

Learning Objective

We will solve problems involving proportions₁.

Proportional		Non-Proportional	
Time (min.)	Distance (ft.)	Time (min.)	Distance (ft.)
0	0	0	4
2	6	2	10
4	12	4	16
6	18	6	22
$\frac{2}{6} = \frac{6}{18}$		$\frac{1}{5} = \frac{2}{10} = \frac{6}{22} = \frac{3}{11}$	
Ratios are equivalent.		Ratios are not equivalent.	

CFU 1

What are we going to do?

We will _____

Vocabulary

¹ equivalent ratios

CFU 2

What two quantities are being compared in the problem to the left?

CFU 3

If there are 8 crayons for every 4 markers, what is the unit rate (per one marker)?

Activate Prior Knowledge

A **ratio** is a relationship between two quantities.

- A ratio can be written with words or numbers.



Directions:

1. Circle ALL crayons.
2. Determine how many crayons you have.
3. Determine how many markers you have.

There are crayons for every markers.

Now, write your ratio in lowest terms below.
Write your ratio in at least two different ways.

	:	

Write your ratio as a fraction

	:	
--	---	--

Write a ratio (crayons & markers)

	TO	
--	----	--

Write your ratio as using "TO"



A **ratio** is a comparison of two quantities using division.

$$\frac{3}{4}, 3 \text{ to } 4, 3:4$$

A **rate** is a ratio of two quantities with different units.

$$\frac{60 \text{ miles}}{2 \text{ hours}}$$

A rate with a denominator of 1 is called a **unit rate**.

$$\frac{30 \text{ miles}}{1 \text{ hour}}$$

Key Idea

Proportions

Words A **proportion** is an equation stating that two ratios are equivalent. Two quantities that form a proportion are **proportional**.

Numbers $\frac{2}{3} = \frac{4}{6}$ The proportion is read "2 is to 3 as 4 is to 6."

CFU 1
In your own words, what is a **proportion**?

CFU 2
When creating a proportion, what mistake was made below?

 $\frac{2}{3} = \frac{2 \times 2}{3 \times 3} = \frac{4}{9}$

Finding Proportional Relationship

Create two proportional statements using any of the numbers below:

1	2	10	4	12	20
15	5	16	6	8	3



—  —

—  —

We will create Ordered Pairs from an Experiment.

Directions: You will receive one sheet of paper. Fold when directed by Mr. Pearson.

Converting From Tables, Create Ordered Pairs, Then Graph (Coordinate Plane)

x	Number Folds	1	2	3	4	5	6
y	Number of Sections						

ORDERED PAIRS (x,y)
(# of Folds, # of Sections)

Fill in your ordered pairs

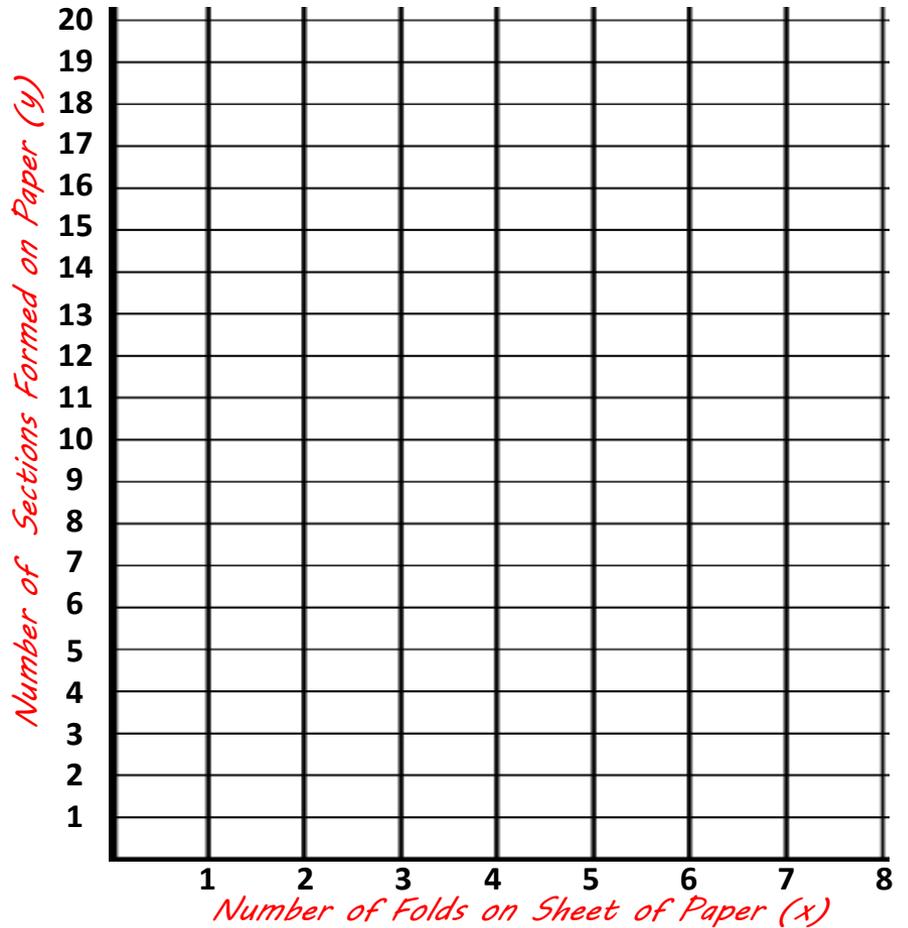
- (1,)
- (2,)
- (,)
- (,)
- (,)
- (,)

