Unit Linear Functions

Day 1
Linear Equations: $y = mx$

I can . . .

. . . identify the proportional rates when given a graph or equation.
. . . compare proportional rates.

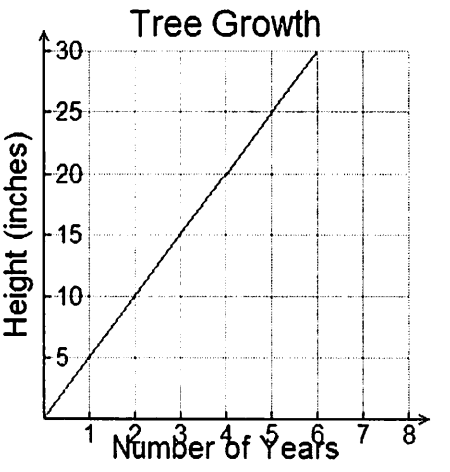
$$y = mx$$

Recall that the graph of a proportional relationship is a line that passes through the origin, (0, 0). An equation that models a proportional relationship can be written in the form $y = mx$. The equation $y = mx$ shows y is always a constant multiple m of x.

An equation is the form $y = mx$ is an example of a linear equation. An equation is a linear equation if the graph of all of its solutions is a line.

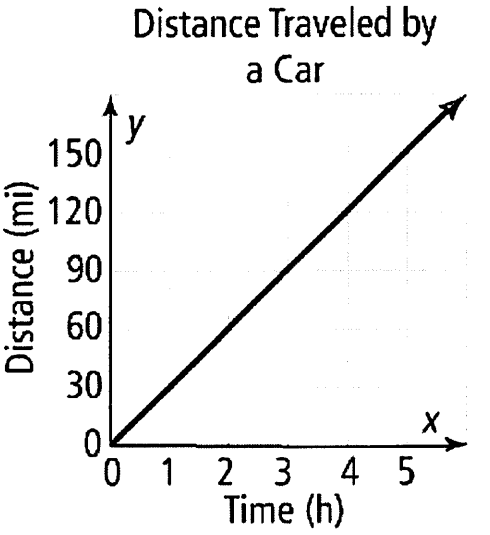
A tree grows 5 inches each year. $y = 5x$

Time (Years)	Height (inches)
0	0
1	5
2	10
3	15
4	20
5	25
6	30



EXAMPLE

The graph shows the distance y a car travels in time x at a constant speed.



a. What is the constant speed of the car?

b. How far will the car travel in 2 h?

c. How long will it take the car to travel 120 mile?

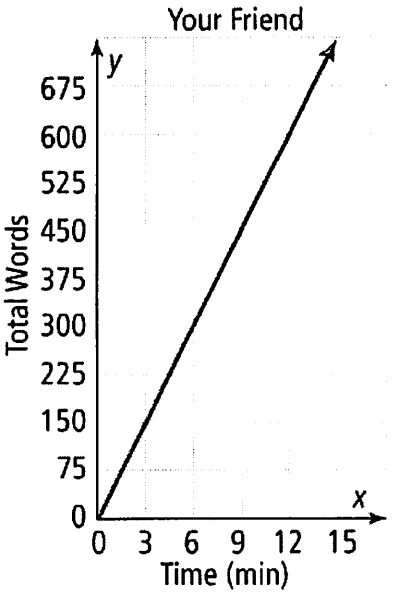
d. Write an equation to model the situation shown.

e. How far will the car travel in 6.5 hours?

f. On the return trip the car drove 120 miles in 5 hours. What is the constant speed of the car?

Comparing RATES

The number of words y you can type in x minutes can be represented by the equation $y = 55x$. The number of words your friend can type in x minutes is modeled by the graph. Which of you can type faster?



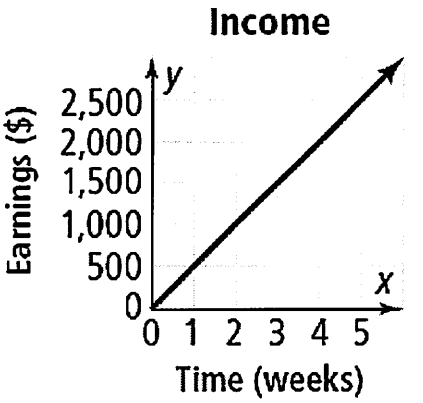
Mr. Ditz says he can type faster than you AND your friend. Mr. Ditz can type 180 words in 4 minutes. Is Mr. Ditz correct?

I THINK I GOT IT?

