Brooke CHARTER SCHOOLS

6th Grade Math
3.06

<table>
<tr><td>Standard:
6.RP.3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
6.RP.3.a: Make tables of equivalent ratios relating quantities with whole- number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.</td><td>Big Idea:
Ratio tables, like bar models/tape diagrams, are another tool to organize and scale ratios. Ratio tables do not need to be in a particular order and can be used to find many equivalent ratios.</td></tr>
<tr><td colspan="2">Point:
Fill in and use a ratio table to solve real world scenarios.</td></tr>
<tr><td colspan="2">Vocab: *Indicates this is the first lesson this vocab is used
<u>Simplified ratio</u>: a ratio that has parts or totals with no common factor to scale down by.
<u>Scale factor</u>: The number you multiply a ratio by to get an equivalent ratio.
<u>Equivalent ratios</u>: Two ratios that express the same relationship between numbers. Equivalent ratios are created by multiplying or dividing both parts of a given ratio by the same number.
<u>Ratio</u>: A scalable relationship between two or more quantities with a distinct order. This can be expressed as part to part or part to total.</td></tr>
<tr><td colspan="2">Extra materials:
None</td></tr>
<tr><td colspan="2">Misconceptions:
Not scaling both parts (or total) of a ratio by the same scale factor
Not knowing what to do when you can’t scale with a whole number (simplify the ratio then try scaling up)</td></tr>
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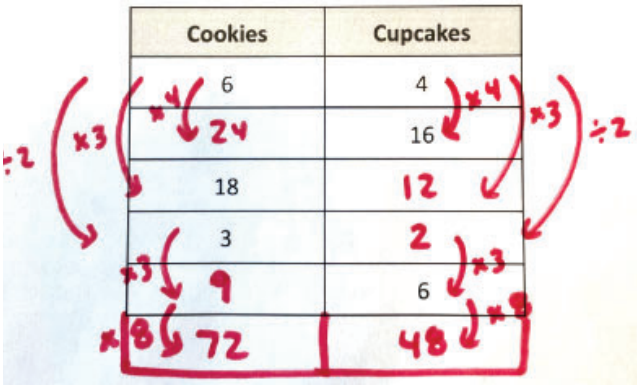
Notes for teachers:
This is the first lesson on ratio tables. In the next few lessons, students should only be using ratio tables until they're really comfortable with them. After a few lessons, we'll have them pick the strategy (table or scaling with colon notation) that works best. Students will need to read, fill in, add to and create ratio tables in this lesson.

By the end of the lesson, students should be able to articulate that ratio tables can be used to create equivalent ratios and be able to show how to find missing parts and totals.

Throughout the lesson, push the vocabulary "scaling the ratio", "simplified ratio" and "equivalent ratio."

Problem Solving Task (20 min):
1. The table below is called a **ratio table**. A ratio table is a tool that you can use to create and organize equivalent ratios. The ratio table below shows the ratio between cookies and cupcakes at a birthday party (6:4).

a. Knowing what you know about how to create equivalent ratios, fill out the missing part of the table.



b. What information is in a ratio table? How can that information be used?
It shows a ratio then rows of equivalent ratios. You can draw arrows with the scale factor to find missing parts of equivalent ratios.

Discussion: Core questions that should be asked, and potential answer

- **Say**: Turn and talk with your partner: what's in a ratio table and how can they be used?
  - *A ratio table shows a ratio in a row (or column in horizontal tables).*
  - *It can be used to create and organize equivalent ratios*
- **Ask**: Remind me: what's an equivalent ratio?
  - *A ratio that has the same value when multiplied by a scale factor*
- **Say**: Ratio tables, like bar models and scaling ratios with colon notation, are a tool to find equivalent ratios. For the next few lessons, we'll learn how to read them, use them and make them.
- **Ask**: We know that the original ratio is 6 cookies for every 4 cupcakes. What was your strategy to find the missing parts of the other equivalent ratios?
  - *(Have several students share what they wrote for part b or show written work for part b and have students evaluate or add to it)*

c. If there are 48 cupcakes, how many cookies are there? Show work.
72 cookies (look to see if students solve this by adding 48 to their table under cupcakes)
	• **Say**: Turn and talk with your partner: describe in words what you did to fill out each row in the table.
	  ○ *(Give students plenty of time to talk so that they are practicing verbalizing their thought process)*
	
	Pick students who are articulating their work clearly to come to the board and share how they found missing cells in the table. Draw the arrows they tell you to draw and label them with the scale factor they are using.
	
