



ACTIVITY 5

MATHia CONNECTION

- Introduction to Double Number Lines
- Using Double Number Lines to Determine Equivalent Ratios
- Problem Solving with Equivalent Ratios and Rates Using Double Number Lines

Ratios
TOPIC 1

LESSON 3

Getting Started

1

2

Activity 3

4

5

Talk the Talk

Double Number Lines

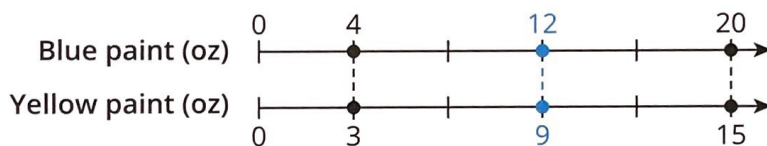
You know several strategies to determine the relationship between two quantities: drawing models, building tape diagrams, and scaling up or down. You can also use a *double number line* to visualize these relationships.

A **double number line** is a model made up of two number lines used together to represent the ratio between two quantities. The intervals on each number line maintain the same ratio.

Dulcina uses 12 ounces of blue paint for every 9 ounces of yellow paint to create the exact shade of green she needs for an art project.

WORKED EXAMPLE

The ratio 12 oz blue paint : 9 oz yellow paint is shown on the double number line. You can see other equivalent ratios by continuing to label each interval.



HABITS OF MIND

- Model with mathematics.
- Use appropriate tools strategically.

TAKE NOTE...

An interval is the amount of space between two tick marks on a number line.

THINK ABOUT...

The scale for each number line is different, but the interval is the same for both lines.

- 1 Describe the interval represented on each number line.

Blue Paint interval is 4 oz

Yellow Paint interval is 3 oz

- 2 How can Dulcina create the exact shade of green she needs if she uses fewer ounces of blue paint? How does that affect the amount of yellow paint?

Dulcina will need to use less yellow paint. To keep the ratio the same she will always need less yellow paint than blue paint

- 3 How can Dulcina create the exact shade of green she needs if she uses more ounces of blue paint? How does that affect the amount of yellow paint?

Dulcina will need more yellow paint to continue the same ratio.



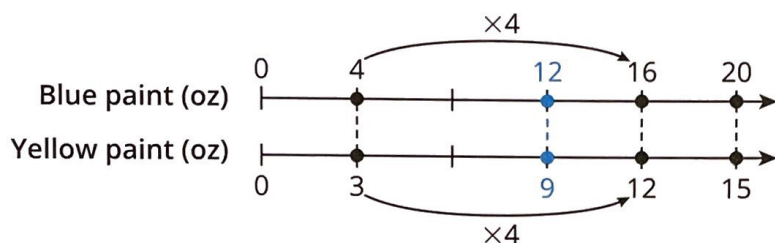
Dulcinea has 12 ounces of yellow paint and needs to determine the amount of blue paint to use to create the same shade of green.

➤ Consider these solutions to Dulcinea's problem.

4 Verify that Oliver's thinking is correct.

Oliver

I labeled 12 ounces of yellow paint on the double number line and then used intervals to determine the number of ounces of blue paint that I need.



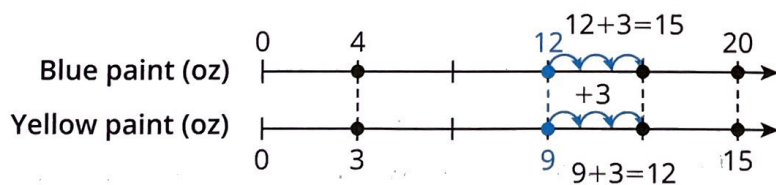
The ratio of $\frac{12}{9} = \frac{16}{12}$

5 Explain why Sal's reasoning is incorrect.

Sal

To use 12 ounces of yellow, I add 3 ounces to 9 ounces of yellow.

So, I should add 3 ounces to 12 ounces of blue to get 15 ounces of blue.



