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## In-Class Workbook

## Ratios and Proportional Relationships: Unit 6-Part 1: Unit Rate Conversions

## How does solving problems with equivalent ratios relate to algebra?

| Standard | Description |
| :--- | :--- |
| 7.RP.A.3 | $\rightarrow$ Use proportional relationships to solve multistep ratio and percent problems. |
| 7.EE.B.4 | Use variables to represent quantities in a real-world or mathematical problem, and construct simple <br> equations and inequalities to solve problems by reasoning about the quantities. |


| Packet Completion Rubric |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{4}$ | $\mathbf{3}$ | $\mathbf{2}$ | $\mathbf{1}$ | $\mathbf{1}$ |  |
| Workbook demonstrates <br> significant effort. Student <br> utilizes notes to help <br> extend their thinking, <br> writing questions, <br> comments or reactions to <br> the content. | Workbook <br> demonstrates some <br> effort. Student takes <br> notes but could <br> further understanding <br> by questioning and <br> interacting with the <br> material. | Workbook shows little <br> effort. Student takes <br> notes sporadically, and <br> could benefit from <br> greater consistency with <br> the material. | Workbook shows little <br> to no effort. Student <br> does not take notes and <br> must demonstrate <br> future interaction with <br> the material to aid <br> understanding. | Workbook is entirely <br> incomplete or not <br> turned in. |  |

## Unit 6 Part 1 Guiding Question:



| Lesson Objectives |  |  |
| :--- | :--- | :--- |
| Lesson: | I can: |  |
| $\square 6.1$ | $\circ$ | Convert a unit of measurement by multiplying with a unit rate equivalent to 1 <br> Solve equivalent ratio problems with the use of scale factor |
| $\square 6.2$ | $\circ$ | Convert multiple units of measurement by multiplying with unit rates equivalent to <br> 1 |
| $\square$ |  | Solve equivalent ratio problems with the use of scale factor |


| Lesson 6.1 Do Now | Tori swims 200 yards in 4 minutes. Rewrite the given information as a.... <br> 1. Ratio: <br> 2. Unit Rate: <br> 3. Describe the units used in the rate: <br> When Abby went skydiving she was descending at a rate of 120 miles per hour. Rewrite the given information as a.... <br> 1. Ratio: <br> 2. Unit Rate: <br> 3. Describe the units used in the rate: |
| :---: | :---: |
| Homework Reminder | This is where you will shade in the box if you turned in your homework. There is no homework due today! :) |
| Check-In | What is one thing you are hopeful for today? <br> Come up with one nice thing you could do for someone else by the end of the day and write it below. |

Explore: What do you notice about the value of each fraction written below? Write you observation on the lines provided for you.

|  |  |  |
| :---: | :---: | :---: |
| $\frac{4}{4}$ | $\frac{1+1}{3-1}$ | $\frac{12 \text { inches }}{1 \text { foot }}$ |

## Instruction

$\qquad$ are ratios between two related units of measurements. A rate can be written so that it has a value that is equivalent to 1 .

| Example of rates <br> with a value of 1: | $\frac{60 \text { seconds }}{1 \text { minute }}=1$ | $\frac{5280 \text { feet }}{1 \text { mile }}=$ | $\frac{1 \text { mile }}{=1}$ |
| :--- | :--- | :--- | :--- |

In each of the rates in the example above, the denominator and the numerator have the same measure, but are expressed in different units. When the numerator and denominator are equivalent to one another, the value of the fraction is 1 .
*Trivia Question: $\frac{2}{4} \times \mathbf{1}=$ $\qquad$
Today we will be using unit rates, like the ones listed above, to convert rates to different units. For example, if Nancy can walk 2 miles in 25 minutes, then how many feet did she walk in 1 second?

## In this question we would need to convert to

and to $\qquad$ -

## Converting Units 101:

1. Charlie is building a model race track that is 5 feet long. How many inches would Charlie's race track be equivalent to? (Hint: 1 foot = 12 inches)

Another approach to converting feet to inches:

| Step 1. <br> Write the information <br> that in given as a <br> fraction. |  |
| :---: | :---: |
| Step 2. <br> Multiply using a rate <br> equivalent to 1, to <br> convert feet to inches. | $\frac{5 \text { feet }}{1} \times \frac{\text { inches }}{\text { feet }}=\square$ |


| Step 3. <br> Simplify |  |
| :---: | :---: |
| Step 4. <br> Restate your final <br> answer. | Charlie's model race track is $\quad<\quad$ in length. |

