

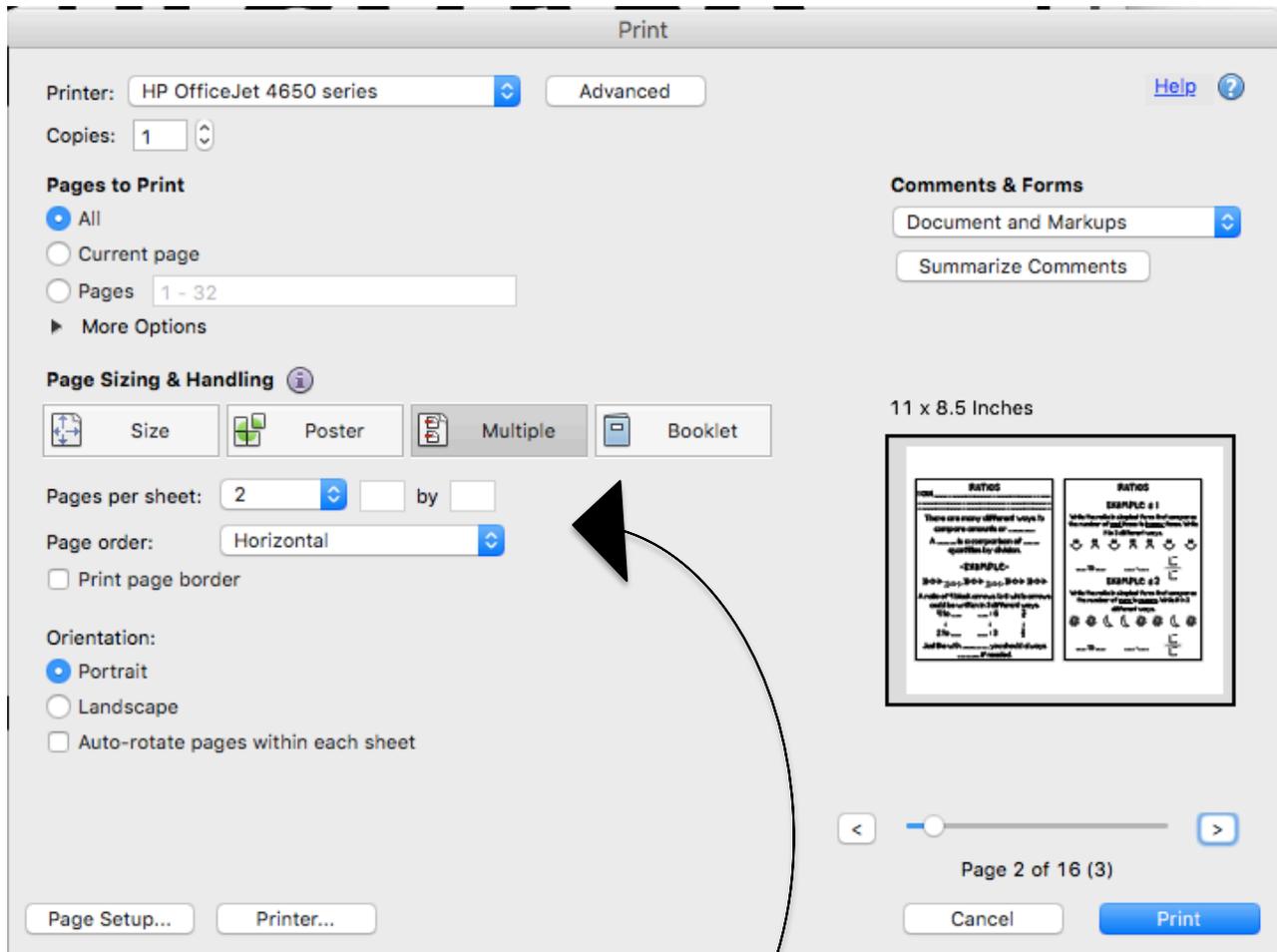
**6TH GRADE**

**6.RP.A**

**RATIO & RATES**

**STUDENT  
GUIDED NOTES**

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# VOCABULARY

<b>WORD</b>	<b>DEFINITION</b>
<b>RATIO</b>	
<b>RATE</b>	
<b>UNIT RATE</b>	
<b>EQUIVALENT RATIO</b>	
<b>RATIO TABLE</b>	
<b>SCALING</b>	
<b>UNIT PRICE</b>	

# RATIOS

I CAN \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

There are many different ways to compare amounts or \_\_\_\_\_.

