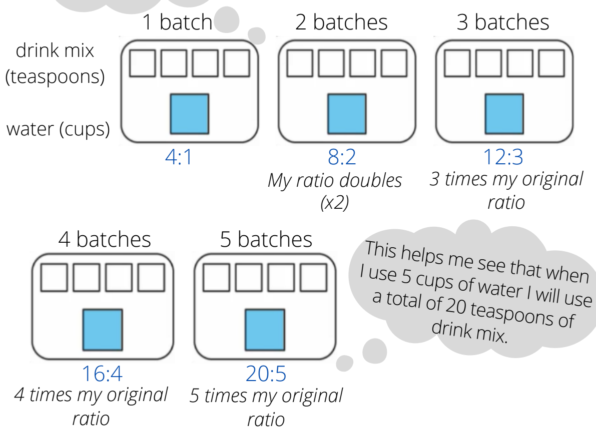
Equivalent Ratios and Proportions

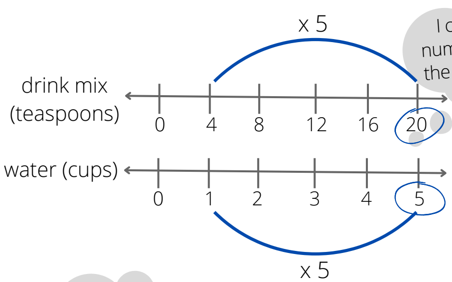
We can make a juice mixture by mixing 4 teaspoons of powdered drink mix for every cup of water. How many teaspoons of drink mix are needed if we use 5 cups of water?

I can create a model showing a ratio of 4 teaspoons of mix to every 1 cup of water or 4:1.



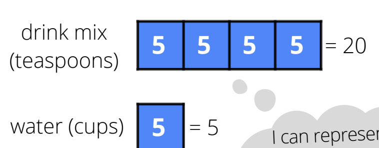
This helps me see that when I use 5 cups of water I will use a total of 20 teaspoons of drink mix.

I can also use double number line to represent the same ratios as above.



A ratio table is another way to represent and find equivalent ratios. I can scale up ti 5 batches of drink mixture.

	x 2	x 3			
drink mix (tsp)	4	8	12	16	20
water (cups)	1	2	3	4	5
	x 2	x 3			



I can represent my thinking using a bar model that shows a ratio of 4:1.

Greatest Common Factor (GCF)

Casey is making balloon bunches from 6 red balloons and 15 blue balloons. He wants the same number of red balloons and the same number of blue balloons in each bunch. What is the greatest number of balloon bunches that Casey can make using all the balloons?

Red Balloons

Number of Bunches	**1**	2	(**3**)	6
Number of Red Balloons	6	3	2	1

I can make a ratio table to show all the factors of 6 and all the factors of 15.

Blue Balloons

Number of Bunches	**1**	(**3**)	5	15
Number of Blue Balloons	15	5	3	1

The common factors in the number of bunches are 1 and 3. The GCF is 3.

The greatest number of balloon bunches that Casey can make is 3.

Distributive Property

The number of visitors to the Gilbert Museum over two different days can be represented as the sum 42 + 15. What are two equivalent representations of this sum?

42	
1	42
2	21
(3)	14
6	7

First, I need to find all the factors of 42 and 15. I can use a ratio table for this. The greatest common factor is 3.

15	
1	15
(3)	5

Since I know the greatest common factor of the two addends is 3, I can factor out a 3 from each term. I can rewrite the expression as

3 groups of 14 x 5
OR
3 (14 x 5)

I can also factor out the 3 from my original expression and then distribute the 3 cross each term which gives me the expression

(3 x 14) + (3 x 5) =

Order Of Operations

$35 \div 7 + 10 \times 3^2$

$35 \div 7 + 10 \times 9$

$5 + 90$

$= 95$

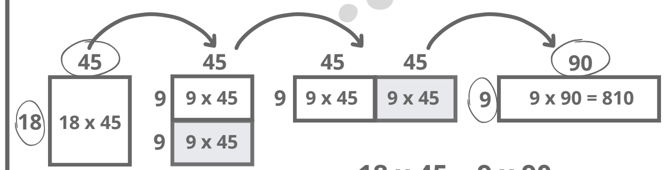
Next, I need to do multiplication and division in the order that they appear.