Plot the ordered (x,y) pairs to the right.

How many points can you plot in the space provided?



Connect each point in your graph.



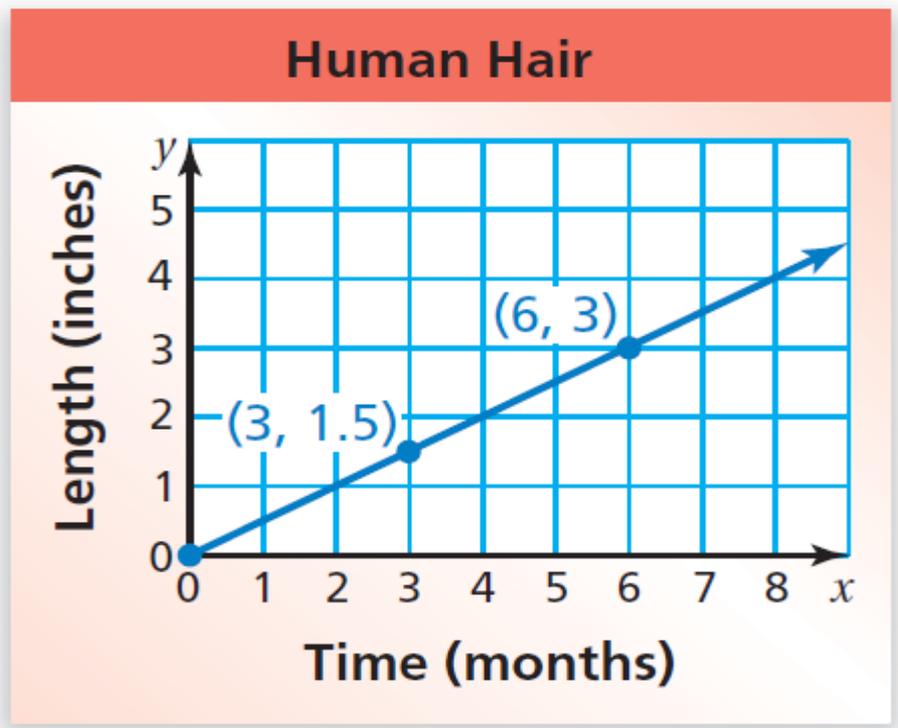
A **proportional relationship** is a set of **equivalent ratios**.
Equivalent ratios have **equal values** using different numbers.

We will determine if a graph shows a proportion.

- 1 Read the problem carefully.
 - a Identify what two quantities are being compared.
 - b Identify the given ordered pairs. What does each ordered pair tell you?
- 2 Do the ordered pairs represent equivalent ratios?
- 3 When graphed, in order to be a **proportion**, the graph must pass two tests:
 1. Line Must Be Straight
 2. Line must intersect at ORIGIN (0,0)
- 4 Determine if the graph shows a proportion.

CFU

- 1 How did I/you identify information about the given ordered pairs?
- 2 How did I/you if the ratios given are equivalent?
- 3 How did I/you determine whether the graph shows a proportion?



Human hair grows, on average, at a rate of ½ inch per month. We can represent this information in a graph.

