Introducing Double Number Line Diagrams

Let's use number lines to represent equivalent ratios.

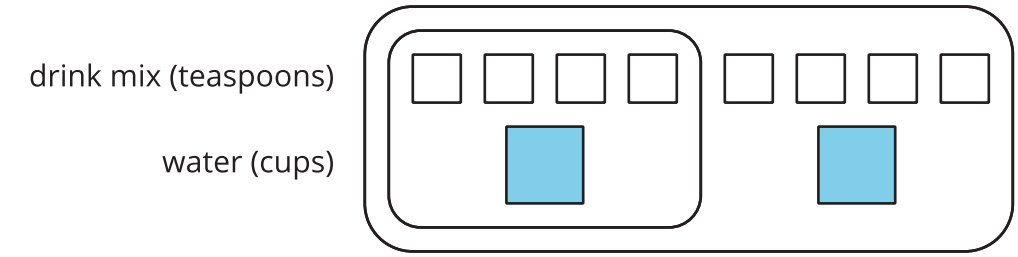
4.1 Math Talk: Adjusting Another Factor

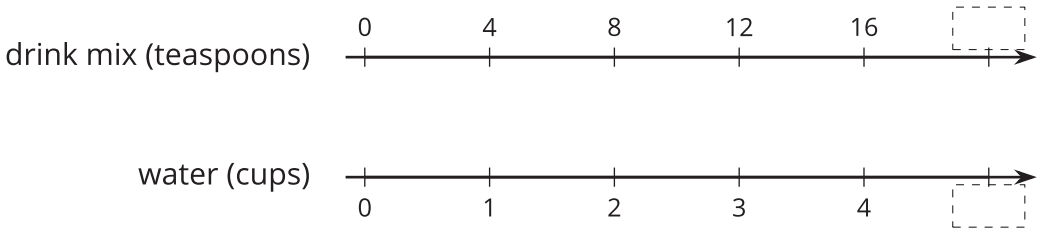
Find the value of each product mentally.

- $2 \cdot 45$
- $2 \cdot (4.5)$
- $6 \cdot (4.5)$
- $(0.2) \cdot 45$

4.2 Drink Mix on a Double Number Line

A drink recipe says to mix 4 teaspoons of powdered drink mix for every cup of water. Here are two ways to represent multiple batches of this recipe:





1. How can we tell that $4 : 1$ and $12 : 3$ are equivalent ratios?

2. How are these representations the same? How are these representations different?

3. How many teaspoons of drink mix should be used with 3 cups of water?

4. How many cups of water should be used with 16 teaspoons of drink mix?

5. What numbers should go in the empty boxes on the **double number line diagram**? What do these numbers mean?

Are you ready for more?

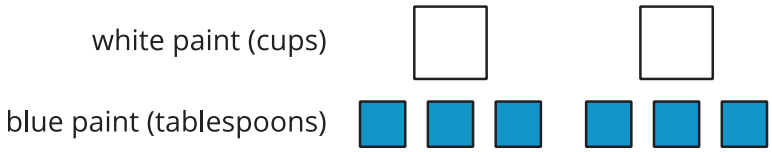
Recall that a *perfect square* is a number of objects that can be arranged into a square. For example, 9 is a perfect square because 9 objects can be arranged into 3 rows of 3. 16 is also a perfect square, because 16 objects can be arranged into 4 rows of 4. In contrast, 12 is not a perfect square because you can't arrange 12 objects into a square.

1. How many whole numbers starting with 1 and ending with 100 are perfect squares?

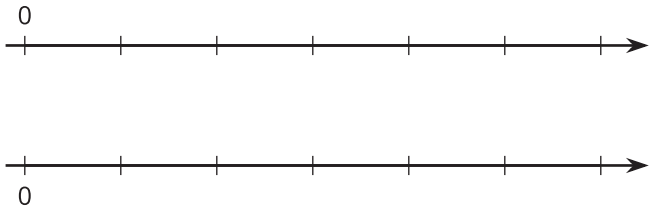
2. What about whole numbers starting with 1 and ending with 1,000?

4.3 Blue Paint on a Double Number Line

Here is a diagram showing Elena's recipe for one batch of light blue paint.



1. Complete the double number line diagram to show the amounts of white paint and blue paint in different-sized batches of light blue paint.



2. Compare your double number line diagram with your partner. Discuss your thinking. If needed, revise your diagram.
3. How many cups of white paint should Elena mix with 12 tablespoons of blue paint? How many batches would this make?

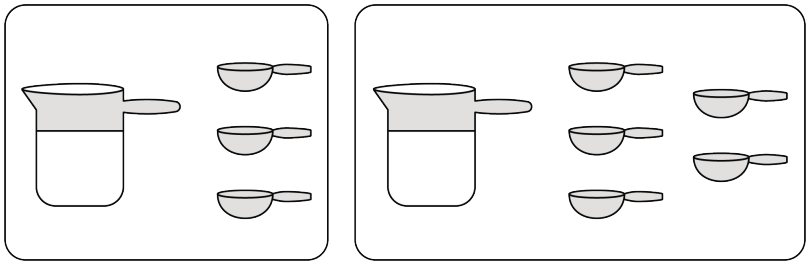
4. How many tablespoons of blue paint should Elena mix with 6 cups of white paint? How many batches would this make?

5. Use your double number line diagram to find another amount of white paint and blue paint that would make the same shade of light blue paint.

6. How do you know that these mixtures would make the same shade of light blue paint?

4.4 Fix It!

Andre likes a hot cocoa recipe with 1 cup of milk and 3 tablespoons of cocoa. He poured 1 cup of milk but accidentally added 5 tablespoons of cocoa.



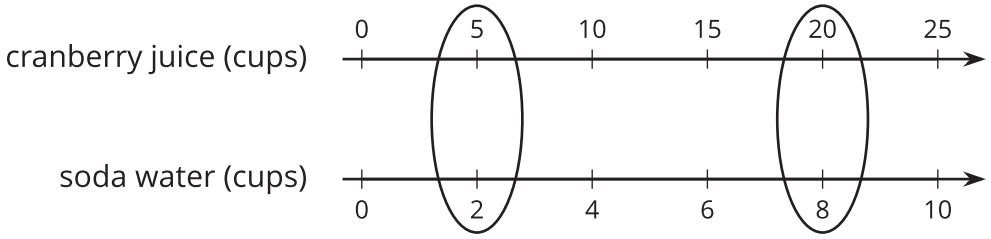
1. How can you fix Andre's mistake and make his hot cocoa taste like the recipe?

2. Explain how you know your adjustment will make Andre's hot cocoa taste the same as the one in the recipe.

Lesson 4 Summary

You can use a **double number line diagram** to find many equivalent ratios.

For example, a recipe for fizzy juice says, "Mix 5 cups of cranberry juice with 2 cups of soda water." The ratio of cranberry juice to soda water is $5 : 2$. Multiplying both ingredients by the same number creates equivalent ratios.



This double number line shows that the ratio $20 : 8$ is equivalent to $5 : 2$. If you mix 20 cups of cranberry juice with 8 cups of soda water, it makes 4 times as much fizzy juice that tastes the same as the original recipe.