Since there aren't any parentheses, I will start with the exponent. The exponent 3^2 is the same as 3 x 3.

Multiplication: Doubling and Halving

18 x 45 =

I can **double** one factor (45) and **halve** the other (18). My product is will be the same. This will make my problem easier to work with.



18 x 45 = 9 x 90

Multiplication (Decimals): Area Model

2.63 x .43 =

2 .6 .03 .4 .03

	2 ones +	**6 tenths** +	**3 hundredths**
4 tenths +	(.4 x 2) = .8	(.4 x .2) = .24	(.4 x 0.03) = 0.012
3 hundredths	(0.03 x 2) = 0.06	(.03 x .6) = .018	(.03 x .03) = 0.009

.8 + [.06 + .24] + [.018 + .012] + .0009 =

[.8 + .3] + [.03 + .0009] =

1.1 + .0309 = **1.1309**

Multiplication (Decimals): Partial Products

2.63 x .43 =

2 .6 .03 .4 .03

I notice that the order I choose to multiply doesn't matter since I will be adding the product of each smaller equation in order to find the product of the original equation.

2 + .6 + .03
x .4 + .03

(.03 x .03) =	0.0009
(.03 x .6) =	0.0180
(.03 x 2) =	0.0600
(.4 x .03) =	0.0120
(.4 x .6) =	0.2400
(.4 x .2) =	+ 0.8000
2.63 x .43 =	**1.1309**

I line up the decimal points and write 0's to help me keep the place values aligned.

Multiplication: Standard Algorithm

2.63 ⟵ 2 decimal places
x .43 ⟵ 1decimal place
789
+ 10420
1.1109 ⟵ 3 decimal places in the product

Division: (Decimals) Partial Quotients

8.6
0.24 ⟌ 2.064
-1.200 (5)
0.864
-0.480 (2)
0.384
-0.240 (1)
0.144
-0.120 (0.5)
0.024
-0.024 (0.1)
0

5 + 2 + 1 + 0.5 + 0.1 = **8.6**

A ratio table helps me identify groups of 0.24.

I can keep track of the partial quotients as I subtract from the dividend.

	0.24
0.1	0.024
0.5	0.120
1	0.24
2	0.48
10	2.40
5	1.20
7	1.68

Division: (Decimals) Expanded Notation

I can add the partial quotients together to find the final quotient.

0.1 + 0.5 + 1 + 2 + 5 = **8.6**

0.24 ⟌ 2.064
-1.200
0.864
-0.480
0.384
-0.240
0.144
-0.120
0.024
-0.024
0

	0.24
0.1	0.024
0.5	0.120
1	0.24
2	0.48
10	2.40
5	1.20
7	1.68

Division: (Decimals): Scaling

2.064 ÷ 0.24 =

I can scale my problem up to make a friendlier number and my quotient stays the same.

$\frac{2.064}{0.24} \times \frac{100}{100} = \frac{206.4}{24} =$ **24 ⟌ 206.4**

Division: (Decimals) Standard Algorithm

8.6
24 ⟌ 206.4
-192 ↓
14.4
-14.4
0

Now that I have removed the decimals in my divisor by scaling my equation, I can divide more easily.

A ratio table helps me see the best way to combine groups of 24.

	24
1	24
10	240
5	120
0.1	2.4
.5	12
.6	14.4
8	192

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Grade 6 Models and Strategies

- **Ratios and Proportions**
- **Multiplication**
- **Division**

This brochure highlights some of the models and strategies used to develop computational fluency through a deep understanding of place value, number sense, and properties of operations.

By learning multiple strategies, students think flexibly, make connections, and choose the most effective and efficient strategy for problem solving.