A \_\_\_\_\_ is a comparison of \_\_\_\_\_ quantities by division.

## -EXAMPLE-



A ratio of 4 black arrows to 6 white arrows could be written in 3 different ways.

4 to \_\_\_

\_\_\_ : 6

$\frac{4}{6}$

↓

↓

↓

2 to \_\_\_

\_\_\_ : 3

$\frac{2}{3}$

Just like with \_\_\_\_\_, you should always \_\_\_\_\_ if needed.

# RATIOS

## EXAMPLE # 1

Write the ratio in simplest form that compares the number of sad faces to happy faces. Write it in 3 different ways.



---- TO ----

---- : ----


## EXAMPLE # 2

Write the ratio in simplest form that compares the number of suns to moons. Write it in 3 different ways.



---- TO ----

---- : ----


# RATIOS

## COMPARE CATEGORICAL DATA

Categorical data can only be assigned to \_\_\_\_\_ group.

\_\_\_\_\_ diagrams and frequency \_\_\_\_\_ can be used to represent categorical data.

\_\_\_\_\_ can be used to compare the data.

### EXAMPLE # 1

Several students named their favorite flavor of ice cream. Write the ratio that compares the number who chose chocolate to the total number of students.

Flavor	#
Vanilla	9
Strawberry	8
Chocolate	3
Oreo	1

Chocolate: \_\_\_\_\_

Total:  $9 + 8 + 3 + 1 =$  \_\_\_\_\_

The ratio is \_\_\_\_\_ to \_\_\_\_\_ or the fraction \_\_\_\_\_ = \_\_\_\_\_ .

The simplest form of the ratio is \_\_\_\_\_.

# RATIOS

## COMPARE CATEGORICAL DATA

### EXAMPLE #2

Saturday's yogurt sales are recorded in the table. Write the ratio that compares the sales of strawberry yogurt to the total sales.

Flavor	# sold
Peach	3
Blueberry	6
Vanilla	7
Strawberry	8

Strawberry: \_\_\_\_\_

Total: \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_

Strawberry yogurt sold →  $\frac{\square}{\square} = \frac{\square}{\square}$

Total Sold →  $\frac{\square}{\square}$

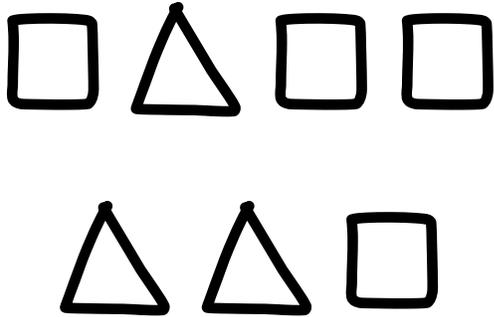
OR

\_\_\_\_\_ TO \_\_\_\_\_

So \_\_\_\_\_ out of every \_\_\_\_\_ yogurt cups were strawberry.

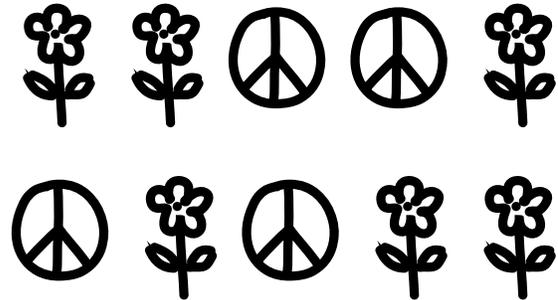
# RATIOS PRACTICE

Triangles to squares



--- to ---

Flowers to Peace Signs



--- to ---

The table shows the number of books Davie has read. Find the ratio of graphic novels to the total.

Type	# books
Graphic Novel	10
Nonfiction	7
Mystery	5
Western	2

-----

A pet store sold the animals listed in the table in one week. Write the ratio of cats to pets sold that week.

