Slope-Intercept: $y = mx + b$ (m: rate of change: slope; b: y-Intercept (starting point))

Lesson 22: Constant Rates Revisited

Classwork

Exercises

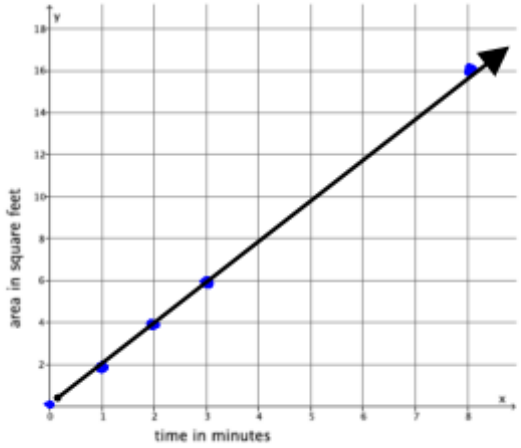
Rate of Change

1. Peter paints a wall at a constant rate of 2 square feet per minute. Assume he paints an area y, in square feet, after x minutes.

   a. Express this situation as a linear equation in two variables.

   $y = 2x$

   b. Sketch the graph of the linear equation.



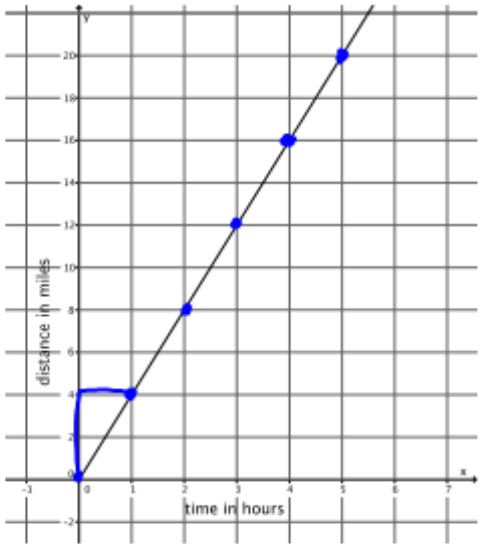
   c. Using the graph or the equation, determine the total area he paints after 8 minutes, $1\frac{1}{2}$ hours, and 2 hours. Note that the units are in minutes and hours.

After 8 min., Peter paints 16 square feet.
After 1½ hrs., Peter paints 180 square feet
After 2 hrs., Peter paints 240 square feet.

2. The figure below represents Nathan's constant rate of walking.

Nathan's Rate: $\frac{\Delta y}{\Delta x} = \frac{4}{1}$

$y = 4x$



a. Nicole just finished a 5 mile walkathon. It took her 1.4 hours. Assume she walks at a constant rate. Let y represent the distance Nicole walks in x hours. Describe Nicole's walking at a constant rate as a linear equation in two variables.

Nicole's Rate: $\frac{\Delta y \text{ (miles)}}{\Delta x \text{ (hours)}} = \frac{5 \text{ miles}}{1.4 \text{ hrs}}$

$= 3.57$

$y = 3.57x$

b. Who walks at a greater speed? Explain.

Nathan walks at a greater speed, because he walks with a greater rate of change.

3.

a. Susan can type 4 pages of text in 10 minutes. Assuming she types at a constant rate, write the linear equation that represents the situation.

Rate: $\frac{\Delta y}{\Delta x}$ $\frac{(\text{pages})}{(\text{min.})}$: $\frac{4 \text{ pages}}{10 \text{ min.}} = 0.4$

$y = 0.4x$

b. The table of values below represents the number of pages that Anne can type, y, in a few selected x minutes. Assume she types at a constant rate.

Minutes (x)	Pages Typed (y)
3	2
5	$\frac{10}{3}$
8	$\frac{16}{3}$
10	$\frac{20}{3}$

$\frac{\Delta y}{\Delta x} = \frac{2}{3} = 0.\overline{6}$

3 → 8 (+5), $\frac{6}{3} \cdot 2$

$y = 0.7x$

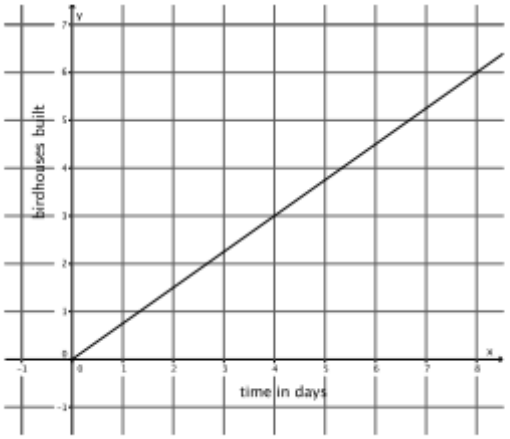
Who types faster? Explain.

Anne types faster because she has a greater rate of change.

4.

a. Phil can build 3 birdhouses in 5 days. Assuming he builds birdhouses at a constant rate, write the linear equation that represents the situation.

b. The figure represents Karl's constant rate of building the same kind of birdhouses. Who builds birdhouses faster? Explain.



