

4.3 Graphing Proportional Relationships

Learning Targets:

- **Identify Proportional Relationships**
 1. **Graphs**
 2. **Tables**
- **Graph Proportional Relationships**
- **Interpret Proportional Relationships**
- **Write and Use Direct Variation Equations**

Learning Target

#1 Identify Proportional Relationships

- From a Graph
- From a Table



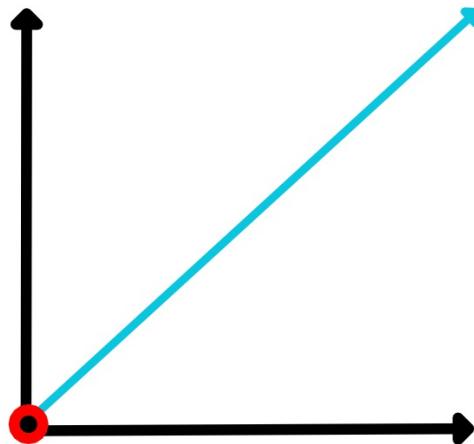
Identifying Proportional Relationships

Visually

1. Graph is a line (**STRAIGHT**)
2. Includes the point $(0, 0)$



From a Graph



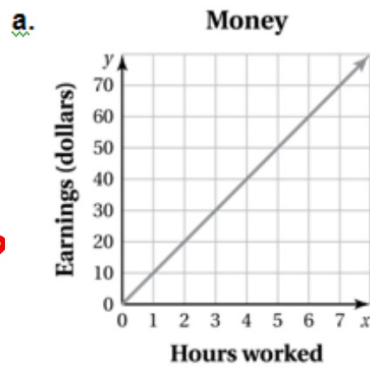
Identifying Proportional Relationships

Check

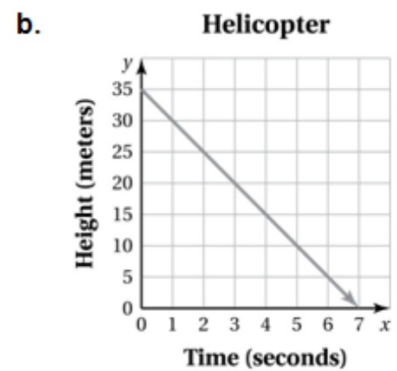
(0, 0) ?

Check

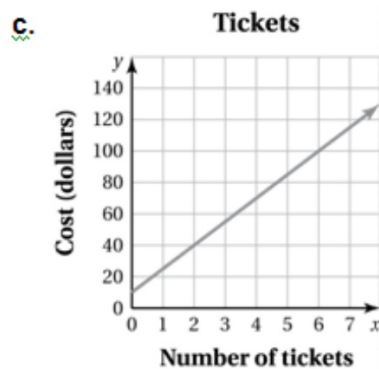
Straight Line ?



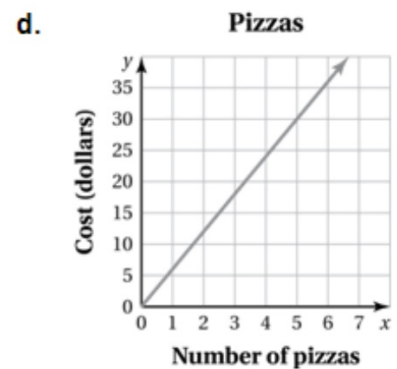
Proportional



Not Proportional



Not Proportional



Proportional

Direct Variation Equation

$$y = kx$$

$$y = mx$$

- *The slope*
- *The unit rate*
- *The constant of proportionality*

How much \$ per hour
How many miles per minute
etc.

Identifying Proportional Relationships

Is there a constant rate of change?



From a Table

Does not go through (0,0)

$\Delta x + 2$

-30
0

x	2	4	6	8	10
y	-20	-10	0	10	20

$\Delta y + 10$

$$m = \frac{\Delta y}{\Delta x} = \frac{10}{2} = \frac{5}{1} = 5$$

It is a Straight line

Not Proportional! Look for Patterns

As "x" changes by a constant amount

is "y" changing by a constant amount

Identifying Proportional Relationships

Is there a constant rate of change?