Type	# books
Birds	10
Cats	14
Dogs	8
Hamsters	3

-----

# RATES

I CAN \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

To write a rate as a \_\_\_\_\_, divide the \_\_\_\_\_ and the \_\_\_\_\_ of the rate by the denominator.

## -EXAMPLE-

Josie picked 45 oranges in 5 minutes. Write this rate as a unit rate.

1. Write the rate as a fraction.
2. Compare the number of oranges to the number of minutes.
3. Then divide.

$$\frac{45 \text{ oranges}}{5 \text{ minutes}} = \frac{\text{---- oranges}}{\text{---- minutes}}$$

The diagram illustrates the simplification of the rate  $\frac{45 \text{ oranges}}{5 \text{ minutes}}$  to a unit rate. It shows the original fraction on the left, an equals sign in the middle, and the simplified fraction on the right. Two curved arrows indicate the division process: one above the equation pointing from the denominator '5 minutes' to the denominator '---- minutes' with a division symbol '÷ 5' above it, and one below the equation pointing from the numerator '45 oranges' to the numerator '---- oranges' with a division symbol '÷ 5' below it.

So the unit rate is \_\_\_\_\_, or 9 oranges per minute.

# RATES

## EXAMPLE # 1

Tyler downloaded 35 songs in 5 minutes. How many songs did he download per minute?

$$\frac{\text{---- songs}}{\text{---- minutes}} = \frac{\text{---- songs}}{\text{---- minutes}}$$

Diagram illustrating the relationship between the two fractions:

- The top fraction is  $\frac{\text{---- songs}}{\text{---- minutes}}$ .
- The bottom fraction is  $\frac{\text{---- songs}}{\text{---- minutes}}$ .
- The two fractions are separated by an equals sign (=).
- Curved arrows indicate the relationship between the terms: one arrow points from the denominator of the left fraction to the numerator of the right fraction, and another arrow points from the denominator of the right fraction to the numerator of the left fraction. Each arrow is accompanied by a division symbol ( $\div$ ) and a blank line (---).

## EXAMPLE # 2

Erica is baking several loaves of bread to sell in his bakery. He used 12 cups of water and 6 cups of whole wheat flour. How much water was used per cup of flour.

$$\frac{\text{---- water}}{\text{---- flour}} = \frac{\text{---- water}}{\text{---- flour}}$$

Diagram illustrating the relationship between the two fractions:

- The top fraction is  $\frac{\text{---- water}}{\text{---- flour}}$ .
- The bottom fraction is  $\frac{\text{---- water}}{\text{---- flour}}$ .
- The two fractions are separated by an equals sign (=).
- Curved arrows indicate the relationship between the terms: one arrow points from the denominator of the left fraction to the numerator of the right fraction, and another arrow points from the denominator of the right fraction to the numerator of the left fraction. Each arrow is accompanied by a division symbol ( $\div$ ) and a blank line (---).

# UNIT PRICE

The Unit Price is the cost per \_\_\_\_\_.

To write a price as a \_\_\_\_\_, divide the \_\_\_\_\_ and the \_\_\_\_\_ of the rate by the denominator.

## -EXAMPLE-

Josie spent \$36 on 4 tickets to the fair. How much did one ticket cost?

The diagram illustrates the process of finding the unit price. It shows two equivalent fractions separated by an equals sign. The left fraction has a numerator of \$36 and a denominator of 4 tickets. The right fraction has a numerator of \$ \_\_\_\_ and a denominator of \_\_\_\_ tickets. Two curved arrows, one above and one below the equals sign, both point from the left fraction to the right fraction and are labeled with  $\div 4$ , indicating that both the numerator and denominator of the left fraction are divided by 4 to obtain the right fraction.

$$\frac{\$36}{4 \text{ tickets}} = \frac{\$ \text{ ____}}{\text{ ____ tickets}}$$

So the cost per unit, or per ticket is \_\_\_\_\_.

# UNIT PRICE

## -EXAMPLE-

Four potted plants cost \$88. What is the price per plant?

$$\frac{\$ \text{-----}}{\text{----- plants}} = \frac{\$ \text{-----}}{\text{----- plants}}$$

So, the price per plotted plant is -----.

---

## PRACTICE

Joshua's cousin pledged \$12 for a charity walk. If Joshua walked 3 miles, how much did his cousin pay per mile?

