Slope

Sep 27-10:48 AM

What is Slope?

Slope is a measure of the steepness of a line

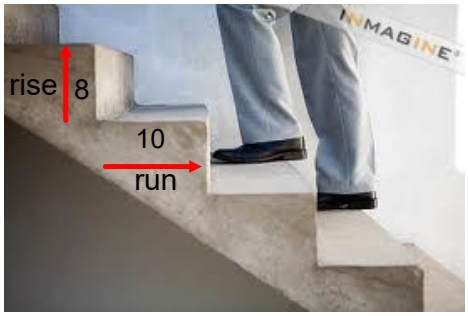
Slope is the ratio of the rise to the run of a line or line segment

$$\text{Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{\text{Vertical}}{\text{Horizontal}} = \frac{\updownarrow}{\leftrightarrow} = \frac{Y_2 - Y_1}{X_2 - X_1}$$

Sep 27-10:53 AM

Calculating Slope

Aiden is a carpenter's apprentice. He needs to check that the handrail is installed at the same slope as the stairs. What should the slope of the handrail be?



Slope = rise/run

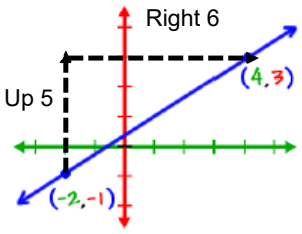
= 8/10

= 4/5

Sep 27-10:57 AM

Let's look at the line going through the points

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



The simplest way to look at the slope is

$$\frac{\text{rise}}{\text{run}} = \frac{5}{6}$$

(rise over run)

7

Apr 23-4:28 PM

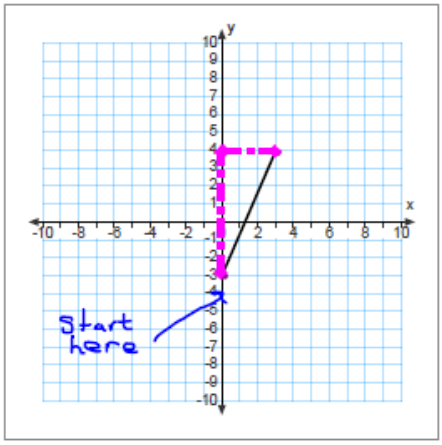
Day 1 - What is slope.notebook April 05, 2020

Graph the line that passes through the points

(0,-3) and (5,4)

Then, use the graph to find the slope.

$\frac{\text{rise}}{\text{run}} = \frac{7}{5}$



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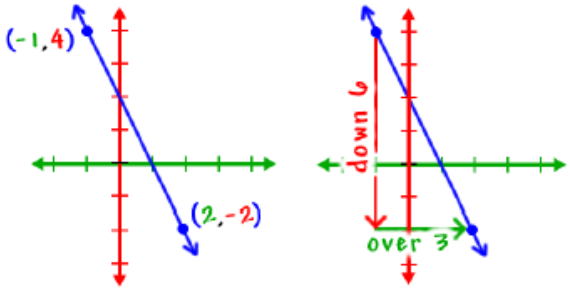
Check it out:

Let's find the slope of this line:



$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{-6}{3} = -2$$

Negative -- and the line is going downhill

Using ratios and proportions

Suppose the slope of a line is 3:4 and the run is 12. What does the rise have to be?

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

$$\text{Slope} = \frac{3}{4} = \frac{x}{12}$$

$$3 \times 12 = 4x$$

$$\frac{36}{4} = \frac{4x}{4}$$

$$9 = x$$

Sep 27-11:00 AM

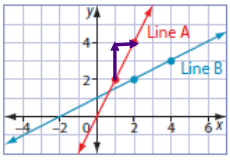
Exercises for practice
Pages 266-267 questions 1-9
Pages 270-271 questions 1-8

Sep 27-10:59 AM

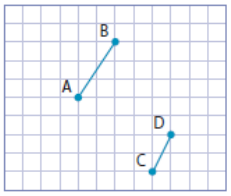
Try It

1. What are the rise and run of each line?

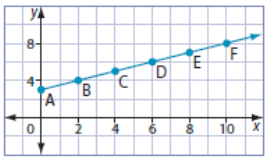
Answer Line A: rise= 2 run=1



2. Determine the slope of each line segment.



3. Examine the graph.



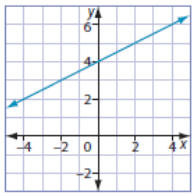
a) What is the slope of line segment DE?

b) Can you predict the slope of line segment EF? Explain.

c) Can you predict the slope of line segment AF? Explain.

d) State another line segment with the same slope as AF.

