Edgenuity

Warm-Up | Dimensional Analysis

Lesson Question

Lesson Goals

Calculate unit _____ for rates to compare quantities.

Determine appropriate _____ to model scenarios.

_____ monetary conversions.

_____ units of measure.

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Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

accuracy	level of _____
estimate	to form an approximate opinion of _____, amount, size, or _____
measurement	the assignment of _____ to a dimension of a _____
unit rate	a rate that _____ a quantity to exactly one unit of another _____

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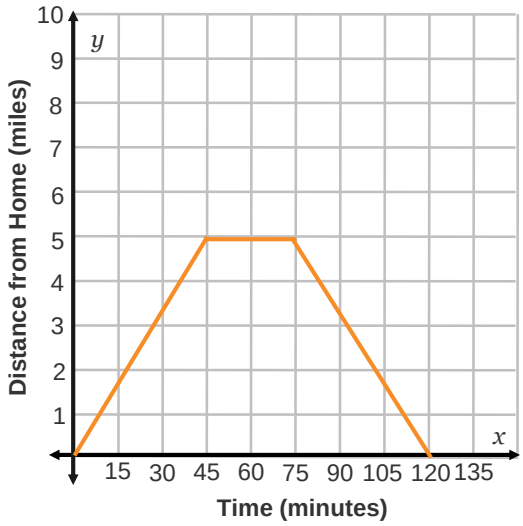
Converting Quantities Shown in a Graph

The graph represents Mike's shopping trip. During the first 45 minutes of his trip, Mike traveled 5 miles. How many hours did it take Mike to travel those first 5 miles?



The graph is giving us information in minutes, whereas the question wants to know how many hours. So that means we need to do a unit ☐.

$$\frac{45\text{ min}}{1}\left(\frac{1\text{ hrs}}{60\text{ min}}\right)=\frac{45\text{ hrs}}{60}=\frac{\square}{\square}\text{ hrs}$$

How many hours did the entire trip take?

$$\frac{\square\text{ min}}{1}\left(\frac{1\text{ hrs}}{60\text{ min}}\right)=\frac{120\text{ hrs}}{\square}=\square\text{ hrs}$$

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Determining Appropriate Quantities

FIND WHAT IS NEEDED

Daniel is painting the 3 walls of his bedroom that do not have a door. He knows that the **measurement** of the height of each wall is 78 inches and that 1 gallon of paint will cover 300 square feet of wall space.

How many gallons of paint will Daniel need?

So let's figure out what we'll need.

- [ ] in feet
- [ ] of each wall
- Total square [ ] (area)

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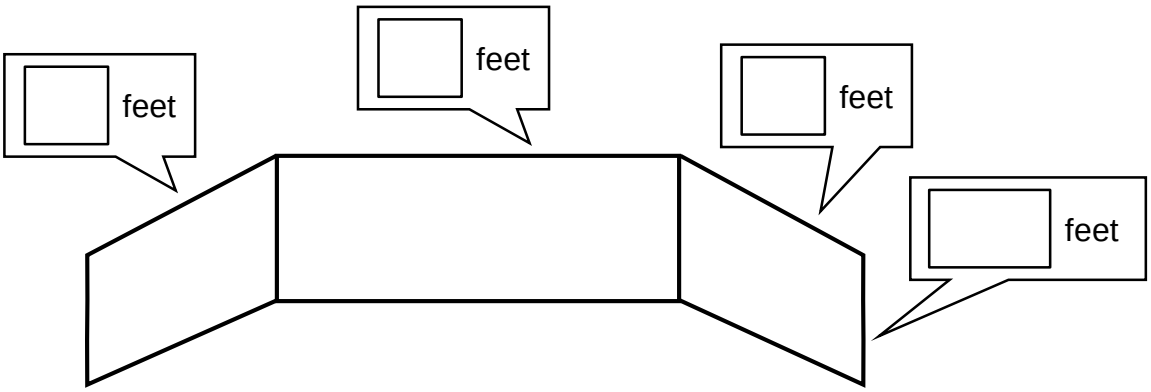
PERFORM THE CONVERSIONS

Height of each wall in feet:

$$\frac{78 \text{ in.}}{1}\left(\frac{1 \text{ ft}}{12 \text{ in.}}\right) = \frac{78 \text{ ft}}{12} = \square \text{ ft}$$

The 3 walls have lengths 7 feet, 6 feet, and 7 feet.