# RATES PRACTICE

Write as a unit rate.

44 points in 4  
quarters

-----

Write as a unit rate.

125 feet in 5 seconds

-----

Theo's mom bought an eight-pack of juice boxes at the store for \$4. find the unit rate for the juice boxes.

-----

Leo went out to eat with 5 other friends. They spent \$72 on 6 steaks. Find the unit rate for each steak.

-----

# RATIO TABLES

I CAN \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

A ratio \_\_\_\_\_ has \_\_\_\_\_ that are filled with \_\_\_\_\_ of numbers that have the same \_\_\_\_\_.

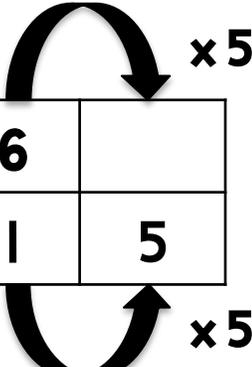
\_\_\_\_\_ ratios express the same relationship between \_\_\_\_\_.

## EXAMPLE

To make the yellow icing, you mix 6 drops of yellow food coloring with 1 cup of white icing. How much yellow food coloring should you mix with 5 cups of white icing to get the same shade?

Use the ratio table. Since  $1 \times 5 = 5$ . Multiply each quantity by 5

Drops of Yellow Food Coloring	6	
Cups of Icing	1	5



So add \_\_\_ drops of yellow food coloring to 5 cups of icing.

# RATIO TABLES

## EXAMPLE # 1

In a recent year, Grant won a hot dog eating contest by eating nearly 66 hot dogs in 12 minutes. If he ate at a constant rate, determine how many hot dogs he ate every 2 minutes.

Divide each quantity by 1 or more common factor until you reach 2 minutes.

Hot Dogs	66		
Time (min)	12		2

Diagram illustrating the simplification process:

- From 66 to 33:  $\div 2$
- From 33 to 11:  $\div 3$
- From 12 to 6:  $\div 2$
- From 6 to 2:  $\div 3$

So he ate about \_\_\_\_\_ hot dogs every 2 minutes.

## PRACTICE

To make cranberry jam, you need 12 cups of sugar for every 16 cups of cranberries. Find the amount of sugar needed for 4 cups of cranberries.

Sugar	12		
Cranberries	16		4

So you need \_\_\_\_\_ cups of sugar for every 4 cups of cranberries.

# RATIO TABLES & SCALING

Multiplying or dividing two related \_\_\_\_\_ by the same number is \_\_\_\_\_.

Sometimes you may need to \_\_\_\_\_ back and then \_\_\_\_\_ forward to find an equivalent ratio.

## EXAMPLE 1

Cans of corn are on sale at 10 for \$4. find the cost of 15 cans.

Cans of Corn	10		15
Cost in Dollars	4		

Diagram illustrating the scaling process for the ratio table. The table shows 10 cans for \$4 and 15 cans for an unknown cost. Arrows indicate the scaling factors:  $\div 2$  and  $\times 3$  are shown above the table, and  $\div 2$  and  $\times 3$  are shown below the table.

So, 15 cans of corn would cost \$\_\_\_\_\_.

## PRACTICE

A child's height measures 105 centimeters. Estimate her height in inches.

Height (cm)	25		105
Height (in)	10		

The child's height is about \_\_\_\_\_ inches.

# RATIO TABLE PRACTICE

To make 5 apple pies, you need about 2 pounds of apples. How many pounds of apples do you need to make 20 apple pies?

Number of Pies	5		2
Pounds of Apples	20		

You need \_\_\_\_\_ pounds of apples to make 20 apple pies.

Before leaving to visit Mexico, Kevon traded 270 American Dollars and received 3,000 Mexican Pesos. When he returned from Mexico, he had 100 pesos left. How much will he receive when he exchanges the pesos for American Dollars.

American Dollars	270		
Mexican Pesos	3,000		100

Kevon will receive \_\_\_\_\_ American dollars for his 100 pesos.

Four balls of wool will make 8 knitted caps. How many balls of wool will Asia need if he wants to make 6 caps?