What does the ordered pair (3, 1.5) represent?

What does the ordered pair (6, 3) represent?

Are the ordered pairs (3, 1.5) and (6, 3) proportional?

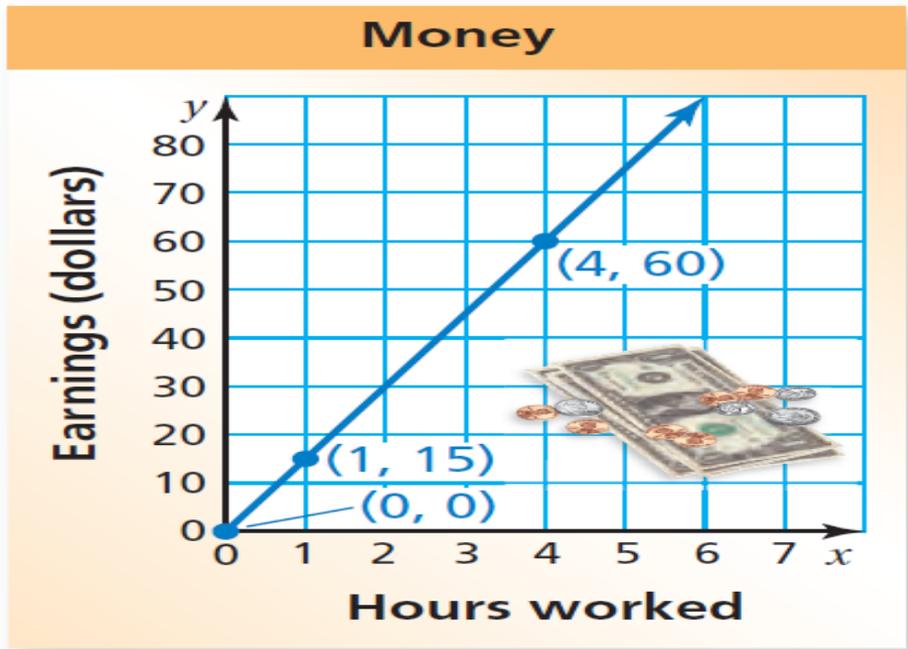
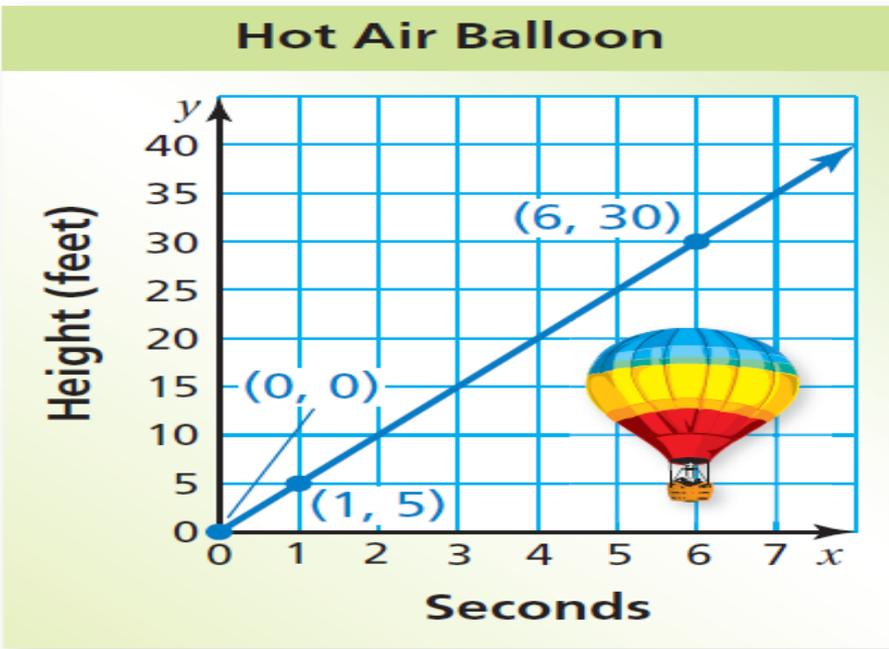
A **proportional relationship** is a set of **equivalent ratios**.
Equivalent ratios have **equal values** using different numbers.

proportion

- RULES:**
- ✓ Ratios are Equivalent
 - ✓ Line Passes through the Origin (0,0)
 - ✓ Line is straight and passes through all Ordered Pairs in graph

CFU

- 1 How did I/you identify information about the given ordered pairs?
- 2 How did I/you if the ratios given are equivalent?
- 3 How did I/you determine whether graphs shows a proportional relationship?