Area of each wall:

$(6.5 \text{ ft})(7 \text{ ft}) = \square \text{ ft}^2$

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$(6.5 \text{ ft})(7 \text{ ft}) = \square \text{ ft}^2$

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SOLVE THE PROBLEM

Put those areas together.

$$45.5\ \text{ft}^2 + 39\ \text{ft}^2 + 45.5\ \text{ft}^2 = \square\ \text{ft}^2$$

If we figure a double coat of paint, we have:

$$130\ \text{ft}^2 \times 2 = \square\ \text{ft}^2$$

1 gallon of paint will cover ☐ square feet of space, so Daniel needs ☐ gallon of paint.

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Conversion Ratios

Example: Jacob and Michael are going to run a 1-mile race. Jacob can run 2,652 yards in 15 minutes and Michael can run 7,920 feet in 0.375 hours.

Use **unit rates** to determine who will win the race.

We need to get them into the same unit rate so that we can compare the two.

Convert both to miles per hour.

Jacob: $\dfrac{2{,}652\ \text{yd}}{15\ \text{min}}\left(\dfrac{1\ \text{mile}}{\square\ \text{yd}}\right) = \dfrac{2{,}652\ \text{miles}}{26{,}400\ \text{min}}\left(\dfrac{60\ \text{min}}{1\ \text{hr}}\right)$

$\approx \square$ miles per hour

Michael: $\dfrac{7{,}920\ \text{ft}}{0.375\ \text{hr}}\left(\dfrac{1\ \text{mile}}{5{,}280\ \text{ft}}\right) = \dfrac{\square\ \text{miles}}{1{,}980\ \text{min}}$

$\approx \square$ miles per hour

☐ can go faster, so he would win the race.

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Conversions with Currency

CONVERT DOLLARS TO EUROS

Unit conversions can be used to _____, or find the approximate value of, currency exchanges.

Using the given conversion factors, how many euros equal 150 USD?

Currency	USD/1 Unit	Units/1 USD
Canadian dollar	0.97071	1.03069
Euro	1.35261	0.73935
Japanese yen	0.01007	99.30487
Indian rupee	0.01594	62.72053

1. Find the correct cell on the table.

   Circle the cell that gives the conversion rate from US dollars to euros.

2. Multiply the number of dollars by that conversion ratio.

$$\frac{150\ \text{USD}}{1}\left(\frac{0.73935\ \text{euros}}{1\ \text{USD}}\right) = \_\_\_\_\_\ \text{euros}$$

3. Round to 2 decimal places: _____ euros

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CONVERT EUROS TO DOLLARS

$150 \text{ USD} \left(\frac{0.73935 \text{ euros}}{1 \text{ USD}}\right) = 110.90 \text{ euros}$

Using the given conversion factors, verify how many USD equal 110.90 euros.

Currency	USD/1 Unit	Units/1 USD
Canadian dollar	0.97071	1.03069
Euro	1.35261	0.73935
Japanese yen	0.01007	99.30487
Indian rupee	0.01594	62.72053

1. Find the correct cell on the table.

   Circle the cell that gives the conversion unit from euros to US dollars.

2. Multiply the number of euros by that conversion ratio.

$$110.90 \text{ euros} \left(\frac{1.35261 \text{ USD}}{\square \text{ euro}}\right) = 150.004449 \text{ dollars}$$

3. Round to $ _____ .

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Determining Appropriate Measures

When measuring quantities, the _____ of the measurement is limited by the tool used.

Consider the tool you use to measure things, because when we make calculations we need to consider accuracy, or level of correctness, and _____ in our measurements. Our calculation is only as accurate as the least precise measurement.

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Example: Isaac and three teammates are training for an upcoming 400-meter relay race. They hold a practice race and their times are listed in this table.

- Two of the runners' times were measured using a stopwatch accurate to the nearest hundredth of a second. The other two runners' times were measured using a stopwatch accurate to the nearest tenth of a second.

Athlete	Time (seconds)
Isaac	12.25
Teammate 1	13.16
Teammate 2	12.2
Teammate 3	12.9

What is the most accurate total time for the practice race?

Total time: $12.25 + \square + 12.2 + \square = \square$

Isaac's and Teammate 1's times are accurate to the nearest ☐ of a second. The other two runners' times are accurate to the nearest tenth of a second. So, our time can only be accurate to the nearest ☐ of a second. We will need to round our answer to the tenths place.

The answer is ☐ seconds.

Summary | Dimensional Analysis

Lesson Question	Why are units of measure important when solving real-world problems?

Answer

Use this space to write any questions or thoughts about this lesson.