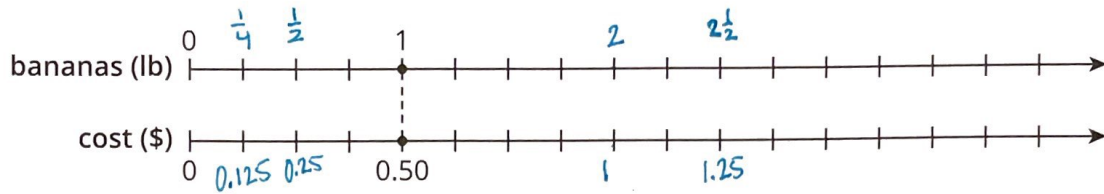
Sal used additive reasoning instead of multiplicative reasoning

$$\frac{15}{12} \neq \frac{12}{9}$$



Use the double number lines to determine each unknown quantity.

- 6 One pound of bananas costs \$0.50. Determine the cost for each quantity of bananas.



(a) 2 pounds

\$1

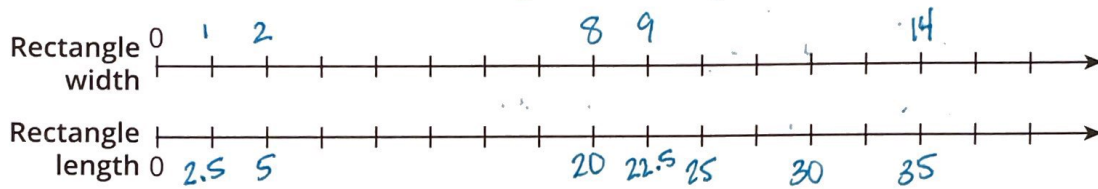
(b) $\frac{1}{2}$ pound

\$0.25

(c) $2\frac{1}{2}$ pounds

\$1.25

- 7 The width of a rectangle is 8 feet and its length is 20 feet. Determine a rectangle that maintains the same ratio of side lengths for each given dimension.



(a) width = 2 ft

length = 5 ft

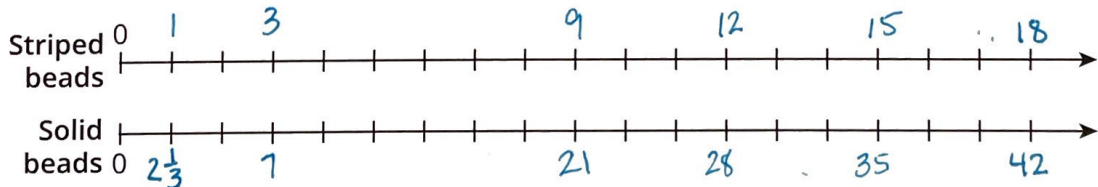
(b) length = 22.5 ft

width = 9 ft

(c) width = 14 ^{ft} inches

length = 35 ft

- 8 Amanda is packaging beads. For every 9 striped beads she includes 21 solid beads. Determine the number of striped beads she should package for each given number of solid beads.



(a) 7 solid beads

3 striped beads

(b) 35 solid beads

15 striped beads

(c) 42 solid beads

18 striped



Make a Choice

Use a drawing, tape diagram, or double number line to answer each question. **Show all of your work and explain why you chose your strategy.**

- 1 A T-shirt store keeps 7 white T-shirts on the shelves for every 3 purple T-shirts on the shelves.

- (a) How many white T-shirts are on the shelves if there are 15 purple T-shirts on the shelves?

White

5						
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Purple

5		
---	--	--

 = 15 purple

$$15 \div 3 = 5$$

$$5 \times 7 = 35 \text{ white t-shirts}$$

- (b) How many purple T-shirts are on the shelves if there are 49 white T-shirts on the shelves?

$$49 \div 7 = 7$$

$$3 \times 7 = 21 \text{ purple t-shirts}$$

- (c) How many white shirts are on the shelves if there are 40 total shirts (purple and white) on the shelves?

$$7 + 3 = 10$$

$$40 \div 10 = 4$$

$$7 \times 4 = 28 \text{ white t-shirts}$$

- 2 A grocery store advertises 4 pounds of apples for \$6.00.

- (a) What is the cost for 1 pound of apples?

\$1.50

cost

1.50	3	4.50	6
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- (b) What is the cost for 3 pounds of apples?

\$4.50

pounds

1	3	4
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- (c) How many pounds of apples can you purchase with \$37.50?

$$6 \times 6 = 36 + 1.50$$

$$4 \times 6 = 24$$

$$24 + 1 = 25 \text{ lbs}$$

Circle the question that your teacher has asked you to present to the class. Write at least 3 sentences to tell your classmates how you completed the work.