Balls of Wool	4		
Number of Caps	8		6

Asia needs \_\_\_\_\_ balls of wool to make 6 caps.

On a bike trip across the US, Tyler notes that he covers about 190 miles every 4 days. If he continues at this rate, use the ratio table to determine about how many miles he could bike in 6 days.

Miles Biked			
Days			

Tyler will bike \_\_\_\_\_ miles in 6 days.

# **ANSWER keys**

# VOCABULARY

<b>WORD</b>	<b>DEFINITION</b>
<b>RATIO</b>	The relative sizes of two values.
<b>RATE</b>	The ratio between two related quantities.
<b>UNIT RATE</b>	The comparison of two different quantities when they are combined together.
<b>EQUIVALENT RATIO</b>	Two ratios that have the same quantities.
<b>RATIO TABLE</b>	A table that represents the relationships between different ratios.
<b>SCALING</b>	Using ratios to scale things up or down.
<b>UNIT PRICE</b>	The cost per unit.

# RATIOS

I CAN understand how to use a ratio and use ratio language.

There are many different ways to compare amounts or **quantities**.

A **ratio** is a comparison of **two** quantities by division.

## -EXAMPLE-



A ratio of 4 black arrows to 6 white arrows could be written in 3 different ways.

4 to 6                  4 : 6                   $\frac{4}{6}$

2 to 3                  2 : 3                   $\frac{2}{3}$

Just like with **fractions**, you should always **simplify** if needed.

# RATIOS

## EXAMPLE # 1

Write the ratio in simplest form that compares the number of sad faces to happy faces. Write it in 3 different ways.



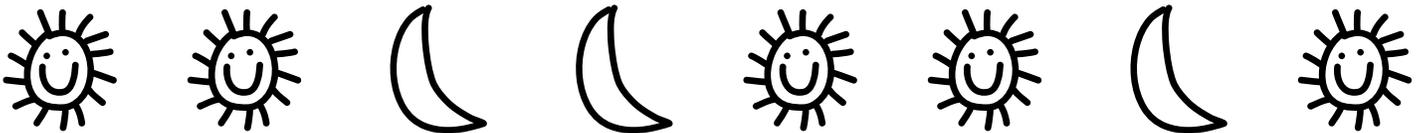
3 TO 4

3 : 4

$\frac{3}{4}$

## EXAMPLE # 2

Write the ratio in simplest form that compares the number of suns to moons. Write it in 3 different ways.



5 TO 3

5 : 3

$\frac{5}{3}$

# RATIOS

## COMPARE CATEGORICAL DATA

Categorical data can only be assigned to **one** group.

**Bar** diagrams and frequency **tables** can be used to represent categorical data.

**Ratios** can be used to compare the data.

### EXAMPLE # 1

Several students named their favorite flavor of ice cream. Write the ratio that compares the number who chose chocolate to the total number of students.

Flavor	#
Vanilla	9
Strawberry	8
Chocolate	3
Oreo	1

Chocolate: **3**

Total:  $9 + 8 + 3 + 1 = 21$

The ratio is **3** to **21** or the fraction  $\frac{3}{21} = \frac{1}{7}$  .

The simplest form of the ratio is  $\frac{1}{7}$  .

# RATIOS

## COMPARE CATEGORICAL DATA

### EXAMPLE #2

Saturday's yogurt sales are recorded in the table. Write the ratio that compares the sales of strawberry yogurt to the total sales.

Flavor	# sold
Peach	3
Blueberry	6
Vanilla	7
Strawberry	8

Strawberry: 8

Total:  $3 + 6 + 7 + 8 = 24$

$$\begin{array}{r} \text{Strawberry yogurt sold} \rightarrow \boxed{8} \\ \hline \text{Total Sold} \rightarrow \boxed{24} \end{array} = \frac{\boxed{8}}{\boxed{24}} = \frac{\boxed{1}}{\boxed{3}}$$

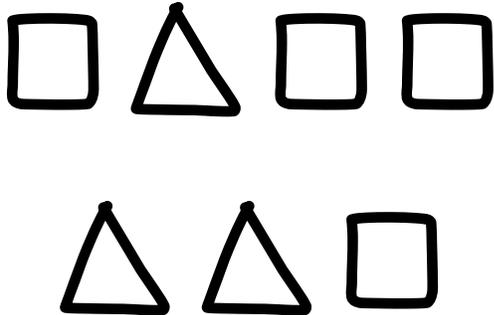
OR

**1 TO 3**

So **1** out of every **3** yogurt cups were strawberry.

