Lesson 16
Unit Rates

NAME:

Start by navigating to the Online Lesson for instructions.

Objectives

- Compute a unit rate
- Determine a unit rate from a graph on the coordinate plane
- Apply the unit rate to predict values from graphs and/or scenarios

Why?

Unit rates are used in daily life when we compare two different units. Some common unit rates are miles per hour, salary per month, price per pound, etc. We can use unit rates to predict mileage, time, income and cost.

Explore

Unit Rates

Fill in the notes as you watch the video in the Online Lesson.

- A _____ is a ratio between two units where the second unit, the denominator, is one.
- Unit rates show the relationship between two variables, an _____, and a _____.
- The independent variable _____ depend on the other variable and is represented by the variable _____.
- The dependent variable is _____ upon the independent variable and is represented by the variable _____ .
  - $(x, y) \leftrightarrow$ (_____, _____)
- For example, _____ is an independent variable.

- On the coordinate plane, the values for the _____ are represented on the horizontal _____, and the values for the _____are represented on the vertical _____.
- To determine the unit rate from a graph using one coordinate, the graph must go through the _____.
- Choose _____ values for the x- and y-value (x, y), if possible.
- To compute the unit rate, _____ the dependent variable (y) by the independent variable (x), _____, then _____ so the denominator is one.
- To predict values, _____ the unit rate by the given value. Common units will simplify out of the expression.
- Unit rates are often written with a slash: _____

Example 1

Complete the example as you watch the video in the Online Lesson.

Compute the unit rate.

A) Rayne walked 0.75 miles in 0.25 hours. What is Rayne's walking speed in miles per hour?

(hours, miles)

B) Vincent bought 3 pounds of grapes for $\$5.83$. What is the cost per pound of the grapes?

(pound, price)

C) Six tickets to a local concert cost $159. What is the cost for one ticket?

$(\text{tickets}, \text{cost})$

Example 2

Complete the example as you watch the video in the Online Lesson.

Determine the unit rate from a graph on the coordinate plane.

Jacob wanted to determine his paid time off (PTO) at his new job at Computers & Company. The company included the PTO graph as a part of his welcome packet. Using the graph, determine how much PTO Jacob earns per month.

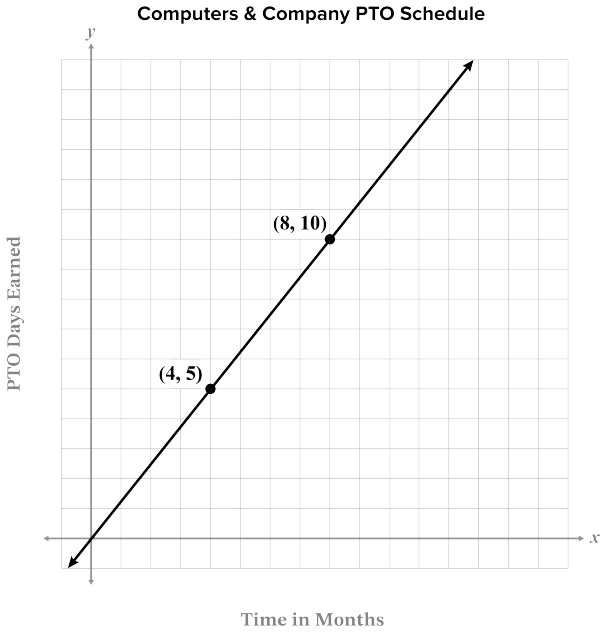
Plan

Determine if the graph goes through the origin.

Choose a coordinate with integer values (x, y)

Divide the dependent variable (y) by the independent variable (x).

Write the unit rate with appropriate units.



Example 3

Complete the example as you watch the video in the Online Lesson.

Apply the unit rate to predict values.

A) Jacob determined that he earns 1.25 days of PTO per month. How many days of PTO will Jacob earn after 12 months?

Plan

Multiply 12 months by the unit rate.

Months simplifies out of the expression.

Simplify.

B) Rayne walked at a speed of 3 miles per hour. How many hours did it take to walk 5 miles?

Plan

Divide 5 miles by the unit rate.

Miles simplifies out of the expression.

Simplify.

Practice

Compute the unit rate.

1) It took Angie $\frac{1}{5}$ of an hour to walk $\frac{1}{2}$ miles. What is her speed in miles per hour?

2) A dozen eggs cost $\$3.79$. What is the price per egg?

3) A factory machine seals 450 bottles every 6 minutes. How many bottles are sealed each minute?

4) Ida painted $\frac{5}{6}$ of a wall in $\frac{2}{3}$ of an hour. How many walls can Ida paint per hour?

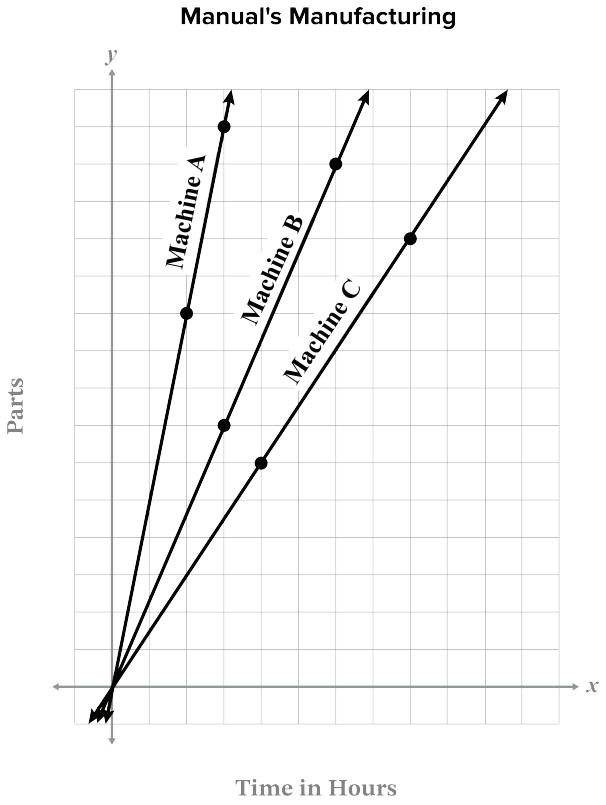
5) A car uses 8 gallons to travel 248 miles. What is the mileage of the car? Note: a car's mileage is the miles it travels per gallon.

6) 171 grams of a certain liquid has a volume of 18 milliliters. What is the density of this liquid? Note: density is the mass (grams) per volume (mL).

Determine the unit rate from a graph on the coordinate plane.

For problems 7–9:

Manuel's Manufacturing has three machines that produce parts at different rates.



7) Determine the unit rate for Machine A.

8) Determine the unit rate for Machine B.

9) Determine the unit rate for Machine C.

Apply the unit rate to predict values.

10) A liquid has a density of $8.4\ \mathrm{g}/\mathrm{mL}$. Determine the mass of the liquid when the volume is $15\ \mathrm{mL}$.

11) A car can drive 38.2 miles per gallon of gas. If the car drove 452 miles, determine how many gallons of gas were used and round your answer to the nearest gallon.

12) Tyler walked for 1.5 hours at a rate of 2.8 miles per hour. Determine the distance walked.

13) A machine produces 140 parts per hour. Determine the time in hours to produce 520 parts.

14) Home Builders Inc. is able to build 3.2 homes per acre. Determine the number of homes Home Builders Inc. can build in 640 acres.

To continue, return to the Online Lesson.