4. Determine the slope of the line shown.

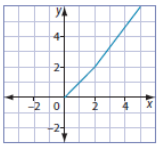


5. Suppose the slope of a line is 2:3 and the run is 6 cm. What is the rise of the line?

Apr 23-5:18 PM

Apply It

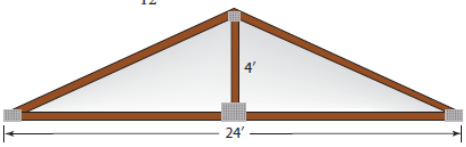
6. Does the graph show a straight line? Justify your answer using slope.



F.Y.I.

The pitch of a roof is the same as the slope of the roof. Pitch is usually expressed as a fraction, out of 12.

7. Betty says the pitch, or slope, of the roof shown is $\frac{2}{12}$. Carolyn insists the slope is $\frac{4}{12}$. Who is correct? How do you know?



F.Y.I.

"Piano" is a shortened form of *pianoforte*, the Italian word for the instrument. *Pianoforte* was used because the sound can be loud and soft. *Piano* means soft and *forte* means loud.

8. Cole bought a piano. The delivery truck has a ramp so the piano can be easily taken off the truck. The distance from the top of the ramp to the ground is 3 ft. The ramp reaches 12 ft on the ground from the back of the truck. What is the slope of the ramp?

9. Kara and Amy are planning a ski trip to Skier's Paradise. They check the website and see the following table.

Ski Run	Horizontal Distance	Vertical Distance
Skier's Surprise	1576 m	519 m
Rigorous Run	419 m	220 m
Magic Mountain	231 m	95 m
Bunny Slope Express	87 m	28 m

a) Calculate the slope of each run. Express each answer as a decimal to the nearest hundredth.

b) Kara is an avid skier. Which run should she choose? Why?

c) Amy has only skied once before and is a little nervous about skiing. Which run should she choose? Why?

Remember to divide the roof width by 2

**Remember Vertical is the rise and Horizontal is the run

Apr 23-5:24 PM

Check Your Understanding

Try It

1. Solve each proportion.

a) $\frac{1}{12} = \frac{x}{372}$ **b)** $\frac{1}{8} = \frac{28}{x}$

c) $\frac{x}{25} = \frac{2}{5}$ **d)** $\frac{75}{6} = \frac{x}{8}$

2. Copy and complete the table.

	Rise	Run	Slope
a)	60 m	10 m	
b)	15 in.	50 in.	
c)	75 cm	100 cm	
d)	1 inch	1 foot *convert to inches	
e)	4 inches	$2\frac{1}{2}$ feet *convert to inches	
f)	3 m	400 cm	
g)	50 cm	2 m *convert to cm	

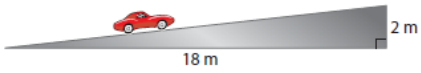
*convert to cm

Remember the units must be the same before you can create the slope.

100 cm = 1 m

12 inches = 1 foot

3. Determine the slope of the ramp shown.



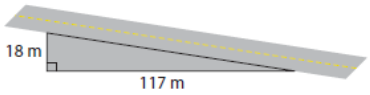
4. A ramp rises 1 ft for every 3 ft horizontally.

a) What is the slope of the ramp?

b) If the top of the ramp is 4 ft high, what is the distance along the floor?

Apply It

5. A road rises 18 m for every 117 m of horizontal distance. Determine the slope of the road.



a) Express the slope as a fraction.

b) Express the slope as a decimal. *create a decimal by dividing

c) Express the slope as a percent. *create a percent by multiplying the decimal by 100

6. Robert built some stairs so his puppy could get up on the bed by herself. The stairs have a height of 18″ and a horizontal length of 22″.

a) What is the slope of the stairs?

b) What is the slope of each step? Explain.

*Remember slope and stairs must have the same slope.