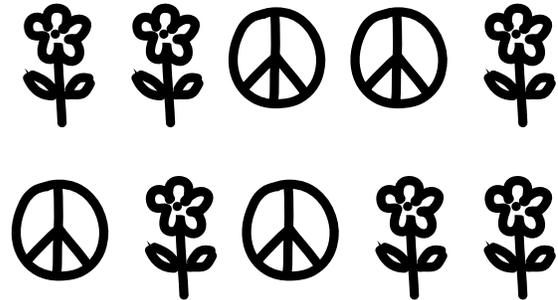
# RATIOS PRACTICE

Triangles to squares



**3 to 4**

Flowers to Peace Signs



**6 to 4 or 3 to 2**

The table shows the number of books Davie has read. Find the ratio of graphic novels to the total.

Type	# books
Graphic Novel	10
Nonfiction	7
Mystery	5
Western	2

**10 to 24 or 5 to 12**

A pet store sold the animals listed in the table in one week. Write the ratio of cats to pets sold that week.

Type	# books
Birds	10
Cats	14
Dogs	8
Hamsters	3

**14 to 35**

# RATES

I CAN use rates and use rate language.

To write a rate as a **unit rate**, divide the **numerator** and the **denominator** of the rate by the denominator.

## -EXAMPLE-

Josie picked 45 oranges in 5 minutes. Write this rate as a unit rate.

1. Write the rate as a fraction.
2. Compare the number of oranges to the number of minutes.
3. Then divide.

$$\frac{45 \text{ oranges}}{5 \text{ minutes}} = \frac{\text{---- oranges}}{\text{---- minutes}}$$

The diagram illustrates the process of simplifying the rate. It shows the original rate  $\frac{45 \text{ oranges}}{5 \text{ minutes}}$  on the left, followed by an equals sign, and then a simplified rate  $\frac{\text{---- oranges}}{\text{---- minutes}}$  on the right. Two curved arrows, one above and one below the equals sign, both labeled with  $\div 5$ , indicate that both the numerator and denominator of the original rate are divided by 5 to reach the unit rate.

So the unit rate is  $\frac{9}{1}$ , or 9 oranges per minute.

# RATES

## EXAMPLE # 1

Tyler downloaded 35 songs in 5 minutes. How many songs did he download per minute?

$$\frac{35 \text{ songs}}{5 \text{ minutes}} = \frac{7 \text{ songs}}{1 \text{ minutes}}$$

Diagram illustrating the simplification of the rate:  $\frac{35 \text{ songs}}{5 \text{ minutes}}$  is simplified to  $\frac{7 \text{ songs}}{1 \text{ minutes}}$  by dividing both the numerator and denominator by 5.

## EXAMPLE # 2

Erica is baking several loaves of bread to sell in his bakery. He used 12 cups of water and 6 cups of whole wheat flour. How much water was used per cup of flour.

$$\frac{12 \text{ water}}{6 \text{ flour}} = \frac{2 \text{ water}}{1 \text{ flour}}$$

Diagram illustrating the simplification of the rate:  $\frac{12 \text{ water}}{6 \text{ flour}}$  is simplified to  $\frac{2 \text{ water}}{1 \text{ flour}}$  by dividing both the numerator and denominator by 6.

# UNIT PRICE

The Unit Price is the cost per **unit**.

To write a price as a **unit price**, divide the **numerator** and the **denominator** of the rate by the denominator.

## -EXAMPLE-

Josie spent \$36 on 4 tickets to the fair. How much did one ticket cost?

$$\frac{\$36}{4 \text{ tickets}} = \frac{\$9}{1 \text{ tickets}}$$

So the cost per unit, or per ticket is **\$9**.

# UNIT PRICE

## -EXAMPLE-

Four potted plants cost \$88. What is the price per plant?

$$\frac{\$ 88}{4 \text{ plants}} = \frac{\$ 22}{1 \text{ plants}}$$

So, the price per plotted plant is **\$22**.