	Check for understanding every so often: for example, "Why is 24 a reasonable number of cookies, if there are 16 cupcakes? …Why **wouldn't** 10 be a reasonable answer?" You're looking for students to recognize 24 is logical because the amount of cookies should **always** be more than the amount of cupcakes for the ratio to be true.
	
	Follow the same process for the other three blanks by having one student narrate their thought process and work while you model the work on the board.
	
	The last row is an interesting one to talk about because you can't use the original ratio to scale to 6 cupcakes. Instead students need to recognize they can scale the simplified ratio they just found in the previous row to scale (x3) to 6 cupcakes. By the end of reviewing the table, students should recognize that it doesn't matter the order of the rows of ratios or if the simplified ratio is written first.
	
	• **Ask**: How can we **use** this ratio table to solve part c?
	  ○ *Add a row and put 48 under cupcakes. Then scale from the original ratio (or any equivalent ratio) to find the number of cookies.*

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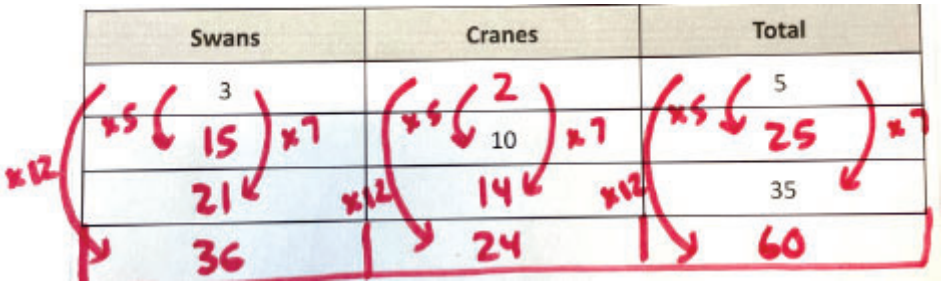
	If you had a student do this work during the PST, show their work. ● **Ask**: What are your takeaways from today's PST? ○ *(Use students' takeaways to generate notes)* **Notes:** ● **Ratio table = a tool that I can use to create and organize equivalent ratios by scaling up OR down by the same number.** ● **Every row** (or column as seen in Section A #1) **shows an equivalent ratio.**
Section A (15 min): ● Fill in and use part to part ratio tables	#1 is from the 6th Grade NYS 2013 No item # (no data) #2 is from the 6th Grade NYS 2022 Item 2 (State 53%)
Section B (*remaining time*): ● Fill in and use part to part to total ratio tables	Students will now see a third column represent the total of the ratio. Make sure students are solid in their understanding that two parts of a ratio can be added together to find a total and a total can be subtracted by a part to find the other part.

Exit Ticket (5 min):

1. Arianna is making origami swans and cranes for her friend's birthday party.

a. Complete the ratio table below and then answer the questions that follow.



b. If she makes 36 swans, how many cranes does she make? Show your work by adding to the ratio table.

She will make 24 cranes. (Work should be shown by adding a row to the table. It's okay if the total, 60, is not found since the question doesn't ask for it)

Name: _____

Classwork

Problem Solving Task:

1. The table below is called a **ratio table**. A ratio table is a tool that you can use to create and organize equivalent ratios.

The ratio table below shows the ratio between cookies and cupcakes at a birthday party.

a. Knowing what you know about how to create equivalent ratios, fill out the missing part of the table.

