

# Module 2—T1L2---Similar Triangles and Steepness

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Per. A B C D E F

Figure A

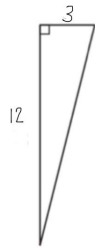


Figure B

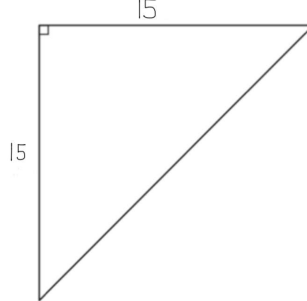
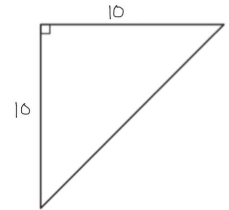


Figure C



Figure D



Getting Started:  
Which Triangle  
is Steepest?

Predict: Rank the steepness of the triangles from steepest to least steep.


Write a ratio that represents the relationship between height and the base of each triangle.

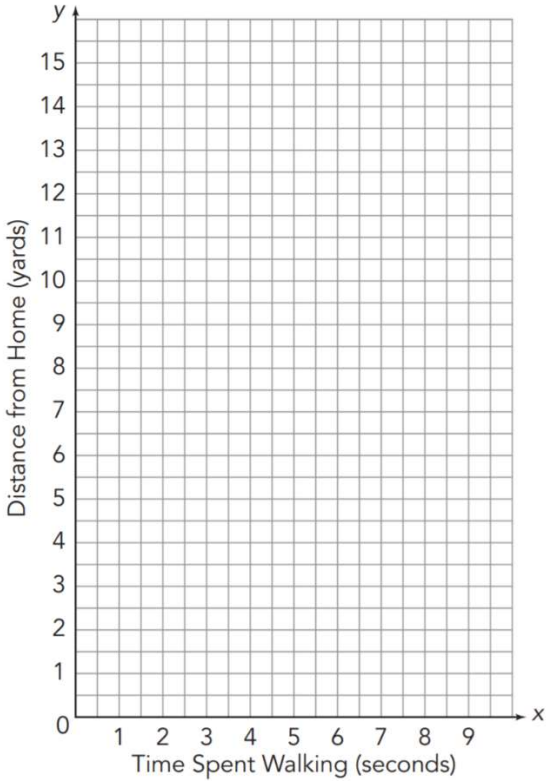
**The greater the  
unit rate, the  
\_\_\_\_\_**  
**the line.**

Write each ratio as a unit rate.

Use these unit rates to rank the triangles from steepest to least steep. Was your prediction correct?

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<p>Activity 2.1 Jack and Jill walk up a hill from their home to the bus stop.</p> 	<b>JACK AND JILL WALK 6 YARDS EVERY 3 SECONDS.</b>		
	<p>Write a ratio to represent the rate shown above.</p>	<p>Write an equation to represent the distance, <math>d</math>, Jack and Jill walked over time, <math>t</math>.</p>	<p>Does this situation represent a proportional relationship?</p> <p style="text-align: center;">YES      NO</p> <p>How do you know?</p> <p>Identify the constant of proportionality.</p>

<p><b>JACK AND JILL WALK 6 YARDS EVERY 3 SECONDS.</b></p>	<p>Complete the table. Graph the points and draw a line to show the time they walked and their distance from home.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Time walking (seconds)</th> <th style="padding: 5px;">Distance from home (yards)</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;"><b>0</b></td> </tr> <tr> <td style="padding: 5px;"><b>1</b></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"><b>3</b></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;"><b>8</b></td> </tr> <tr> <td style="padding: 5px;"><b>6.5</b></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"><b>8</b></td> <td style="padding: 5px;"></td> </tr> </tbody> </table> <div style="text-align: right; margin-top: 10px;">  </div> <p style="margin-top: 10px;">Using the line created on the graph, estimate How far Jack and Jill will be from home after...</p> <p>2 seconds? _____ 5.5 seconds? _____</p> <p style="margin-top: 10px;">By looking at the graph, explain how you can tell that Jack and Jill's walk to the bus stop represents a proportional relationship.</p>	Time walking (seconds)	Distance from home (yards)		<b>0</b>	<b>1</b>		<b>3</b>			<b>8</b>	<b>6.5</b>		<b>8</b>	
Time walking (seconds)	Distance from home (yards)														
	<b>0</b>														
<b>1</b>															
<b>3</b>															
	<b>8</b>														
<b>6.5</b>															
<b>8</b>															

