

Chapter 6: Linear Functions

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1



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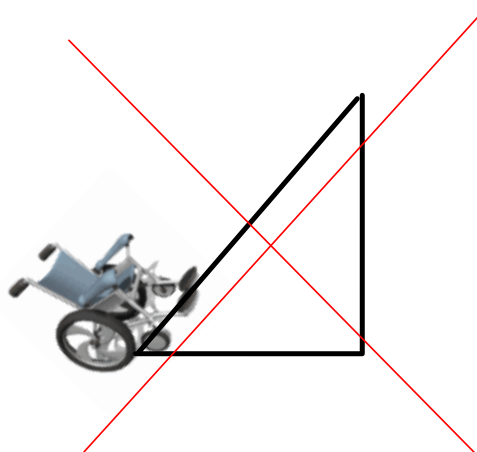
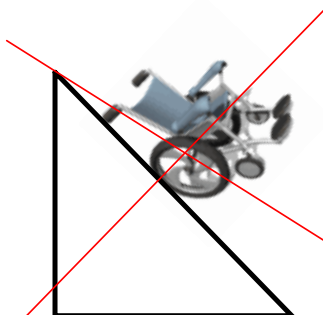


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7

A wheelchair ramp should not exceed a slope of 0.125.

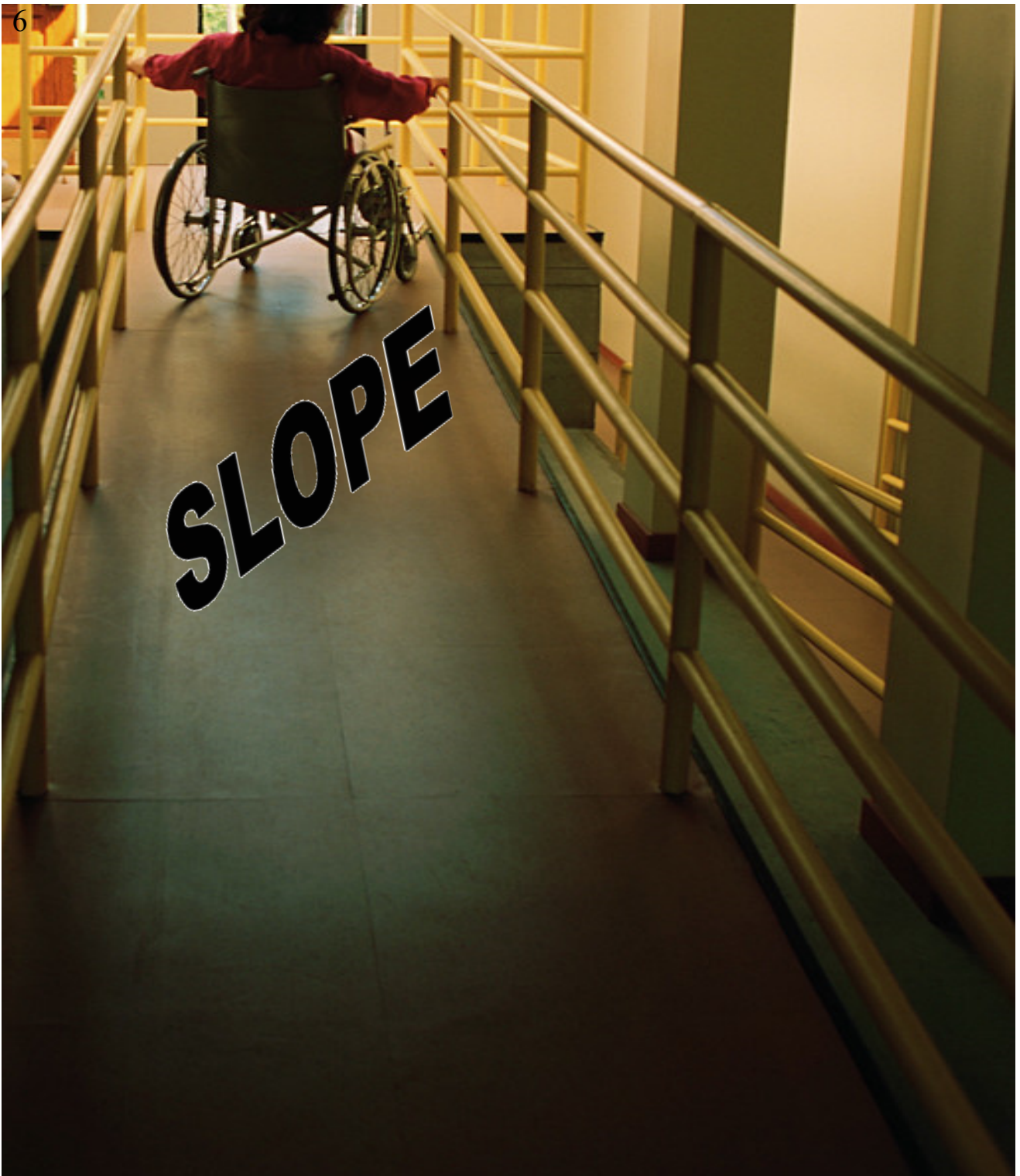


8



Building stairs
should
not exceed
a slope of
0.83

6



10

When you see a graph

Calculating slope!

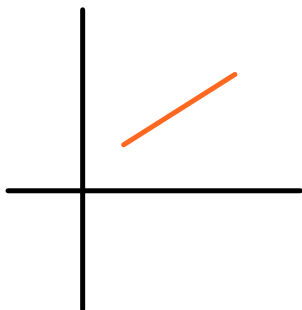
Same as rate of change



$$\text{slope} = \frac{\text{rise}}{\text{run}} \quad \begin{array}{l} \uparrow \\ \rightarrow \end{array}$$

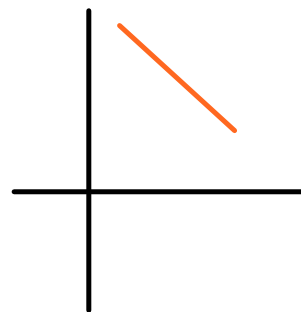
$$\frac{\Delta y}{\Delta x}$$

Positive slopes



when read left to right,
it looks like going up hill

negative slopes



when read left to right,
it looks like going down hill



Some roofs are steeper than others. Steeper roofs are more expensive to shingle.
 The steepness of a roof is measured by calculating its **slope**.

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

The **rise** is the vertical distance from the bottom of the edge of the roof to the top.
 The **run** is the corresponding horizontal distance.
 For each roof, we count units to determine the rise and the run.

Roof A

Right 13 $m = \frac{+13}{+13} = 1$

UP 13 run rise down

Left 13 $m = \frac{-13}{-13} = 1$

For Roof A
 Slope = $\frac{\text{rise}}{\text{run}}$
 Slope = ?