Proportion? Yes or No

Proportion? Yes or No

A **proportional relationship** is a set of **equivalent ratios**.
Equivalent ratios have **equal values** using different numbers.

We will determine proportions in Tables.

- 1 Read each statement carefully. Determine quantities being compared.
 - a Identify whether the monthly rates remains the same month to month.
 - b Identify the unit rate and compare it to the monthly rate.
- 2 Determine if each monthly rate shows an equivalent ratio.

CFU

- 1 How did I/you determine if the ratios are equivalent?
- 2 How did I/you identify whether the ratios are proportional?



The YMCA has over 30 locations in the San Francisco Bay area.. There is a sale price allowing new members to try a membership for five months. New members will pay the following rates listed below.

Number of months	1	2	3	4	5
Cost of membership	\$50	\$90	\$120	\$140	\$150

Equivalent ratios? YES or NO

Proportional? YES or NO



C3 Fitness Gym is a new and exciting Gym Coming to Redwood City in 2015. As an introductory offer, they will allow new members to sign up at the following rates listed below.

Number of months	1	2	3	4	5
Cost of membership	\$15	\$30	\$45	\$60	\$75

Equivalent ratios? YES or NO

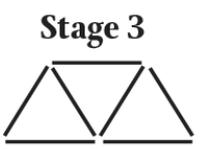
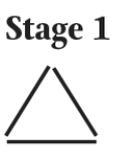
Proportional? YES or NO

A **proportional relationship** is a set of **equivalent ratios**.
Equivalent ratios have **equal values** using different numbers.

Finding Proportions in a table.

- 1 Read the problem carefully.
 - a Identify what quantities are being compared.
 - b Fill in the values for each Stage in the table.
- 2 Do the ordered pairs (x,y) in the table represent equivalent ratios?
- 3 Determine if the relationship in the graph is proportional.

Here are several stages of a pattern made from toothpicks.



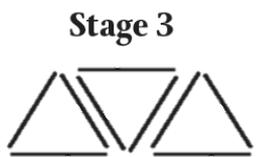
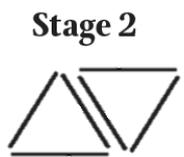
Fill in the table below.

Stage	Toothpicks
1	
2	
3	

Equivalent ratios? YES or NO

Proportional? YES or NO

Here are several stages of a pattern made from toothpicks.



Fill in the table below.