## Module 2—T1L2---Similar Triangles and Steepness

<p>Unit Rate:</p> <p>How many yards per second are Jack and Jill walking?</p>	<p>What is the unit rate of Jack and Jill?</p> <p>How can you find it from the table and the graph.</p> <p><b>Table</b> <span style="float: right;"><b>Graph</b></span></p> <p>What does the unit rate mean in the context of this situation?</p> <p>True or False: The graph goes up from left to right because jack and Jill are walking up hill?</p>
<p>Rate of Change</p>	<p>The Rate of change for a situation describes the amount that the dependent variable changes compared with the amount that the independent variable changes.</p> <p style="text-align: center;"> <math>\frac{y}{x}</math> <span style="margin-left: 100px;"><math>\frac{\textit{vertical}}{\textit{horizontal}}</math></span> <span style="margin-left: 100px;"><math>\frac{\textit{dependent}}{\textit{independent}}</math></span> </p> <p>Identify the independent and dependent variables for the Jack and Jill scenario. What is the rate of change?</p> <p>If Jack and Jill walked faster, 3 yards per second, what would the graph look like? Show on the graph how the line would be affected.</p> <p>If Jack and Jill walked slower, 1 yard per second, what would the graph look like? Show on the graph how the line would be affected.</p>

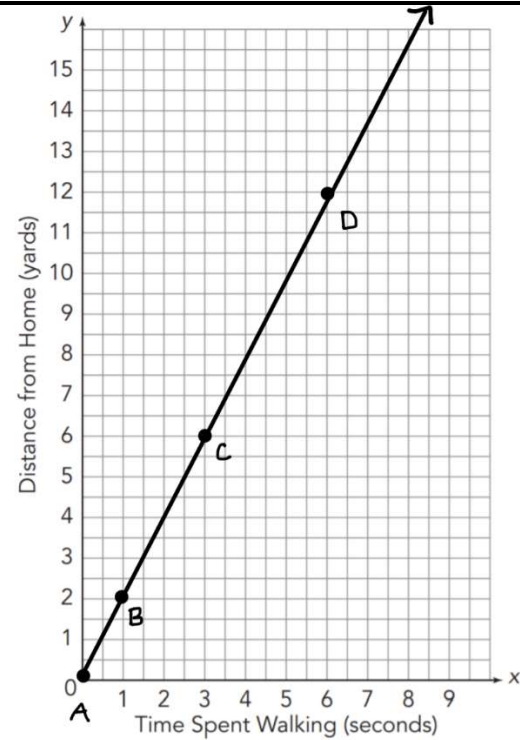
# Module 2—T1L2---Similar Triangles and Steepness

## Activity 2.2 Slope of a Line

The graph represents the relationship between the time Jack and Jill walk and the distance they walk.

You can use right triangles to find the steepness of a line. Let's look at 3 different instances along Jack and Jill's path to the bus stop.

Draw right triangles by drawing vertical and horizontal lines from each of the points shown. Predict which triangle you think will be the steepest.



Determine the steepness of each triangle by finding the unit rate of the vertical side to the horizontal side. Label each triangle before you find the ratio. How do the ratios compare?



A to B



B to C



C to D



Based on what you found above, what conclusion can be made about finding a ratio/unit rate from two points on a line when using right triangles.

What is the relationship among the 3 triangles?

What triangle represents the unit rate? How do you know?

# Module 2—T1L2---Similar Triangles and Steepness

<p>In short....</p>	<p>Because the Jack and Jill situation represented a proportional relationship, the rate of change can also be called the _____ of _____.</p> <p>The steepness of the line in the triangle example remained constant between the two points.</p> <p>In any linear relationship, you can use the _____ to describe the direction and steepness of a line. The slope is another word for rate of change.</p>
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	CONSTANT OF PROPORTIONALITY	SLOPE
<p>Summary</p> <p>What is the difference between all of these terms?</p>	Uses the letter k	Uses the letter m
	Find it by doing $\frac{y}{x}$	Find it by doing $\frac{y}{x}$
	<p>Only works when the relationship is proportional.</p> <p>Must pass through the origin (0,0)</p> <p>Linear</p>	<p>Tells you the steepness and direction of the line.</p> <p>If the slope is positive, the line goes up.</p>  <p>If the slope is negative, the line goes down.</p> 
	Use the equation $y=kx$ (where k is represents the constant of proportionality)	<p>Use the equation <math>y=mx+b</math></p> <p><math>m</math>=slope <math>b</math>= beginning of the line (y-intercept)</p>

SLOPE DUDE:

# Module 2—T1L2---Similar Triangles and Steepness

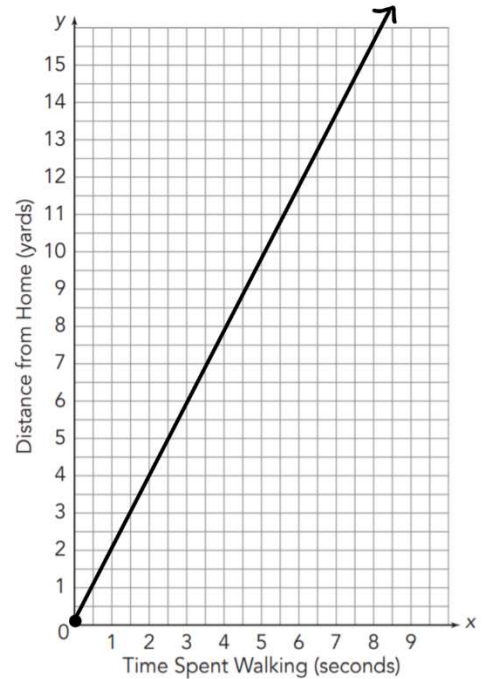
## Activity 2.3

The line to the right represents the line that we have been using to show Jack and Jill's walking rate. The graph shows the line:  $y = \frac{6}{3}x$  or  $y = 2x$ , which represents their path towards the bus stop.

Jack and Jill's Aunt Mary lives next door. **She lives 4 yards from their home closer to the bus stop.** How will the graph of the line change if they started walking at the same rate (2 yards per second)?

Time (seconds)	0	1	2	3	4	5
Distance from Home (yards)						

The two lines are \_\_\_\_\_. Why do you think that is?



Equation for a Line not Through the Origin

How will the **slopes** of the two lines compare? Why? (How fast did they walk from home? How fast did they walk from Mary's?)

How will this affect the graph of the line?

How do the **starting points** of the two lines compare? Why? (Think about their distance from home when they begin in each situation).

How will this affect the graph of the new line?

Draw a line on the graph that represents the walk from their Aunt Mary's house to the bus stop.

Does the walk from their Aunt Mary's house represent a proportional relationship? Why or why not?

How does the translation of the starting the line 4 units higher affect the coordinates of the new line? Complete the table to help.

How does this translation affect the slope?

Write an equation that represents the old line and another equation for the new line. How are the equations the same? Different?

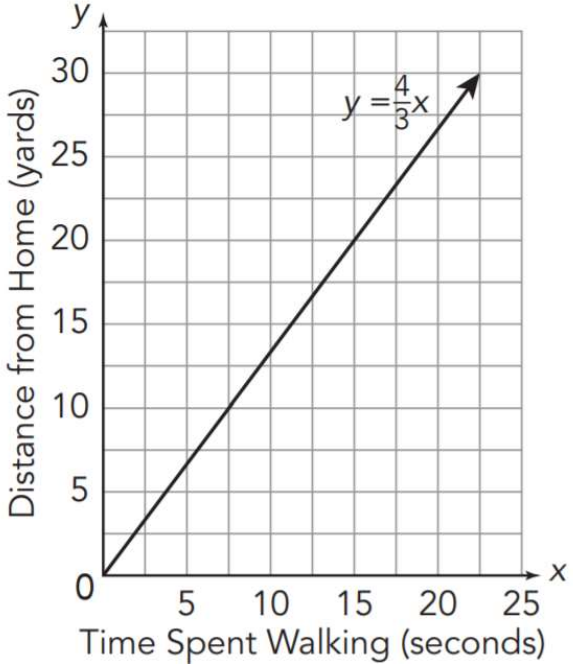
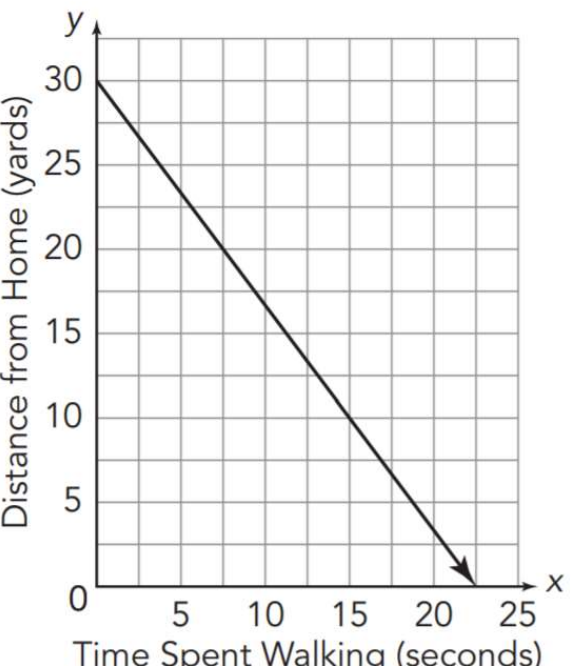
OLD LINE: \_\_\_\_\_ NEW LINE: \_\_\_\_\_