Slope-intercept equation

Study

$$y = mx + b$$

↑ slope ↑ y-intercept

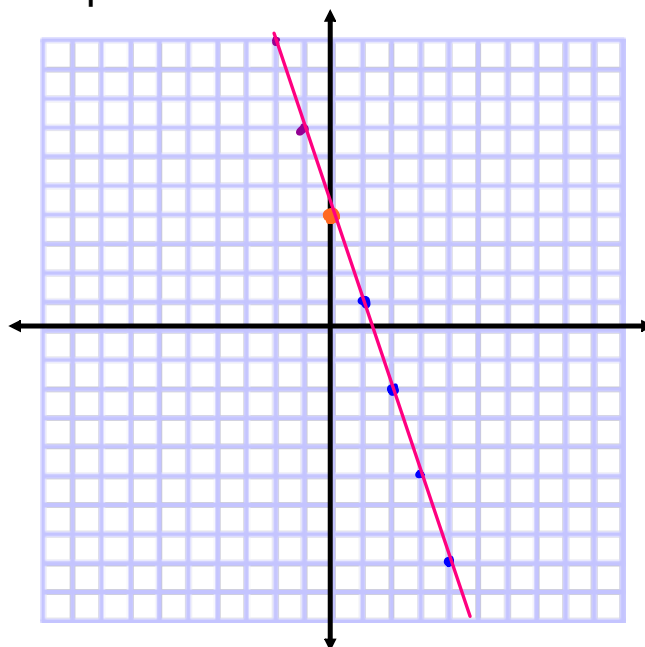
Ex) $y = -3x + 4$

$$m = \frac{-3}{1} \text{ rise over run or } \frac{+3}{-1}$$

y-intercept = $+4$
 $(0, 4)$
 plot the y intercept first

Use rise /run to get new points

Sketch using these two pieces of information





The slope of a line segment on a coordinate grid is the measure of its rate of change.
From Chapter 5, recall that:

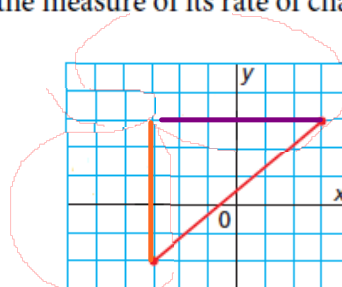
$$\text{Rate of change} = \frac{\text{change in dependent variable}}{\text{change in independent variable}}$$

$$\text{Rate of change} = \frac{\text{change in } y}{\text{change in } x}$$

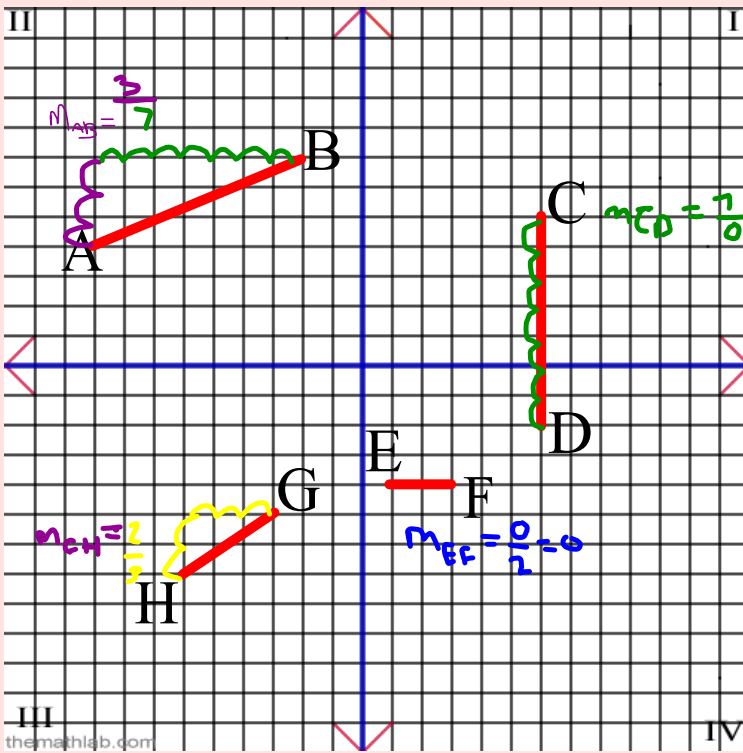
The change in y is ?

The change in x is ?

$$\text{So, slope} = \frac{\text{rise}}{\text{run}} = \frac{+5}{+6} = \frac{5}{6}$$



11



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



This is used when you can see the graph!

When you are given two points

Calculating slope!

(x_1, y_1) (x_2, y_2)

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

Find the slope of a line passing through points (2,-3) and (-5,8).

x_1 y_1 x_2 y_2

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

tidy signs This is used when you are given co-ordinates.