1. The graph shows the earnings y of an airplane mechanic for a number of weeks x.

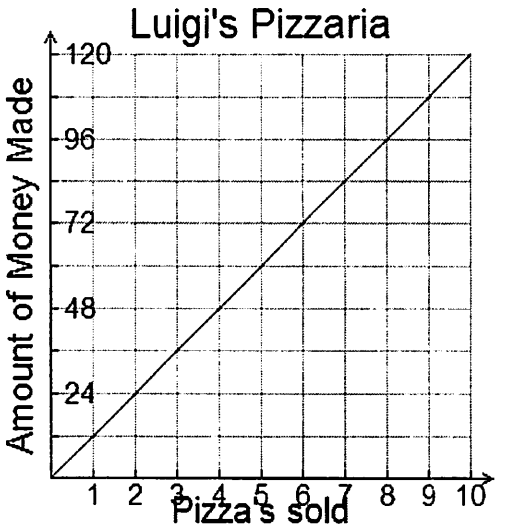
   a. What is the rate of earnings per week?

   b. Write an equation to model the situation shown.



I GOT IT!

2. The amount of money, y, pizzeria Mama Mia makes by selling x pizzas can be modeled by the equation $y = 15x$. The relationship of the amount of money pizzeria Luigi's makes is shown in the following graph. Which pizzeria makes more money per pizza? Explain.



ANSWERS: 1) a. $\frac{\Delta y}{\Delta x} = \frac{\$500}{1 \text{ week}}$ b. $y = 500x$ 2) Mama Mia makes \$15 per pizza. Luigi's makes \$12 per pizza. Mama Mia makes more money per pizza.

Unit Linear Functions

Day 1
Linear Equations: $y = mx$

I can . . .

. . . identify the proportional rates when given a graph or equation.
. . . compare proportional rates.

constant of proportionality

rate of change
slope

$y = mx$

$\frac{\text{change } y}{\text{change } x}$

Recall that the graph of a proportional relationship is a line that passes through the origin, (0, 0). An equation that models a proportional relationship can be written in the form $y = mx$. The equation $y = mx$ shows y is always a constant multiple m of x.

An equation is the form $y = mx$ is an example of a linear equation. An equation is a linear equation if the graph of all of its solutions is a line.

A tree grows 5 inches each year.

$y = 5x$

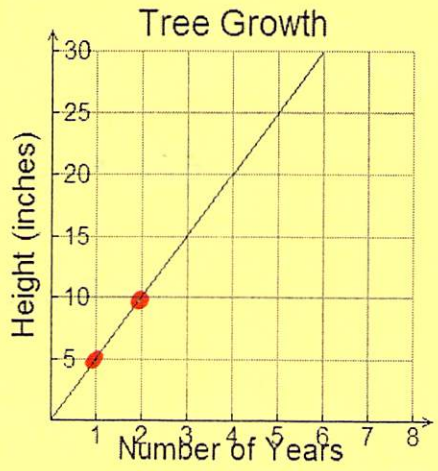
$\frac{\text{change } y}{\text{change } x} = \frac{5}{1}$

Time (Years)	Height (inches)
0	0
1	5
2	10
3	15
4	20
5	25
6	30

+1 +1 +1 +1 +1 +1

+5 +5 +5 +5 +5 +5

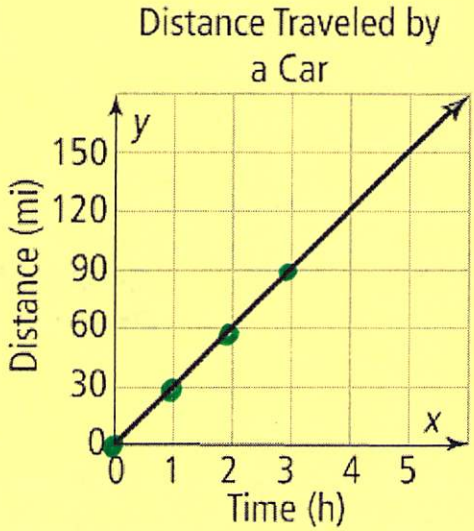
$\frac{\text{change } y}{\text{change } x} = \frac{5}{1}$



$\frac{\text{change } y}{\text{change } x} = \frac{5}{1}$

EXAMPLE

The graph shows the distance y a car travels in time x at a constant speed.



a. What is the constant speed of the car?

miles per hour

$\frac{\Delta y}{\Delta x}$ $\frac{30 \text{ miles}}{1 \text{ hour}}$ = 30 mph

b. How far will the car travel in 2 h?

60 miles

c. How long will it take the car to travel 120 miles?

4 hours

d. Write an equation to model the situation shown.

$30 \cdot x = y$

x → time (hours)
y → distance

e. How far will the car travel in 6.5 hours?