Cookies	Cupcakes
6	4
	16
18	
3	
	6

b. What information is in a ratio table? How can that information be used?

c. If there are 48 cupcakes, how many cookies are there? Show work.

Section A:

1. The table below shows the number of tea bags needed to make different amounts of iced tea.

Number of Tea Bags	Total Quarts of Iced Tea
8	2
16	4
24	?
36	9

What is the total number of quarts of iced tea that can be made with 24 tea bags?

(A) 5

(B) 6

(C) 7

(D) 8

2. A farmer places beehives containing bees in her orchard to pollinate the plants. The table below shows the ratio of the number of beehives to the number of acres in the orchard.

BEEHIVES PER ACRE

Number of Beehives	3	9	12	18
Number of Acres	8	24	32	?

If the bees pollinate the plants at a constant rate, how many acres will be pollinated by the bees in 18 beehives?

(A) 38

(B) 40

(C) 44

(D) 48

3. Below is a ratio table that shows the ratio of movies watched to books read by Kassandra. Fill in the table with **three** other equivalent ratios!

Movies	1			
Books	6			

4. Below is a ratio table that shows the ratio of teachers to students in Madison Middle School. Fill in the missing parts.

Teachers	**Students**
3	33
9	
	11
	110

5. Javier has a new job designing websites. He is paid in a ratio of $60 for every 3 pages of web content that he builds. Use the ratio table to answer the questions that follow.

Total webpages built	3		
Total money earned	60		

a. One week, Javier builds 15 web pages, how much money did he earn?

b. Javier is saving up to purchase a new cell phone that costs 480 dollars. How many pages would he need to build in order to buy the cell phone?

Section B:

6. The table below shows the amount of water and tea concentrate needed to make iced tea.

a. Complete the ratio table using the information provided.

Water (quarts)	**Tea concentrate** (quarts)	**Total amount of iced tea** (quarts)
4		6
	1	
		24

b. How much tea concentrate should be added to 8 quarts of water?

7. Jessica loves purple paint! Last year she played around with adding blue and red paint together until she found what she thinks is the perfect shade of purple paint. To get her favorite shade of purple paint she mixes 4 cups of blue paint with 6 cups of red paint. Complete the ratio table below.

Cups of blue paint	Cups of red paint	Cups of purple paint
4		10
	3	
10		25
8		
	9	

8. The student council is selling bouquets of daisies and tulips. The ratio of the number of daisies to the number of tulips is the same for all the bouquets, although the number of flowers in each bouquet varies. Use ratios to figure out the missing information in the table.

Number of Daisies	Number of Tulips	Total Flowers
	6	
24	12	
	18	
120		

Name: _____

Exit Ticket

1. Arianna is making origami swans and cranes for her friend's birthday party.

a. Complete the ratio table below and then answer the questions that follow.

Swans	Cranes	Total
3		5
	10	
		35

b. If she makes 36 swans, how many cranes does she make? Show your work by adding to the ratio table.

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Name: _____

Homework

Math Class:

1. A school organized a paper recycling competition. The table below shows the amount of oil and the amount of water saved by recycling paper.

a. Fill in the missing values in the table below.

Amount of oil saved (gallons)	**Amount of water saved** (gallons)
350	70
	140
35	
	1
25	

b. How many gallons of water will be saved if 50 gallons of oil are saved? Show your work by adding a row to your ratio table.

c. What is the simplified ratio of the amount of oil saved to the amount of water saved?

2. Ms. Martinez is making playlists to listen to on the bus. For every 4 hip hop songs on her playlist, she adds 3 reggae songs.

a. Fill in the missing values on the ratio table below:

Hip Hop Songs	Reggae Songs	Total Songs on Playlist
4	3	
8		14
	15	
40		
		84

Add to your table to answer the following questions:

b. If Ms. Martinez has a playlist with 32 hip hop songs, how many reggae songs will it have?

c. If Ms. Martinez ended up with 49 songs on her playlist, how many were hip hop songs? How many songs were reggae songs?