

Unit 5 Linear Functions

Lesson #1:

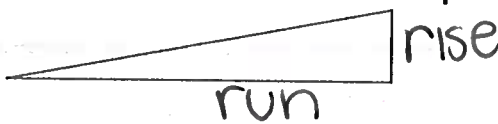
Slope Formula

The slope is a measure of a line's

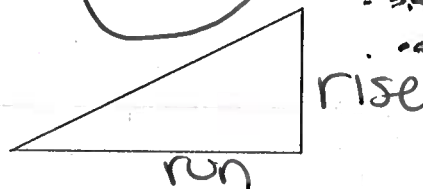
steepness

Look at the two ramps below. Which one do you think has a greater slope?

Ramp A



Ramp B



Slope is defined as the "rise" (how much you go up) divided by the "run" (how much you travel across).

Use a ruler to measure the rise and run of the ramps above, and see if your prediction was correct.

run 5.1 rise 1 $\frac{1}{5.1} \approx 0.2019 \approx 0.49$

Now, what happens when the ramp is going the other way?



In this ramp, we can see if you go from left to right, the ramp goes down. Therefore, The slope is said to be negative

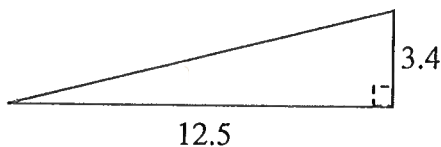


Ex 1: Find the slopes for the following:

a. $\frac{\text{rise}}{\text{run}}$

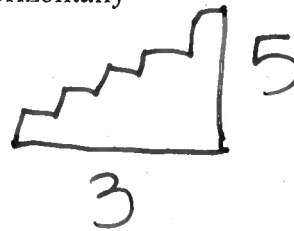
$$\frac{8}{4} = 2$$

b.



$$\frac{3.4}{12.5}$$

c. Stairs climb 5 m for 3 m horizontally



$$\frac{5}{3}$$

d. A road that drops 100 m for every km traveled horizontally

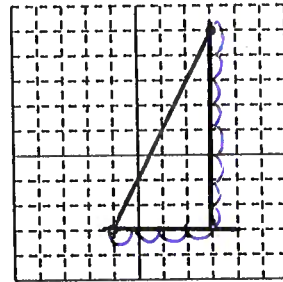
$$\frac{-100}{1000} = -\frac{1}{10}$$

Now, to do this on a grid, we just have to figure out how to find the rise and run using x_1 and y_1 .

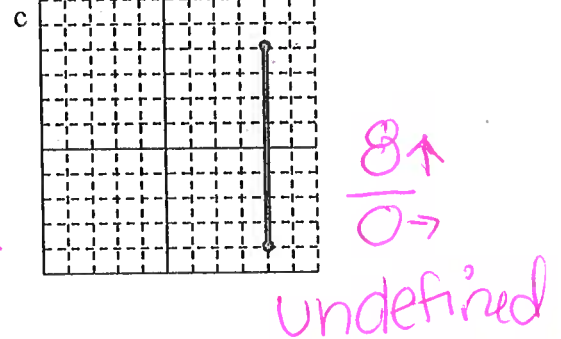
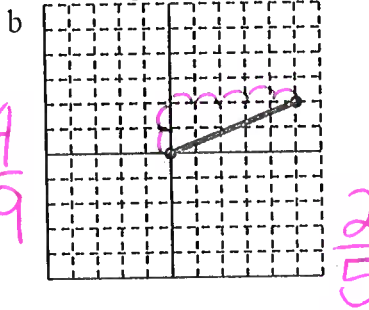
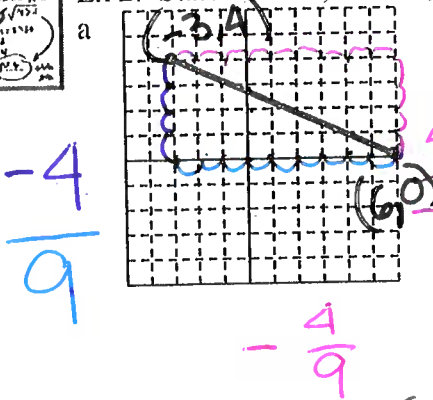
Draw the "slope triangle" and find the rise and run

Find the slope of the segment

8 rise ↑
4 run → 2



Ex 2: State the rise, the run, and the slope for the following:



So, to find the rise, just subtract to two y terms

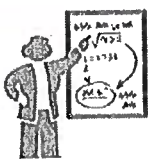
And, to find the run, just subtract the two x terms

Therefore the formula for slope is:

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{or} \quad m = \frac{\text{rise}}{\text{run}}$$

Slope = m

So, find the slope of the following:



Ex 3: x_1, y_1, x_2, y_2
a. W(-4,5) N(4,11)

$$\frac{11 - 5}{4 - (-4)} = \frac{6}{8} = \frac{3}{4}$$

b. P(3,2) O(-5,10)

$$\frac{10 - 2}{-5 - 3} = \frac{8}{-8}$$

$m = -1$

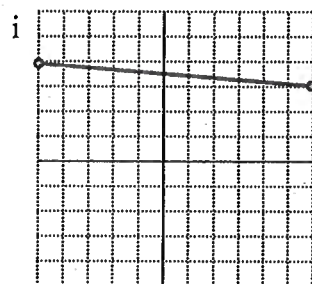
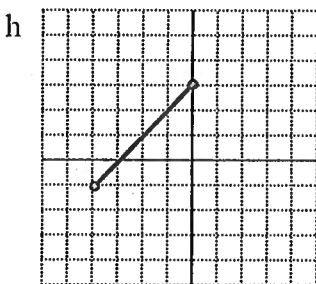
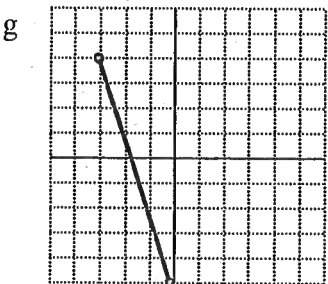
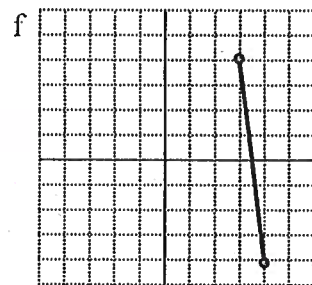
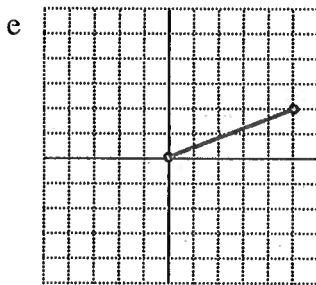
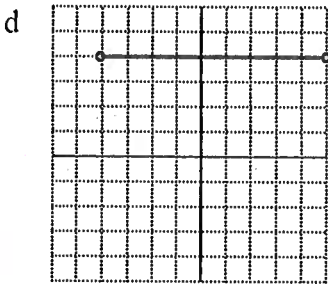
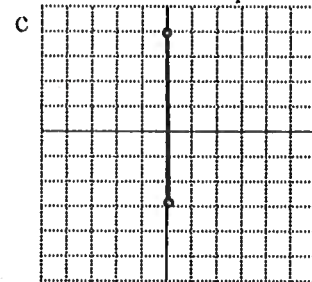
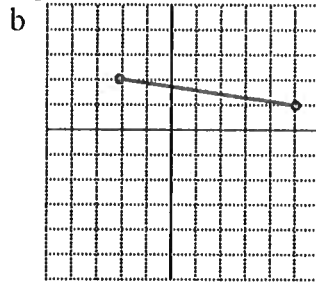
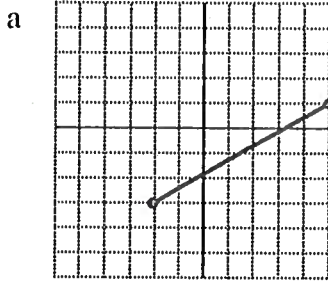
c. Q(1,3) R(1,-2)

$$\frac{-2 - 3}{1 - 1} = \frac{-5}{0}$$

undefined!

Assignment:

1. For each of the following, state the rise, the run, then calculate the slope:



2. Show a line with each of the following slopes:

a. a positive slope



b. A negative slope



c. A zero slope



d. An undefined slope



3. Find the slopes of the following:

a. A(-2,7) B(6,-4)

b. C(3,-5) D(8,10)

c. (E(1,6) F(5,-4)

d. G(-3,7) H(-3,-7)

e. J(-4,-3) K(8,5)

f. L(2,-7) M(7,-7)

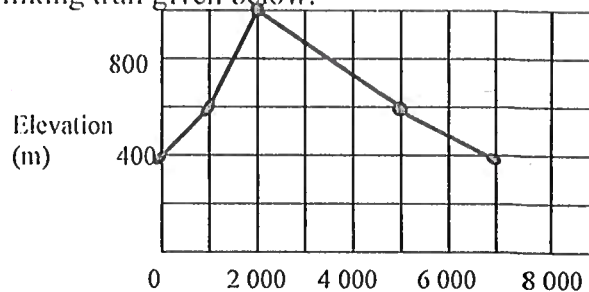
g. N(-6,-1) O(-2,-5)

4. Find the slope of the following:

a. A roof that rises 3m for every 6 m across

b. A road that drops 1 km for every 15 km traveled horizontally

5. Find the slope of each section of the hiking trail given below:



Answer Key:

1. Rise will be given first, then run, then slope to 2 decimal places:

1a) 4, 7, 0.57

1b) -1, 7, 0.14

1c) 7, 0, undefined

1d) 0, 9, 0

1e) 2, 5, 0.4

1f) -1, 8, -8

1g) -9, 3, -3

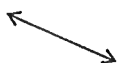
1h) 4, 4, 1

1i) -1, 11, -0.09

2a)



2b)



2c)



2d)



3a) -1.375

3b) 3

3c) -2.5

3d) undefined

3e) 0.6'

3f) 0

3g) -1

3h) 0.3

3i) 18.3'

4a) 0.5

4b) -0.06'

4c) 4

5) 0.2, 0.4, -0.13', -0.1

6) 1, 0.57, 4.5

7) B