5. Explain your general strategy for comparing proportional relationships.

Lesson Summary

Problems involving constant rate can be expressed as linear equations in two variables.

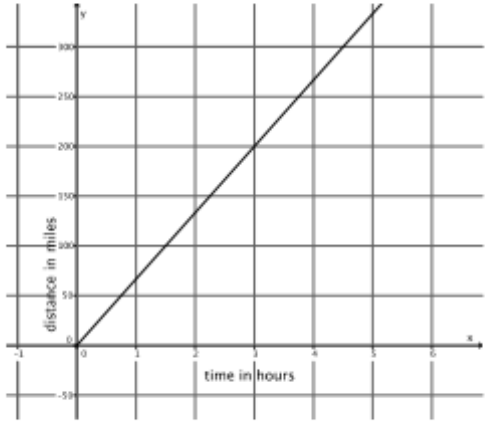
When given information about two proportional relationships, determine which is less or greater by comparing their slopes (rates of change).

Problem Set

1.

a. Train A can travel a distance of 500 miles in 8 hours. Assuming the train travels at a constant rate, write the linear equation that represents the situation.

b. The figure represents the constant rate of travel for Train B.



Which train is faster? Explain.

2.

a. Natalie can paint 40 square feet in 9 minutes. Assuming she paints at a constant rate, write the linear equation that represents the situation.

b. The table of values below represents the area painted by Steven for a few selected time intervals. Assume Steven is painting at a constant rate.

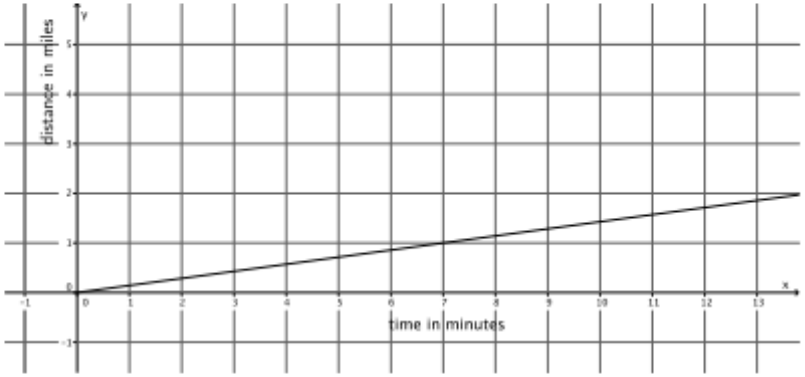
Minutes (x)	Area Painted (y)
3	10
5	$\frac{50}{3}$
6	20
8	$\frac{80}{3}$

Who paints faster? Explain.

3.

a. Bianca can run 5 miles in 41 minutes. Assuming she runs at a constant rate, write the linear equation that represents the situation.

b. The figure below represents Cynthia's constant rate of running.



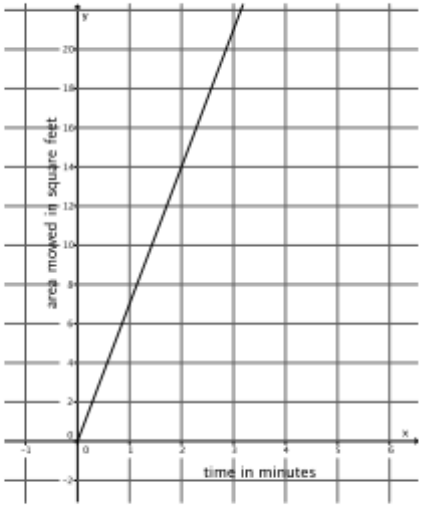
Who runs faster? Explain.

4.

a. Geoff can mow an entire lawn of 450 square feet in 30 minutes. Assuming he mows at a constant rate, write the linear equation that represents the situation.

b. The figure represents Mark's constant rate of mowing a lawn.

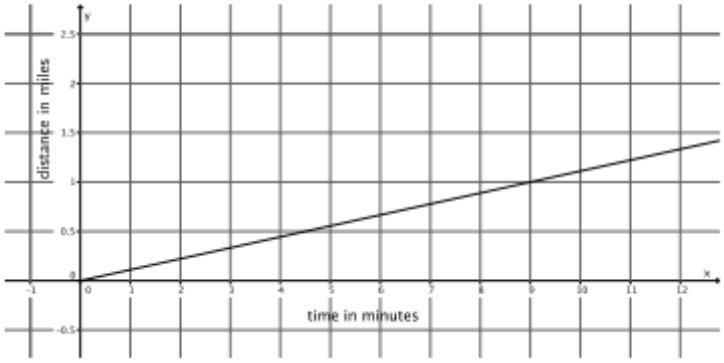
Who mows faster? Explain.



5.

a. Juan can walk to school, a distance of 0.75 miles, in 8 minutes. Assuming he walks at a constant rate, write the linear equation that represents the situation.

b. The figure below represents Lena's constant rate of walking.



Who walks faster? Explain.