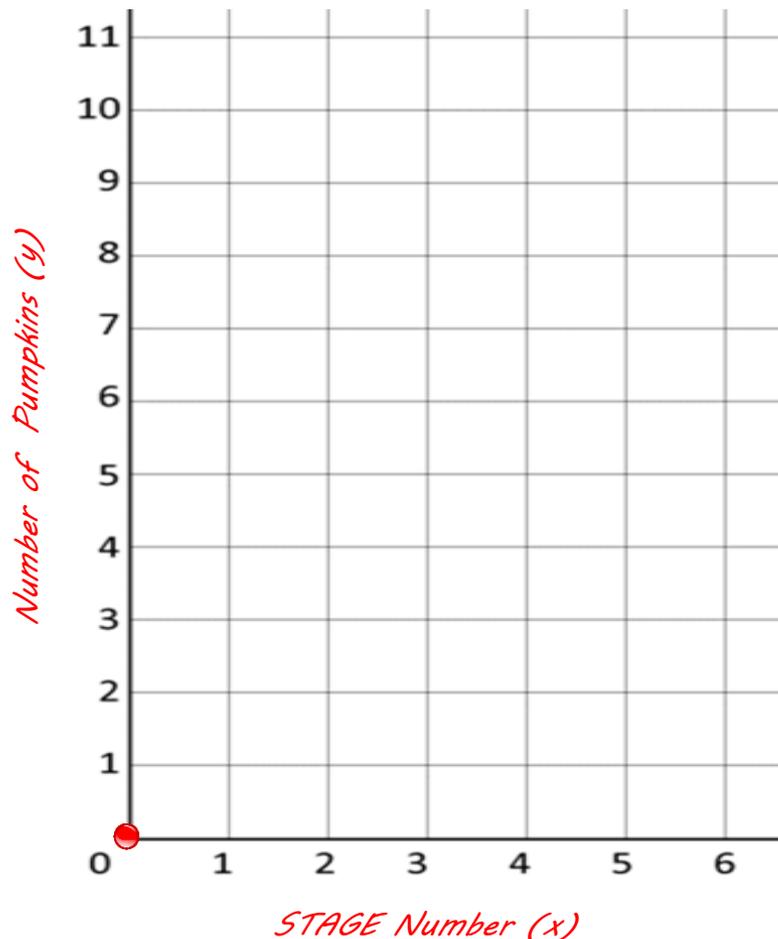
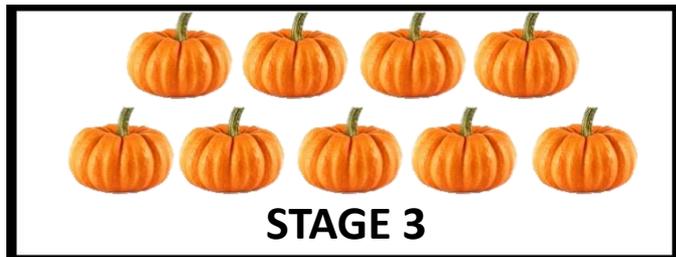
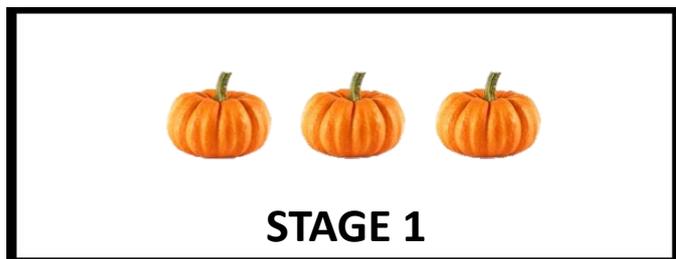
Stage	Toothpicks
1	
2	
3	

Equivalent ratios YES or NO

Proportional? YES or NO

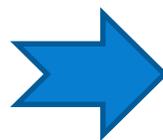
We will create Tables and Graphs from a Pattern.

Each stage continues to grow. Are the Pumpkins proportional to the stage number?



Create the following ratios from STAGES 1-3 above:

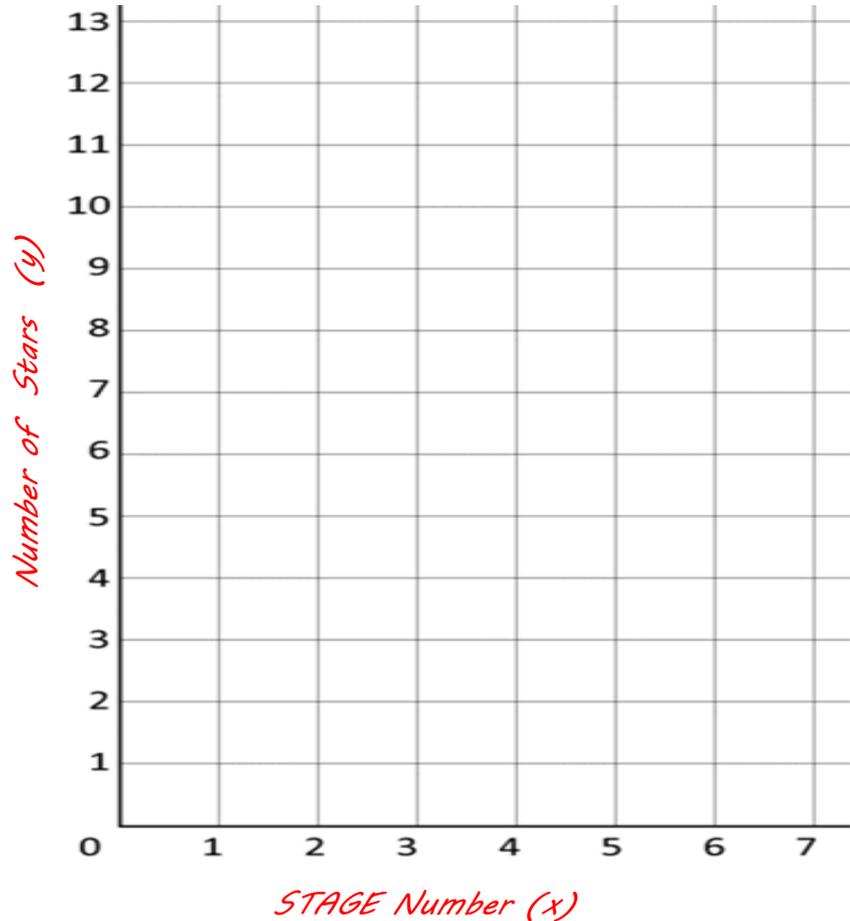
X	STAGE Number	1		
Y	Pumpkins	3		
		1 st	2 nd	3 rd