---

## PRACTICE

Joshua's cousin pledged \$12 for a charity walk. If Joshua walked 3 miles, how much did his cousin pay per mile?

**\$4.00 per mile**

# RATES PRACTICE

Write as a unit rate.

44 points in 4  
quarters

**11 points per quarter**

Write as a unit rate.

125 feet in 5 seconds

**25 ft per second**

Theo's mom bought an eight-pack of juice boxes at the store for \$4. Find the unit rate for the juice boxes.

**\$2 per juice box**

Leo went out to eat with 5 other friends. They spent \$72 on 6 steaks. Find the unit rate for each steak.

**\$12 per steak**

# RATIO TABLES

**I CAN** use a ratio table to find equivalent ratios.

A ratio **table** has **columns** that are filled with **pairs** of numbers that have the same **ratio**.

**Equivalent** ratios express the same relationship between **quantities**.

## EXAMPLE

To make the yellow icing, you mix 6 drops of yellow food coloring with 1 cup of white icing. How much yellow food coloring should you mix with 5 cups of white icing to get the same shade?

Use the ratio table. Since  $1 \times 5 = 5$ . Multiply each quantity by 5

Drops of Yellow Food Coloring	6	30
Cups of Icing	1	5

So add **30** drops of yellow food coloring to 5 cups of icing.

# RATIO TABLES

## EXAMPLE # 1

In a recent year, Grant won a hot dog eating contest by eating nearly 66 hot dogs in 12 minutes. If he ate at a constant rate, determine how many hot dogs he ate every 2 minutes.

Divide each quantity by 1 or more common factor until you reach 2 minutes.

Hot Dogs	66	33	11
Time (min)	12	6	2

Diagram illustrating the simplification of the ratio table. The table shows the number of hot dogs and time in minutes. The values are simplified by dividing by 2 and then 3, as indicated by the arrows and labels above and below the table.

So he ate about **11** hot dogs every 2 minutes.

## PRACTICE

To make cranberry jam, you need 12 cups of sugar for every 16 cups of cranberries. Find the amount of sugar needed for 4 cups of cranberries.

Sugar	12	6	3
Cranberries	16	8	4

So you need **3** cups of sugar for every 4 cups of cranberries.

# RATIO TABLES & SCALING

Multiplying or dividing two related **quantities** by the same number is **scaling**.

Sometimes you may need to **scale** back and then **scale** forward to find an equivalent ratio.

## EXAMPLE 1

Cans of corn are on sale at 10 for \$4. find the cost of 15 cans.

Cans of Corn	10	5	15
Cost in Dollars	4	2	6

Diagram illustrating scaling:  $\div 2$  (from 10 to 5) and  $\times 3$  (from 5 to 15) for Cans of Corn;  $\div 2$  (from 4 to 2) and  $\times 3$  (from 2 to 6) for Cost in Dollars.

So, 15 cans of corn would cost \$6.

---

## PRACTICE

A child's height measures 105 centimeters. Estimate her height in inches.

Height (cm)	25	5	105
Height (in)	10	2	42

The child's height is about **42** inches.

# RATIO TABLE PRACTICE

To make 5 apple pies, you need about 2 pounds of apples. How many pounds of apples do you need to make 20 apple pies?

Number of Pies	5	10	2
Pounds of Apples	20	4	8

You need **8** pounds of apples to make 20 apple pies.

Before leaving to visit Mexico, Kevon traded 270 American Dollars and received 3,000 Mexican Pesos. When he returned from Mexico, he had 100 pesos left. How much will he receive when he exchanges the pesos for American Dollars.

American Dollars	270	27	9
Mexican Pesos	3,000	300	100

Kevon will receive **9** American dollars for his 100 pesos.

Four balls of wool will make 8 knitted caps. How many balls of wool will Asia need if he wants to make 6 caps?

Balls of Wool	4	1	3
Number of Caps	8	2	6

Asia needs **3** balls of wool to make 6 caps.

On a bike trip across the US, Tyler notes that he covers about 190 miles every 4 days. If he continues at this rate, use the ratio table to determine about how many miles he could bike in 6 days.

Miles Biked	190	95	285
Days	4	2	6

Tyler will bike **285** miles in 6 days.