When a line is translated vertically by  $b$  units, we can write the equation in the form:

\_\_\_\_\_

Time walking (seconds)	OLD LINE distance (yards)	NEW LINE Distance (yards)
0		
1		
2		
2.5		

# Module 2—T1L2---Similar Triangles and Steepness

<p><b>Activity 2.4</b> Negative Unit Rate</p>	<p>Jack and Jill are walking back hoe from the bus stop which is 30 yards away from their house. They walk at the same rate, 6 yards every 3 seconds.</p> <p>Complete the table about each of the graphs.</p>	
<p>Graphs</p>	<p style="text-align: center;"><b>Walking to the Bus Stop</b></p> 	<p style="text-align: center;"><b>Walking Home from the Bus Stop</b></p> 
<p>Proportional or Non-Proportional Explain</p>		
<p>Slope of the line Positive or Negative? Why?</p>		
<p>Choose 2 points from each line, and draw a right triangle. It does not matter which 2 points you choose.</p>		
<p>Write a ratio that represents the height over the base of your triangle.</p>		
<p>Simplify your ratio from above</p>		
<p>The slope of the line in simplified form is...</p>		
<p>How is the slope different thatn the simplified ratio?</p>		
<p>Write an equation that represents each line.</p>		

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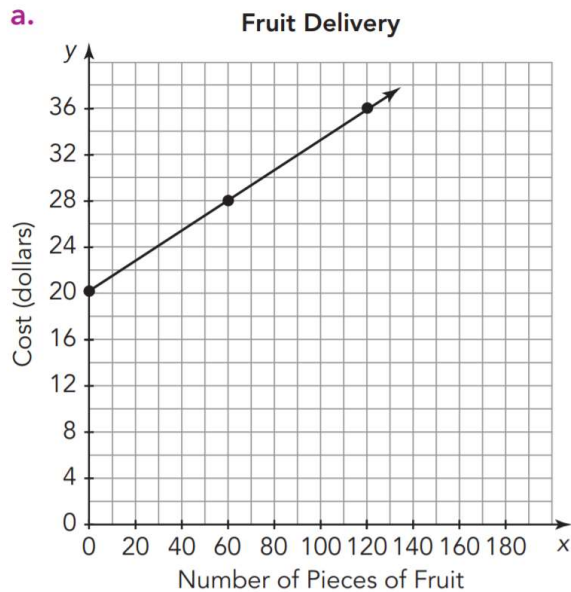
Activity 2.5 Describing Linear Equations	Proportional Relationships	Non—Proportional Relationships
	LINEAR	LINEAR
	Passes through _____	Doesn't pass through _____
Proportional Versus Non-Proportional Relationships	$y=mx$	$y=mx+b$

Consider each graph shown.

\*Determine whether the graph represents a proportional or non-proportional relationship.

\*Write an equation in the form  $y=mx$  or  $y=mx+b$  to represent the relationship.

Comparing Proportional and Non-proportional relationships.

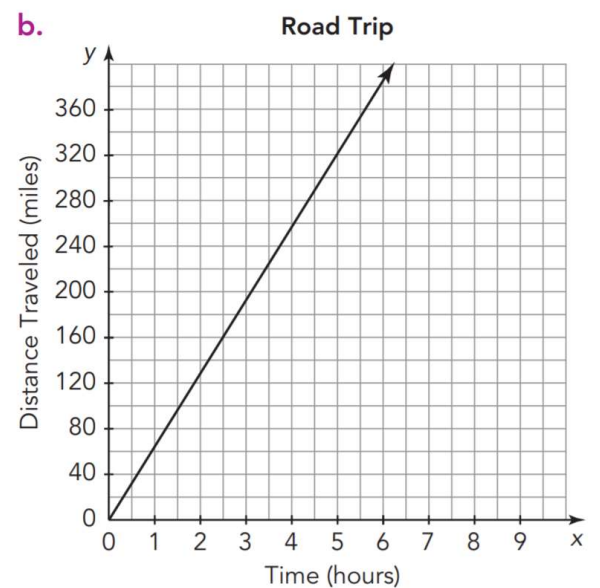


Proportional or Non-proportional

Slope (m)=\_\_\_\_\_ y-intercept (b)=\_\_\_\_\_

Equation: \_\_\_\_\_

Slope represents: \_\_\_\_\_



Proportional or Non-proportional

Slope (m)=\_\_\_\_\_ y-intercept (b)=\_\_\_\_\_

Equation: \_\_\_\_\_

Slope represents: \_\_\_\_\_