Create Ordered Pairs (x,y)
(Stage Number, Pumpkins)
 (,) (,) (,)

Creating Tables and Graphs from a Pattern.

Patterns are observed by comparing the number of STAGES to STARS.



Create the following ratios from STAGES 1-3 above:

STAGE Number	1		
Stars	3		
	1 st	2 nd	3 rd



Create Ordered Pairs (x,y)
(Stage Number, Stars)
 (,) (,) (,)

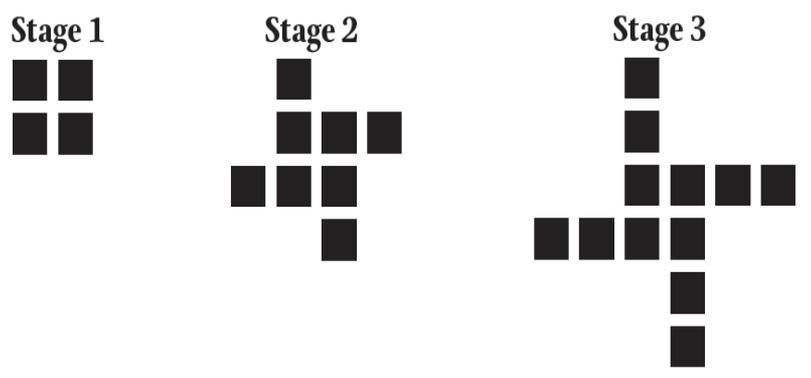
A **proportional relationship** is a set of **equivalent ratios**.
Equivalent ratios have **equal values** using different numbers.

- Solve problems involving proportional relationships.**
- 1 Look at each pattern carefully.
 - a Identify what quantities are being compared.
 - b Fill in the table for each Stage.
 - 2 Write the values in the table as Ordered Pairs (x,y) .
 - 3 Do the ordered pairs in the table represent equivalent ratios?
 - 4 Graph the ordered pairs, then determine if proportional.

CFU

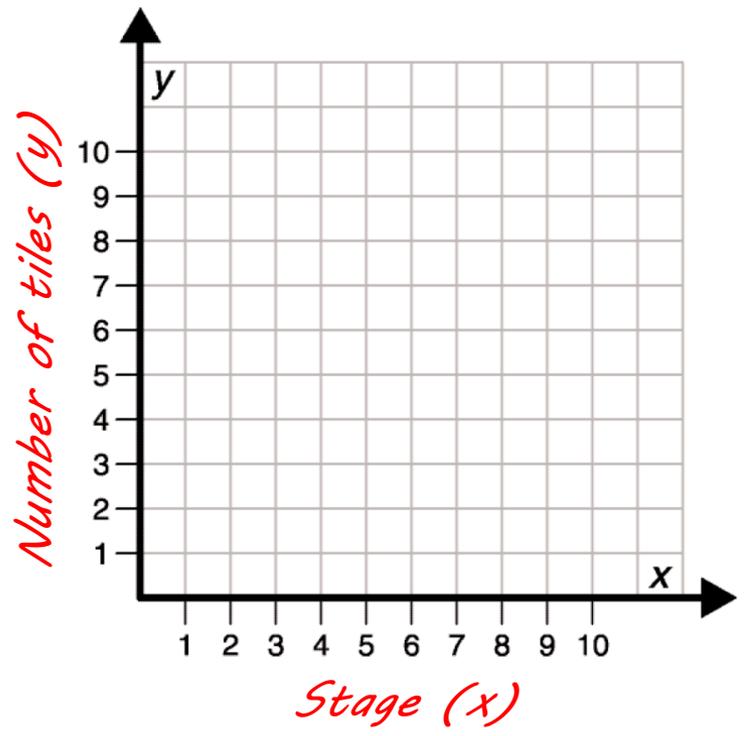
- 1 How did you determine the values that go in the table?
- 2 How do you use the values in the table to form ordered pairs?
- 3 How can you tell from the table and graph whether the relationship is proportional?