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

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

$$m = \frac{11}{-7}$$

YOU TRY

Find the slope of a line passing through the points (7,5) and (8,-2).

x_1 y_1 x_2 y_2

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

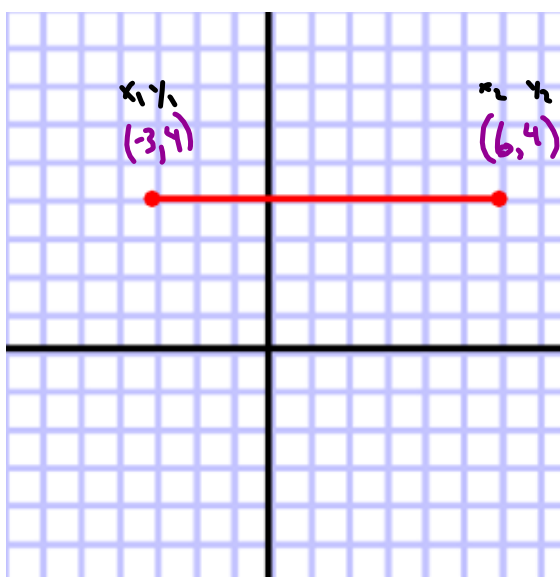
$$= \frac{-2 - 5}{8 - 7}$$

$$m = \frac{-7}{1}$$

$$m = -7$$

Horizontal Line

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

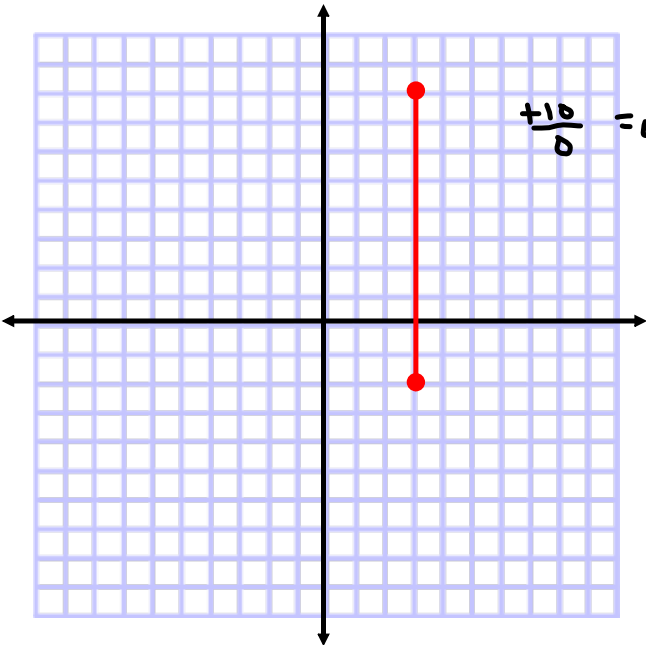


Pick two points

$$\begin{aligned}
 m &= \frac{y_2 - y_1}{x_2 - x_1} \\
 &= \frac{4 - 4}{6 - (-3)} \\
 &= \frac{4 - 4}{6 + 3} \\
 &= \frac{0}{9} = 0
 \end{aligned}$$