Laps, x	1	2	3	4
Time (seconds), y	90	200	325	480

Cups of Sugar, x	$\frac{1}{2}$	1	$1\frac{1}{2}$	2
Cups of Flour, y	1	2	3	4

Handwritten notes: $\Delta x = 1$, Δy Not a pattern, $m = 0.5$, $\times 0.5$, $\perp 1$

$m = \frac{\text{Constant change in } y?}{\text{Constant change in } x?}$

Not a straight line.
Not sure if it will go through $(0,0)$

No, not proportional

$m = \frac{\text{Constant change in } y?}{\text{Constant change in } x?}$

Straight line & goes through $(0,0)$

Yes, Proportional

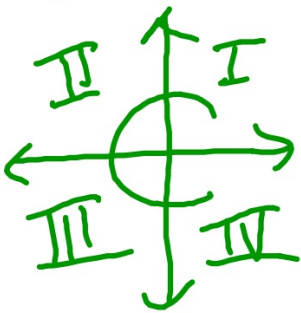
Learning Target

#2 Graph Proportional Relationships





Graphing a direct variation equation



The cost y (in dollars) to rent x video games is represented by $y = 4x$. Graph the equation

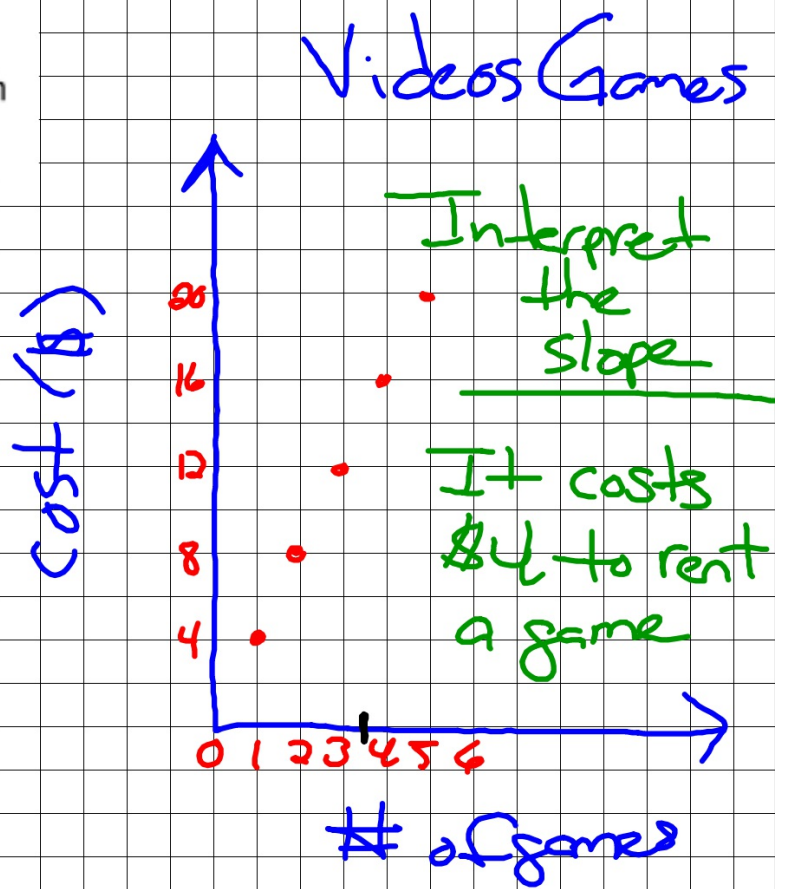
- The graph will be in the 1st Quadrant
- Title the graph Cost for games
- Label the y-axis Cost (\$)
- Label the x-axis # of games
- Make a T-Table
(easy table to find coordinate points)

Interpreting Proportional Graphs

The cost y (in dollars) to rent x video games is represented by $y = 4x$. Graph the equation and interpret the slope.