Marissa is using tiles to make a pattern. Here are the first three stages in her pattern.



1. Complete the table.

Stage (x)	1	2	3
Number of tiles (y)			



2. Write the ordered pairs of values (x,y) from the table.
 (,) (,) (,)

Proportional? YES or NO

A **proportional relationship** is a set of **equivalent ratios**.
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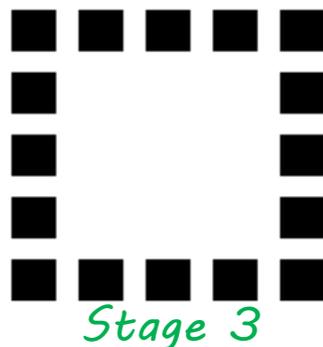
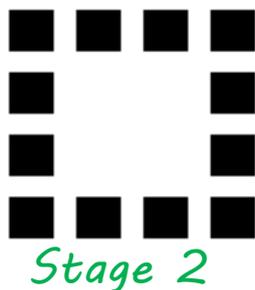
These can be modeled in tables, graphs, etc.

Finding Proportions using Tables and Graphs.

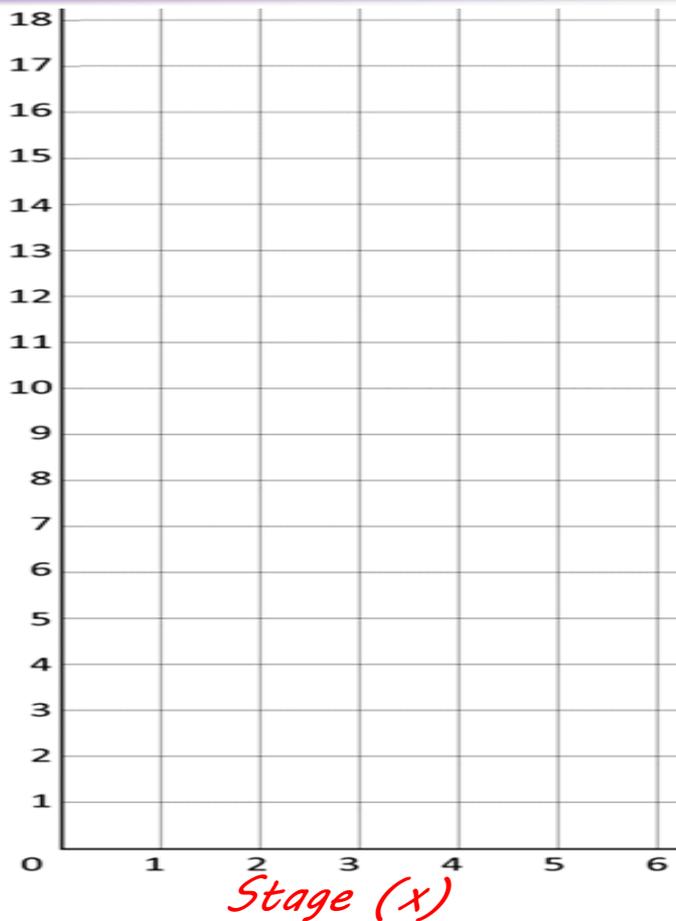
- 1 Look at each pattern carefully.
 - a Identify what quantities are being compared.
 - b Complete the table below.
- 2 Write the values in the table as Ordered Pairs (x,y).
- 3 Graph the ordered pairs on the Coordinate Plane.
- 4 Determine if proportional.