2. Dan estimates that when he is skateboarding he is moving at 15 miles per hour. How many feet per hour is Dan moving? (Hint 1 mile $=5280$ feet)

## Another approach to converting miles to feet:

| Step 1. <br> Write the information <br> that is given as a <br> fraction. | *Keep in mind we write ratios with time or items in the denominator |
| :---: | :---: |
| Step 2. <br> Multiply using a rate <br> equivalent to 1, to <br> convert miles to feet. | $\frac{15 \text { miles }}{1 \text { hour }} \times \frac{\text { feet }}{\text { miles }}=\square$ |
| Step 3. <br> Simplify |  |
| Step 4. <br> Restate your final <br> answer. | Dan is moving on his skateboard at a speed of |

3. Javier drove 280 miles in 4 hours. How many minutes does it take Javier to drive 280 miles? (Hint: 1 hour $=60$ minutes)

## Another approach to converting hours to minutes:

| Step 1. | $*$ Keep in mind we write ratios with time or items in the denominator |
| :---: | :--- |
| Write the information |  |


| that is given as a fraction. | $\underline{\square}$ |
| :---: | :---: |
| Step 2. <br> Multiply using a rate equivalent to 1 , to convert hours to minutes. | $\frac{\text { miles }}{\text { hours }} \times \frac{\text { hour }}{\text { minutes }}=$ |
| Step 3. Simplify |  |
| Step 4. <br> Restate your final answer. | Javier is driving at a rate of ___ miles in 240 minutes. |
| 4. Jennifer sold selling every 10 | 20 cupcakes in 6 hours while working at the farmers' market. How many cupcakes was Jennifer minutes? |
| Step 1. <br> Write the information that is given as a fraction. | *Keep in mind we write ratios with time or items in the denominator $\qquad$ |
| Step 2. <br> Multiply using a rate equivalent to 1 , to convert hours to minutes. | $\square \times \square$ |
| Step 3. Simplify | $\square=\square$ |
| Step 5. <br> Use proportional reasoning to solve the number of cupcakes sold in 10 minutes. | $\qquad$ |
| Step 4. <br> Restate your final answer. | Jennifer sells __ cupcakes in 10 minutes. |

## Your Turn!

1. 280 yards per 10 minutes is how many feet per 10 minutes?

| Step 1. <br> Write the information <br> that is given as a <br> fraction. | ${ }^{*}$ Keep in mind we write ratios with time or items in the denominator |
| :---: | :--- |
| Step 2. <br> Multiply using a rate <br> equivalent to 1, to <br> convert yards to feet. |  |
| Step 3. <br> Simplify |  |
| Step 4. When multiplying inches should be in the denominator <br> Restate your final <br> answer. |  |

2. 300 yards per 30 minutes is 300 yards per how many seconds?

Step 1.
Write the information that is given as a fraction.

## Step 2.

Multiply using a rate equivalent to 1 , to convert minutes to hours.

Step 3.
Simplify

Step 4.
Restate your final answer.

## Let's try one more for good luck!

1. Mackenzie and her sailing crew are sailing from California to Hawaii. They are moving at a rate of 192 miles per day. How many miles per hour are they moving?
2. How many miles will Mackenize and her crew sail in a 7 hour time period?

## Guided Practice

Directions: Answer each of the following question. Use a separate sheet of notebook paper as needed.


|  |  |
| :---: | :---: |
| 5. 15 miles per 2 hours is how many feet per 2 hours? | 6.99 miles in 3 minutes is how many yards in 3 <br> minutes? |

$\square$

## Fun Facts About Measuring When You Don't Have Ruler

There are those times when you need to measure stuff but you are fresh out of rulers, tape measures or other measuring tools. Here are some ways to make due until you get a more accurate tool.

- The distance from the tip of your thumb to the first knuckle can be used to approximate one inch or 2.45 cm .
- Roman merchants would measure yards of cloth by using the tip of their noses to the tips of their outstretched arms would be close to 36 inches or 91.44 cm .
- If you ever wondered what Noah used to measure a "cubit" to build the ark, you would measure the distance from your bent elbow to the tip of your middle finger or about 18 inches or 46 cm . This measurement also came in handy building the pyramids.
- Sailors used a length of rope between their outstretched arms to measure a fathom or 72 inches or 183 cm .
- The height of horses is measured in "hands." This is the distance across your joints just above the palm not including the thumb or about 4 inches or 10 cm .
- A woman's size 9 foot measures about 10 inches or 25 cm long.
- If you have a normal business card it would measure 3.5 inches long by 2 inches wide.
- A standard credit card is $33 / 8$ inches by $21 / 8$ inches.
- A good ole American dollar bill that is $61 / 6$ inches long by $27 / 12$ inches tall. Harder to counterfeit? Who comes up with these measurements? Seven twelves of an inch??
- A penny is about $3 / 4$ of an inch across and a quarter is just slightly less than 1 inch.
- Most common doorways are 6 foot eight inches high.
- The common dining room table is 30 inches high. The chairs are 15-17 inches from the floor.
Unit 6: Unit Rate Conversion (Part 2)

