4}{1-4} = \frac{-6}{-3}$ $\quad \frac{4-(-2)}{4-1} = \frac{6}{3} = \frac{2}{1}$ $\quad \frac{\Delta y}{\Delta x}$ → rise / run

(-6, 4) and (3, -2)

$\frac{4+2}{-6+3} = \frac{6}{-9} = -\frac{2}{3}$ → rise / run

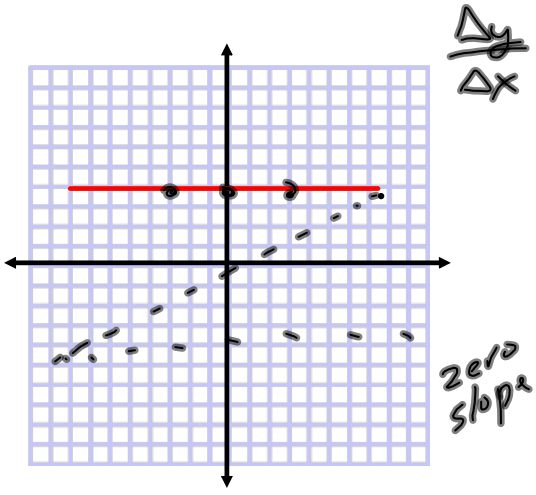


Slope is the movement from one point on a graph to another point on the graph.

$$m = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$$

same ordered pair

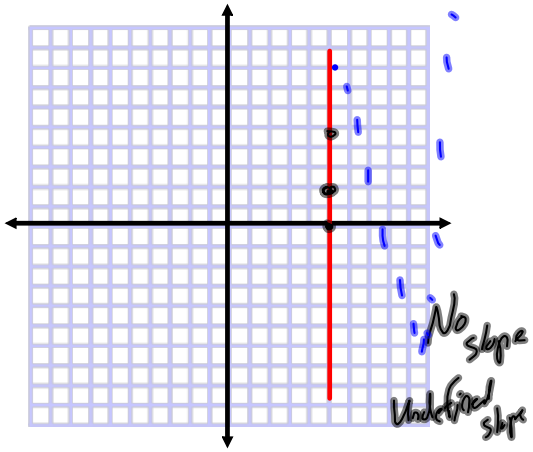
What type of slope does each of the following lines have?



$\frac{\Delta y}{\Delta x}$

zero slope

$\frac{0}{\#} = 0$

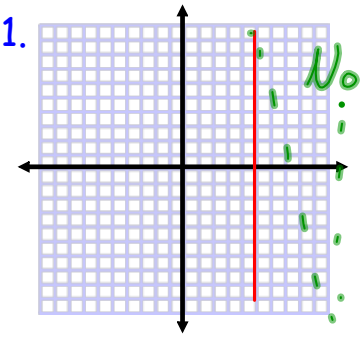


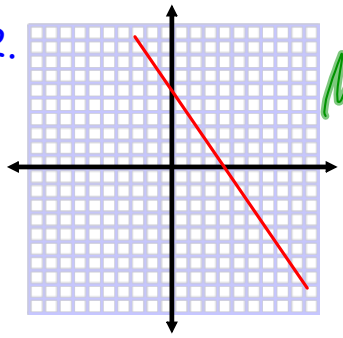
No slope

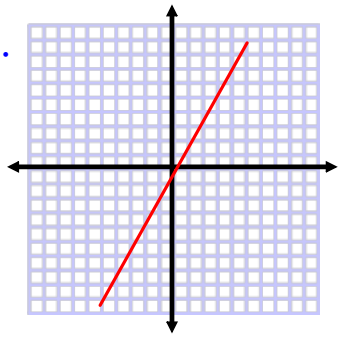
Undefined slope

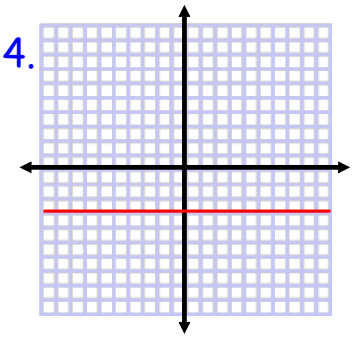
$\frac{\#}{0}$ } undefined No Solution

Tell whether each line has positive, negative, zero, or no slope and then find the slope of each line:

1. 
No Slope

2. 
Neg Slope

3. 
pos

4. 
zero

Find the slope of the line containing the following points:

5. (0, 0) and (4, 8)

$\frac{8-0}{4-0}$ or $\frac{0-8}{0-4}$

$\frac{8}{4} = \frac{2}{1}$ $\frac{-8}{-4} = \frac{2}{1}$ ↑2 →1

positive

6. (1,5) and (3, 9)

$\frac{5-9}{1-3} = \frac{-4}{-2} = \frac{2}{1}$ ↑2 →1

positive

7. (-2, 4) and (0,2)

$\frac{4-2}{-2-0} = \frac{2}{-2} = \frac{-1}{1}$ ↓1 →1

neg

8. (4, 2) and (8, 2)

$\frac{2-2}{8-4} = \frac{0}{4} = 0$

zero horizontal line

Tommy is offered two contract jobs, but he can only accept one. Both Job A and Job B will take exactly 40 hours to complete. Job A offers a sign-on bonus of $75 and Job B does not. The tables show his pay received per hour for a given amount of time for Job A and Job B.

Job A $y = 17x + 75$

Time (hrs)	0	2	4	6
Pay ($)	75	103	131	159

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{131 - 75}{4 - 0} = \frac{56}{4} = 14$

Job B $y = 17x$

Time (hrs)	0	2	4	6
Pay ($)	0	34	68	102

$m = \frac{34 - 0}{2 - 0} = \frac{34}{2} = 17$

a. Find the rate of change (slope) for each job.

b. What does the slope represent? dollars per hr

c. What does the y-intercept represent for each job? starting salary

d. Write an equation to determine the time where Job A and Job B would pay the same amount.

e. Find Tommy's total pay for 40 hours at each job and decide which he should take.

d) A $y = 17x + 75$ B $y = 17x$

$17x + 75 = 17x$

$-17x \quad -17x$

$75 = 3x$

$25 = x$

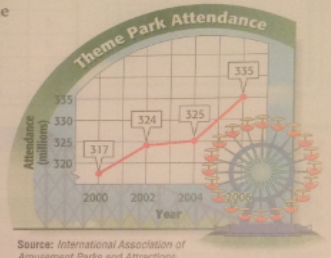
at 25 hrs Job A & Job B pay the same

e) A $17(40) + 75 = \$ 755$ B $17(40) = \$ 680$

Real-World Example 2 Compare Rates of Change

AMUSEMENT PARKS The graph shows the number of people who visited U.S. theme parks in recent years.

a. Find the rates of change for 2000–2002 and 2002–2004.



Source: International Association of Amusement Parks and Attractions

2000–2002:

$\frac{\text{change in attendance}}{\text{change in time}} = \frac{324 - 317}{2002 - 2000}$ ← people / ← years — Substitute.

$= \frac{7}{2}$ or 3.5 — Simplify.

Over this 2-year period, attendance increased by 7 million, for a rate of change of 3.5 million per year.

2002–2004:

$\frac{\text{change in attendance}}{\text{change in time}} = \frac{325 - 324}{2004 - 2002}$ — Substitute.

$= \frac{1}{2}$ or 0.5 — Simplify.

Over this 2-year period, attendance increased by 1 million, for a rate of change of 0.5 million per year.

b. **Explain the meaning of the rate of change in each case.**

For 2000–2002, on average, 3.5 million more people went to a theme park each year than the last.

For 2002–2004, on average, 0.5 million more people attended theme parks each year than the last.

c. **How are the different rates of change shown on the graph?**

There is a greater vertical change for 2000–2002 than for 2002–2004. Therefore, the section of the graph for 2000–2002 is steeper.

HW: WB pp. 104-105 #s 1, 3, 4, 5, 7, 9, 12, 17 - 20.