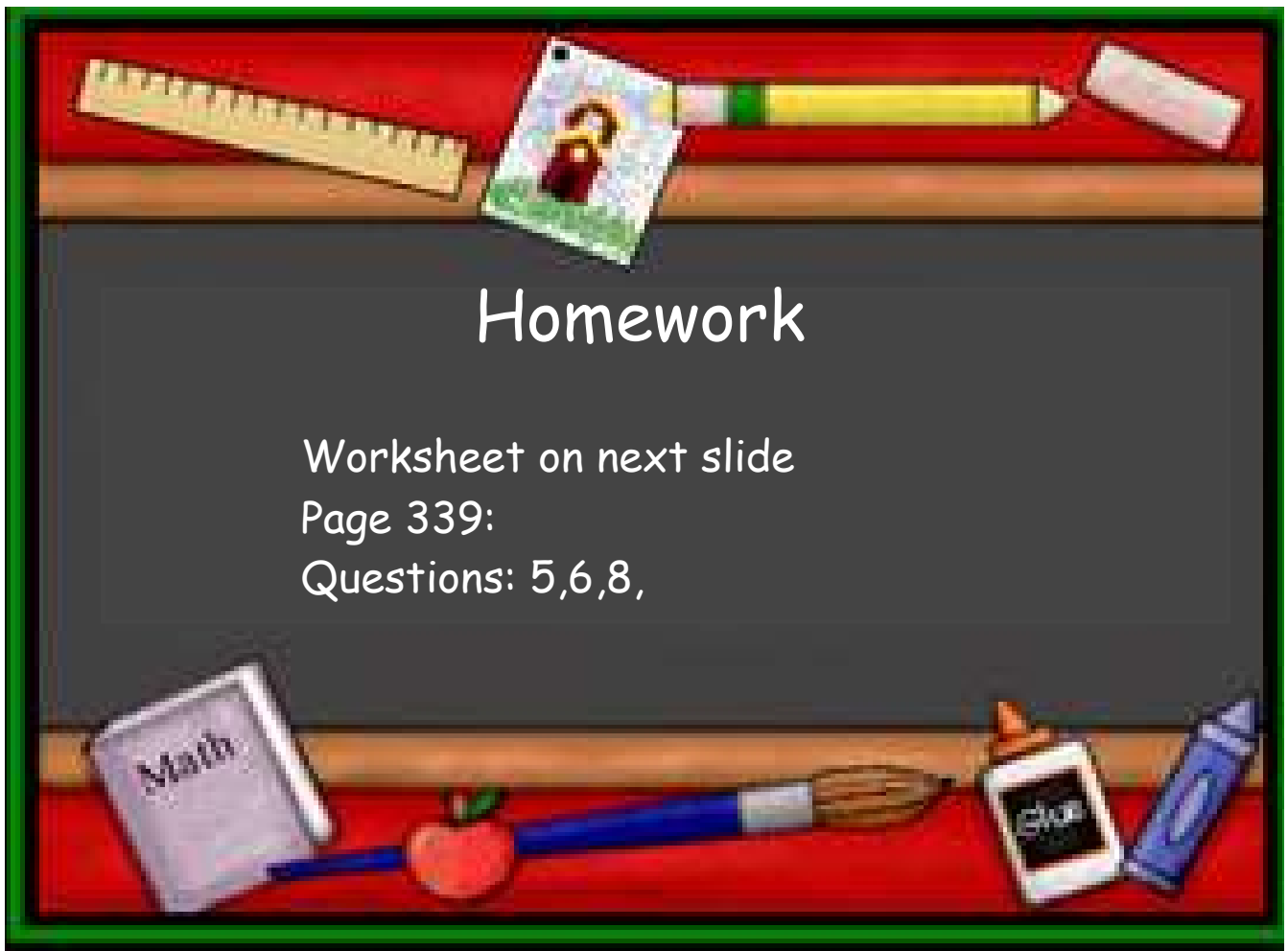
Vertical

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



$\frac{+10}{0} = \text{undefined}$

Line



Calculate the slope.

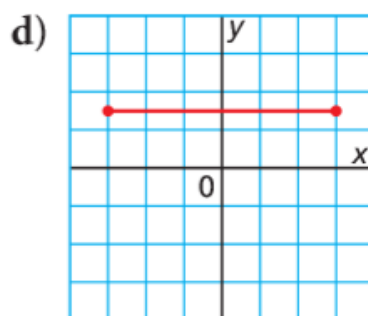
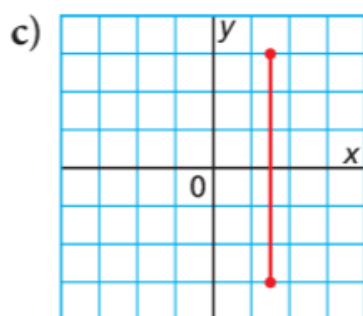
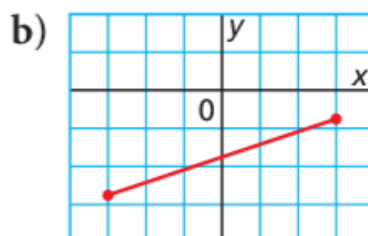
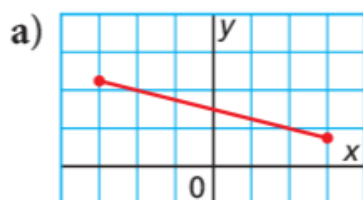
1. (3,5) (2,8)