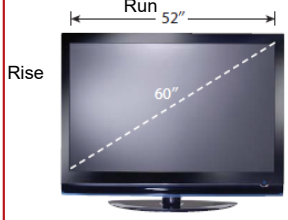
Always reduce your fractions.

7. Jordan assembles two ramps for his younger brother's toy cars.

- The blue ramp is 30 cm high and has a horizontal length of 48 cm.
- The yellow ramp is 12 cm high and has a horizontal length of 14 cm.

Which ramp has the greater slope?

8. A 60-inch TV measures 52 inches wide. What is the slope of the diagonal? **Hint:** You will need to use the Pythagorean relationship.



Remember $c^2 - a^2 = b^2$

9. Suppose a drainage pipe drops 6 in. from one end of the pipe to the other.

a) What is the rise of the pipe?

b) Determine the run of the pipe. Recall that a drainage pipe needs to drop $\frac{1}{4}$ inch per 1-foot length along the horizontal.

c) Drainage pipe is usually sold in lengths of 100′. How many pieces of pipe were needed for this job?

Apr 23-6:04 PM

Chapter 6

Get Ready, pages 260 to 261

1. a) $\frac{1}{3}$ b) $\frac{1}{2}$ c) 0 d) $\frac{1}{4}$
2. a) $x = 50$ b) $x = 5$ c) $x = 12$ d) $x = 20$
3. a) 4 b) 18 c) 25 d) 5
4. a) 12 in. b) 72 in. c) 53 in. d) 30 in.
5. a) 100 cm b) 400 cm c) 810 cm d) 50 cm
6. a) 24% b) 4% c) 125% d) 10%
7. a) 0.65 b) 0.44 c) 0.2 d) 0.01
8. a) 61% b) 4% c) 125% d) 130% e) 56% f) 12%
9. a) $\tan A = \frac{5}{7}$ b) $\tan A = \frac{8}{5}$ c) $\tan A = \frac{12}{7}$
10. a) 0.29 b) 3.08 c) 11.43
11. a) 32° b) 14° c) 54° d) 70°
12. a) 14° b) 18° c) 21°
13. a) 16 in. b) 18 cm c) 20 cm d) 7 in.

6.1 What is Slope?, pages 262 to 273

On the Job 1 Check Your Understanding, pages 266 to 267

1. line A: rise = 2, run = 1; line B: rise = 1, run = 2
2. AB: $\frac{3}{2}$; CD: 2
3. a) $\frac{1}{2}$
   b) Example: Yes. The rise and run are the same for EF as they are for DE.
   c) Example: Yes. The ratio of rise to run is the same for line segments DE and AF.
   d) Examples: AB, BC, BF, CE
4. $\frac{1}{2}$
5. 4 cm
6. No, the line is not straight. The slope from (0, 0) to (2, 2) is 1, but the slope from (2, 2) to (5, 6) is 4:3.
7. Carolyn is correct; the rise of the roof is 4′, and the run on each side of the roof is 12′.
8. $\frac{1}{4}$
9. a) Skier's Surprise: 0.33; Rigorous Run: 0.53; Magic Mountain: 0.41; Bunny Slope Express: 0.32
   b) Example: Kara might prefer Rigorous Run because it has the greatest slope.
   c) Example: Amy might prefer the Bunny Slope Express because it has the least slope, and because it is the shortest run.

On the Job 2 Check Your Understanding, pages 270 to 271

1. a) $x = 31$ b) $x = 224$ c) $x = 10$ d) $x = 100$
2.

	Rise	Run	Slope
a)	60 m	10 m	6
b)	15 in.	50 in.	$\frac{3}{10}$
c)	75 cm	100 cm	$\frac{3}{4}$
d)	1 inch	1 foot	$\frac{1}{12}$
e)	4 inches	$2\frac{1}{2}$ feet	$\frac{2}{15}$
f)	3 m	400 cm	$\frac{3}{4}$
g)	50 cm	2 m	$\frac{1}{4}$

3. $\frac{1}{9}$
4. a) $\frac{1}{3}$ b) 12 ft
5. a) $\frac{12}{13}$ b) about 0.1538 c) about 15%
6. a) $\frac{9}{11}$
   b) $\frac{9}{11}$; The slope is constant, so the slope of each step is the same as the slope of the entire staircase.
7. The yellow ramp has the greater slope.
8. about 0.576
9. a) 6 in. b) 24 ft c) 1