$$y = 4x$$

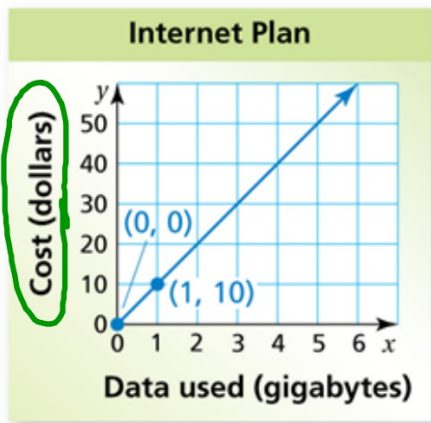
x	y
0	0
1	4
2	8
3	12



Graphing a Proportional Relationship

The cost y (in dollars) for x gigabytes of data on an Internet plan is represented by $y = 10x$. Graph the equation and interpret the slope.

$$y = 10x$$



$$\frac{\text{Cost } \$}{\text{gigabytes}} = \frac{10}{1}$$

slope m is 10 *unit rate

The slope tells us the unit cost is \$10 per gigabyte.

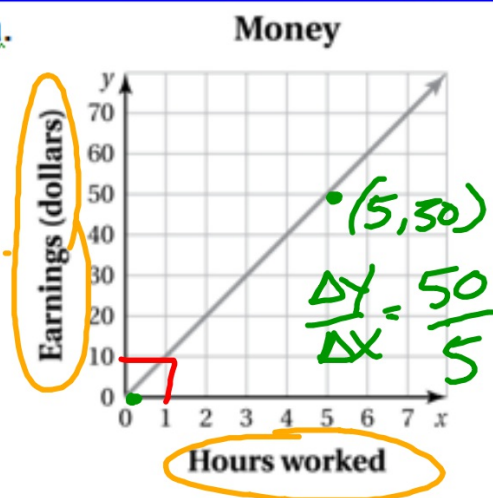
Learning Target

#3 Interpret Proportional Relationships



Interpreting Proportional Graphs

a.



Find the slope of the line

$$m = \frac{10}{1}$$

unit rate!

$$y = mx$$

*↑
denominator*

$$y = \frac{10}{1}x \quad \text{or} \quad y = 10x$$

What does the slope represent?

***The slope/y-coordinate when $x=1$
represents the unit rate***

You Earn \$10 per hour

Learning Target

#4 Write and use
Proportional Relationships



Proportional Relationships Special Linear Equation

Equation Direct Variation Equation

$$y = kx$$

$$y = mx$$

A line with a slope of m
that passes through the origin $(0,0)$

Write and Use a Direct Variation Equation.

The cost y (in dollars) to rent a bike is proportional to the number of hours that you rent the bike. It costs \$20 to rent a bike for 4 hours.

$$m = \text{unit rate} \quad \frac{?\$}{1 \text{ hr}} \quad \frac{20}{4} = \frac{\$5}{1 \text{ hr}}$$

Write an equation that represents the situation.

$$y = 5x$$

How much would it cost to rent a bike for 7 hours?

$$y = 5(7) = \$35$$

Comparing Proportional Relationships



The distance y (in meters) that a four-person ski lift travels in x seconds is represented by the equation $y = 2.5x$. The graph shows the distance that a two-person ski lift travels.

a. Which ski lift is faster?

Four-Person Lift

Two-Person Lift

2-person

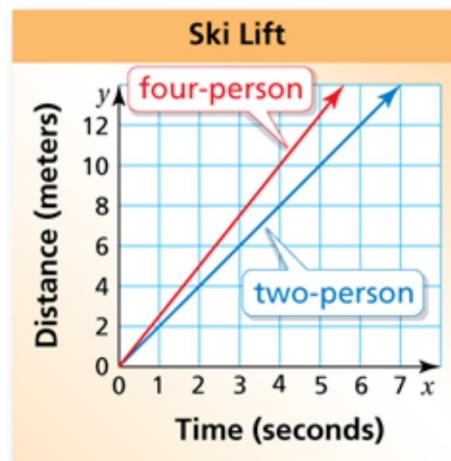
$$y = 2x \quad 2 \text{ meters/sec}$$

★ 4-person

$$y = 2.5x \quad m = \frac{\text{meters}}{\text{sec}} \quad 2.5 \text{ meters/sec}$$

Comparing Proportional Relationships

- b. Graph the equation that represents the four-person lift in the same coordinate plane as the two-person lift. Compare the steepness of the graphs. What does this mean in the context of the problem?



Homework

page 162-163
1-10 and 13