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

2. (-9,-2) (7,3)

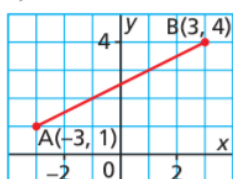
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

5. For each line segment, is its slope positive, negative, zero, or not defined?

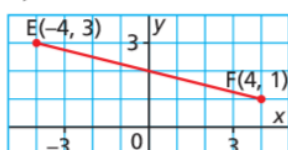


6. For each line segment, determine its rise, run, and slope.

a)

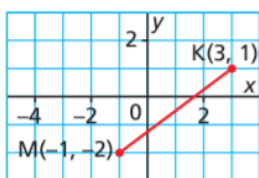


b)

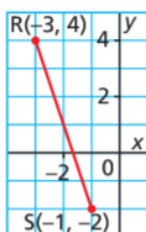


$$m = \frac{\text{rise}}{\text{run}}$$

c)



d)



8. Sketch a line whose slope is:

a) positive

b) zero

c) negative

d) not defined



Examples are in your notes

Solutions Calculate the slope.

1. (3,5) (2,8)

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

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

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

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

2. (-9,-2) (7,3)

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

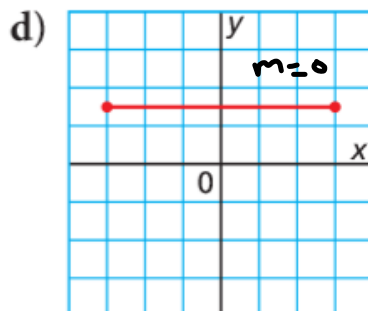
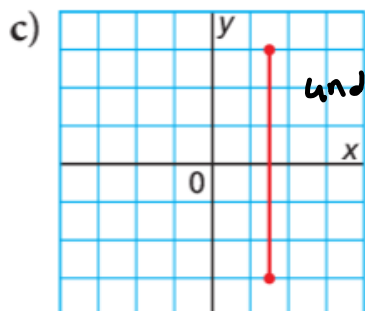
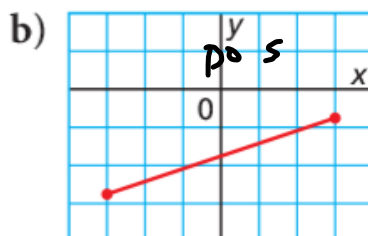
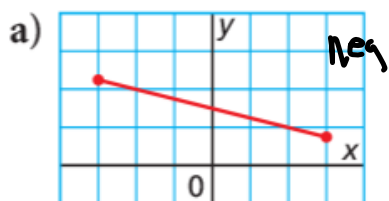
$$m = \frac{3 - (-2)}{7 - (-9)}$$

$$m = \frac{3 + 2}{7 + 9}$$

$$m = \frac{5}{16}$$

Solutions

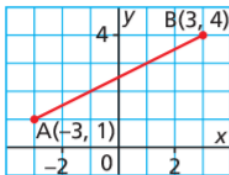
5. For each line segment, is its slope positive, negative, zero, or not defined?



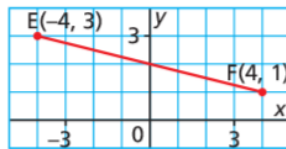
Solutions

6. For each line segment, determine its rise, run, and slope. $m = \frac{2}{5}$

a)

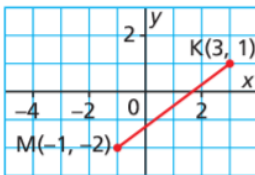


b)

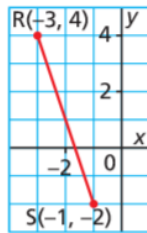


c)

$$m = \frac{3}{4}$$



d)



$$m = \frac{-6}{2} = -3$$

Solutions

8. Sketch a line whose slope is:

a) positive



b) zero



c) negative



d) not defined