| Lesson 6.2 Do Now | Gary eats 20 cookies in 7 minutes. Solve how many seconds it would take Gary to eat 20 <br> cookies, by using what you have learned about converting units. |
| :--- | :--- |
|  |  |
| Homework <br> $\underline{\text { Reminder }}$ | This is where you will shade in the box if you turned in your homework. <br> Homework 6.1 is due today! |
| $\underline{\text { Check-In }}$ | What was something good that happened yesterday? |

$\square$

## Explore

Let's look back at a problem from yesterday.

1. Dan estimates that when he is skateboarding he is moving at 15 miles per hour. How many feet per hour is Dan moving? (Hint 1 mile $=5280$ feet)
a. Which unit is being converted in this problem? $\qquad$
b. Look back at your notes from yesterday, how many feet is Dan moving? $\qquad$
2. What if the problem read, how many feet does Dan move per minute?
a. Which units are being converted in this problem? $\qquad$
b. How could we solve using what we know about unit conversion?

## Drect Instuction

Today we will be solving unit conversion problems in which both the numerator and the denominator must be converted.

| Example \#1 | 1. Start by converting $\qquad$ to |
| :---: | :---: |
| A runner runs 26 miles in 4 hours. Convert this to feet and minutes. | 2. Next, convert $\qquad$ to $\qquad$ <br> 3. Your final answer should compare $\qquad$ to |
| $\frac{26 \text { miles }}{4 \text { hours }}=\frac{\text { feet } ?}{\text { minute } ?}$ | Let's look at how to solve below! |
| Step 1. <br> Convert the numerator | $\frac{26 \text { miles }}{4 \text { hours }} \times \frac{5280 \text { feet }}{1 \text { mile }}=\frac{137,280 \text { feet }}{4 \text { hours }}$ |
| Step 2. <br> Convert the denominator | $\frac{137,280 \text { feet }}{4 \text { hours }} \times \frac{1 \text { hour }}{60 \text { minutes }}=\frac{137,280 \text { feet }}{240 \text { minutes }}$ |
| Step 3. <br> Restate the final answer. | $\frac{26 \text { miles }}{4 \text { hours }}=\frac{137,280 \text { feet }}{240 \text { minutes }}$ |

${ }^{* *}$ Keep in mind: When solving unit conversion problems, start by converting the unit in the $\qquad$ .


| Step 2. <br> Use the ratio found in the last <br> step to solve for the number of <br> inches the tortoise moves in 30 <br> seconds. | $\frac{\text { inches }}{\frac{1 \text { second }}{\times 30} \times 30}=\frac{\text { inches }}{30 \text { seconds }}$ |  |
| :---: | :--- | :--- |
|  | Note: Round to the hundredths place |  |
| Step 3. <br> Restate the final answer. | The tortoise will move ___ inches in 30 seconds. |  |


| You Try! |  |
| :---: | :---: |
| Problem \#1 | 1. Start by converting $\qquad$ to |
| Drew owns a bakery that is famous for selling blueberry | 2. Next, convert $\qquad$ to $\qquad$ |
| muffins. The bakery uses 4 lbs of flour during a 2 hour time period. Use ratios to convert the units into cups per minute. | 3. Your final answer should compare $\qquad$ to $\qquad$ . |
| Initial Ratio: |  |
| Step 1. <br> Convert the numerator |  |
| Step 2. <br> Convert the denominator |  |



Step 3.
Restate the final answer.

Part II:
Nicholas needs to know how many centimeters he can run in 10 seconds. Use the information from Step 3 to solve.
Hint: *you must first solve the number of centimeters Nicholas runs in 1 second.

## CHALLENGE :-

Ailah makes a quilt that is $10 \mathrm{ft}^{2}$. It takes her 48 hours to make the quilt. At this rate, how many in ${ }^{2}$ can Ailah quilt in 30 minutes.

## Guided Practice

Directions: Answer each of the following question. Use a separate sheet of notebook paper as needed.

1. 12 miles in 3 minutes is how many feet in seconds?
2. 70 yards in 3 days is how many feet in hours?