1. Fill in the table.

Stage (x)	1	2	3
Number of tiles (y)			



Number of Tiles (y)



2. Write the ordered pairs of values (x,y) from the table.

_____ (,) (,) (,) **Proportional?** YES or NO

What did you learn today about solving problems involving proportional relationships? (Pair-Share) **Use words / phrases from the word bank on the right.**

Word Bank

Proportional Relationship

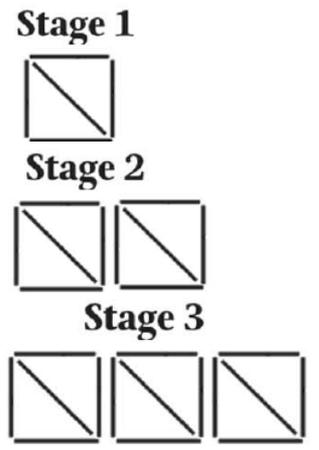
Non-Proportional

Equivalent Ratio

Table / Graph

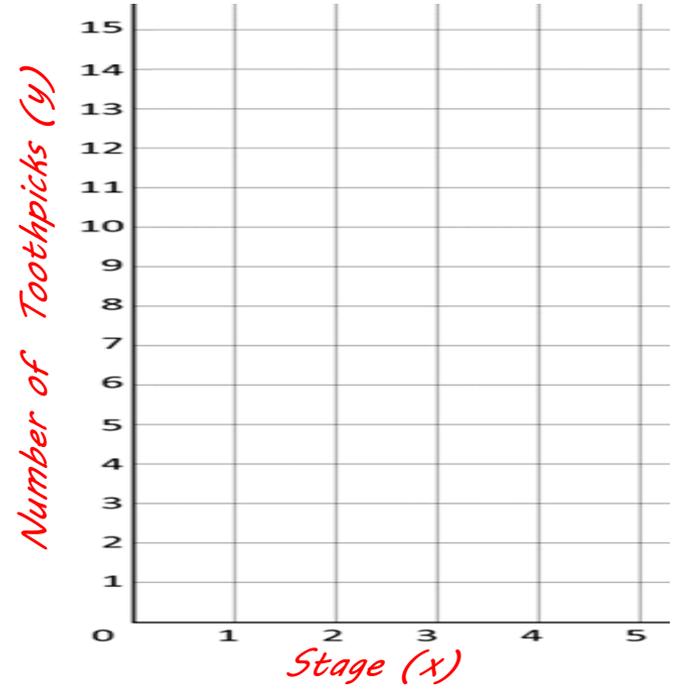
Independent Practice

Here are several stages of a pattern made from toothpicks.



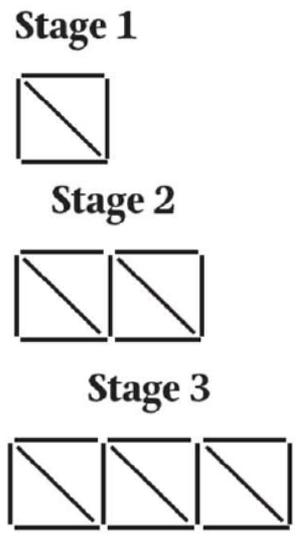
Fill in the table below.

Stage	Toothpicks



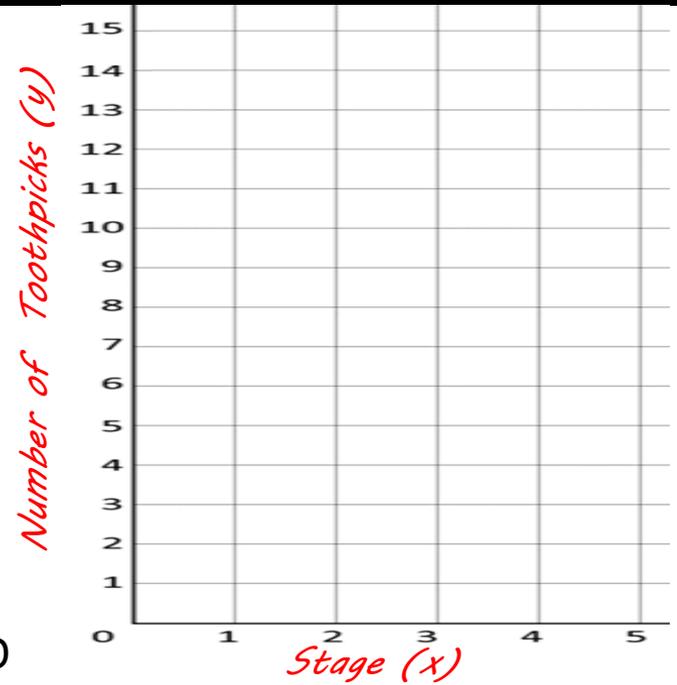
Equivalent ratios? YES or NO

Proportional? YES or NO



Fill in the table below.

Stage	Toothpicks



Equivalent ratios? YES or NO

Proportional? YES or NO