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**Author:**

**Kevin Hall**

Wording for the legal statement above is adapted from the legal statement for *Trigonometry*, published in 2009 by The CK-12 Foundation: <http://about.ck12.org/>

This guide is to help students use a **pictorial** approach to solving proportions by equivalent fractions. In other words, it’s to help students understand a picture that represents the following:

$$ \frac{8}{20}=\frac{x}{100}$$

$$ \frac{8}{20}=\frac{x}{100}$$

• 5

$$ \frac{8}{20}=\frac{x}{100}$$

• 5

• 5

$$ \frac{8}{20}=\frac{x}{100}$$

• 5

• 5

• ?

x = 40

**Step 1**

**Step 2**

**Step 3**

**Step 4**

40

* I’ve created two versions of this picture guide. I’m not sure whether/how I’ll fit them into the overall proportions/ratios unit eventually, but I thought I’d make them available to the public now for those who are interested.
* The first one has fewer steps, but that version of the process only works in a proportion in which you’re scaling UP by a given factor (like multiplying be 5 above)
* The second one has more steps, but it works both directions, for scaling up or scaling down).

**v.1**

**Proportion Picture Guide**

$2

3 candies

11 candies

x dollars

$2

3 candies

11 candies

x dollars

$2

3 candies

11 candies

x dollars

$2

3 candies

11 candies

x dollars

Question: If 3 candies cost $2, then at that rate how much do 11 candies cost?

Is there a ratio we know both parts of? Can we draw and label a picture of it?

For the ratio we DON’T know, can we at least label the amounts?

Now let’s start the second picture. To keep the ratios the same, we have to copy the first picture. Let’s copy it once.

copy

Do we have to copy the ratio more times to match the labels on this picture?

This label says “11 candies”, so we need 11 boxes here. We can get 9 boxes like this.

In this problem, if we copy the whole ratio again, we’ll have too much. We can copy just part of it.

If we count how many boxes represent the “x”, we’ll find out what “x” is. That’s it!

x = 7.3 dollars (approximately)

**v.2**

**Proportions Picture Guide**

**Step 1:**

Question: In a recipe for fruit punch, you use 3 liters of lemonade with 6 liters of Sprite. If you had just 2 liters of Sprite, how much lemonade would you need?

6 liters Sprite : 3 liters lemonade

2 liters Sprite : x liters lemonade

Let’s write the ratios being compared in the problem.

**Step 3:**

6 liters Sprite : 9 liters lemonade

2 liters Sprite : x liters lemonade

**Step 2:**

**6 liters Sprite** : 9 liters lemonade

**2 liters Sprite** : x liters lemonade

Which 2 numbers with matching labels do we know both values of?

matching

We’ll pick the smaller matching number and draw a picture of it.

**Step 4:**

6 liters Sprite : 9 liters lemonade

2 liters Sprite : x liters lemonade

Let’s copy the picture of the smaller number over and over, until it adds up to the matching number.

Copy 3 times

 We have to copy this picture 3 times to get 6 liters.

**Step 5:**

6 liters Sprite : 9 liters lemonade

2 liters Sprite : x liters lemonade

Now we just draw blanks for the other amounts.

**\_\_ \_\_ \_\_**

**\_\_**

Since we copied the other picture 3 times here, we draw 3 blanks.

Since we drew this picture only once, we make only 1 blank.

**Step 6:**

6 liters Sprite : **9** liters lemonade

2 liters Sprite : **x** liters lemonade

What does “x” have to represent to make the blank spaces add up right?

**\_\_ \_\_ \_\_**

**\_\_**

Each of these blanks has to be 3, to add up to 9.

That tells us that “x” in this picture has to be 3.

3 3 3

3

**Step 7:**

6 liters Sprite : 9 liters lemonade

2 liters Sprite : **x** liters lemonade

Let’s finish by drawing the rest of the picture.

We draw 3 boxes on each blank here.

And we draw 3 boxes here.

3 3 3

3

**We’re done! *x* = 3, and we have a picture to prove it.**