$30 \cdot 6.5 = y$

195 miles = y

$30 \cdot x = 200$

f. On the return trip the car drove 120 miles in 5 hours. What is the constant speed of the car?

miles per hour

$\frac{120 \text{ miles}}{5 \text{ hours}} = \frac{24 \text{ miles}}{1 \text{ hour}} = 24$ mph

÷5 ÷5

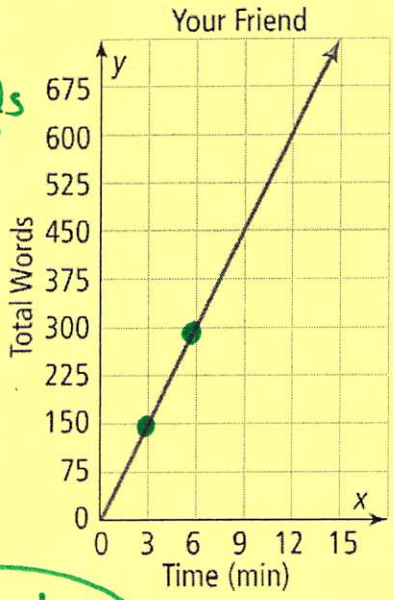
Comparing RATES

The number of words y you can type in x minutes can be represented by the equation $y = 55x$. The number of words your friend can type in x minutes is modeled by the graph. Which of you can type faster?

$y = 55x$

$\frac{\Delta y}{\Delta x} = \frac{55 \text{ words}}{1 \text{ min}}$

$= 55 \text{ wpm}$



$\frac{\Delta y}{\Delta x} = \frac{150 \text{ words}}{3 \text{ min}}$

$= 50 \text{ wpm}$

I can type faster!

Mr. Ditz says he can type faster than you AND your friend. Mr. Ditz can type 180 words in 4 minutes. Is Mr. Ditz correct?

NO!

$\frac{180 \text{ words}}{4 \text{ min}} \overset{\div 4}{=} \frac{45 \text{ words}}{1 \text{ min}}$

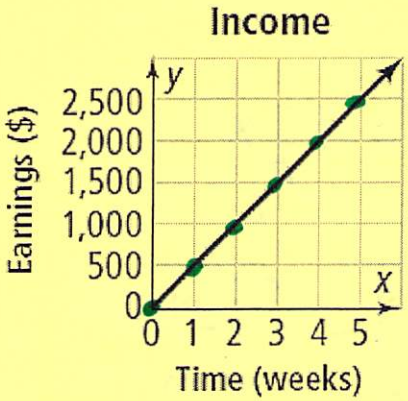
45 wpm

I THINK I GOT IT?

1. The graph shows the earnings y of an airplane mechanic for a number of weeks x.

   a. What is the rate of earnings per week?

$\frac{\Delta y}{\Delta x} = \frac{500}{1} =$ \$500 per week



   b. Write an equation to model the situation shown.

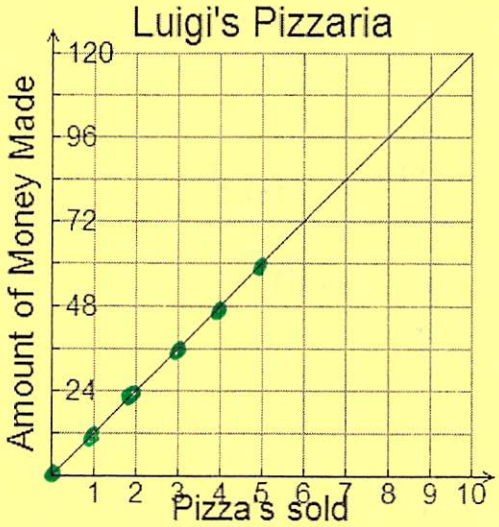
$y = 500x$

I GOT IT!

2. The amount of money, y, pizzeria Mama Mia makes by selling x pizzas can be modeled by the equation $y = 15x$. The relationship of the amount of money pizzeria Luigi's makes is shown in the following graph. Which pizzeria makes more money per pizza? Explain.

Mama Mia
$y = 15x$

$\frac{\Delta y}{\Delta x} = \frac{15}{1} =$ \$15 per pizza



$\frac{\Delta y}{\Delta x} = \frac{12}{1} =$ \$12 per pizza

ANSWERS: 1) a. $\frac{\Delta y}{\Delta x} = \frac{\$500}{1 \text{ week}}$ b. $y = 500x$ 2) Mama Mia makes \$15 per pizza. Luigi's makes \$12 per pizza. Mama Mia makes more money per pizza.