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Lesson 18: Finding a Rate by Dividing Two Quantities

**Student Outcomes**

* While there is no physical way to divide two different quantities like ( miles)/( hours), students make use of the structure of division and ratios to model ( miles)/( hours) as a quantity mph. Interpreting a rate as a division of two quantities, or better yet a fraction, is the first step towards converting measurement units using rates later in the module and dimensional analysis in high school. Students use this interpretation of a rate in word problems when multiplying a rate by a quantity, as in

Materials

* Stations—Set up six workstations around the classroom, identifying each with a number from to .
* Countdown timer

Classwork

**Mathematical Modeling Exercises (12 minutes)**

 **Mathematical Modeling Exercises**

1. At Fun Burger, the Burger Master can make hamburgers at a rate of burgers/minute. In order to address the heavy volume of customers, he needs to continue at this rate for minutes. If he continues to make hamburgers at this pace, how many hamburgers will the Burger Master make in minutes?

If the Burger Master can make four burgers in one minute, he can make burgers in minutes.

Model how to solve the exercise as students take notes. Students can be part of the discussion on how to solve each problem, but the teacher should be modeling the process.

* At what rate does the Burger Master make hamburgers?
* How long does the Burger Master make hamburgers?
* Multiply the rate by the amount of time the Burger Master works.
* Answer the question asked in the problem.
1. Chandra is an editor at the New York Gazette. Her job is to read each article before it is printed in the newspaper. If Chandra can read words/second, how many words can she read in seconds?

If Chandra can read words in second, then she can read words in seconds.

Model how to solve the exercise as students take notes. Ask for student volunteers to explain each step.

* At what rate does Chandra read?
* How long does Chandra have to read?
* Multiply the unit rate by the amount of time Chandra reads.
* Answer the question asked in the problem.

Exercises (18 minutes—3 minutes per station)

Students work in groups to complete station work.

Station One: Helena works for a publishing firm. She is considered an average typist and can type words/minute. If she continues at this rate, how many minutes would it take Helen to type words?

Station Two: Jaxon test drives cars for a car company. Part of his job is to test the cruise control on a testing course. On his last test drive, Jaxon set the cruise control at miles/hour and drove for hours. How many miles did Jaxon drive?

Station Three: To train for an upcoming marathon, Alvin runs miles a day. If Alvin runs miles every day for days, how many total miles will he run?

Station Four: A library just hired Brittany to write reviews on different books. The job requires Brittany to read books/week. If Brittany reads a total of books, how many weeks will she work?

Station Five: Notebooks are on sale for notebooks/dollar. Mrs. Day wants to buy notebooks for her students but only has to spend. How many notebooks can Mrs. Day buy?

Station Six: Kevin hopes to earn a college basketball scholarship. To improve his shooting skills, Kevin shoots baskets/day. If Kevin shoots baskets every day for days, how many shots would Kevin take?

Exercises

Use the table below to write down your work and answers for the stations.

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| --- |
| 1. If Helena types at a constant rate of words/minute, she can type words in minutes.
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| 1. If Jaxon drives at a constant rate of miles/hour, he can drive miles in hours.
 |
| 1. If Alvin runs miles every day for days, he would run a total of miles.
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| 1. If Brittany is required to read books/week, she would have to work weeks in order to read books.
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| 1. If notebooks are on sale for notebooks/dollar, then Mrs. Day can buy notebooks for.
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| 1. If Kevin continues to shoot baskets/day for days, he would shoot a total of baskets.
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Closing (10 minutes)

Discuss solutions for each station. Students show how they solved each problem. Allow time for questions.

Lesson Summary

We can convert measurement units using rates. The information can be used to further interpret the problem. Here is an example:

Exit Ticket (5 minutes)

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lesson 18: Finding a Rate by Dividing Two Quantities**

Exit Ticket

Alejandra drove from Michigan to Colorado to visit her friend. The speed limit on the highway is miles/hour. If Alejandra’s combined driving time for the trip was hours, how many miles did Alejandra drive?

Exit Ticket Sample Solutions

Alejandra drove from Michigan to Colorado to visit her friend. The speed limit on the highway is miles/hour. If Alejandra’s combined driving time for the trip was hours, how many miles did Alejandra drive?

 miles

Problem Set Sample Solutions

1. Enguun earns per hour tutoring student-athletes at Brooklyn University.
	1. If Enguun tutored for hours this month, how much money did she earn this month?
	2. If Enguun tutored for hours last month, how much money did she earn last month?
2. The Piney Creek Swim Club is preparing for the opening day of the summer season. The pool holds gallons of water, and water is being pumped in at gallons per hour. The swim club has its first practice in hours. Will the pool be full in time? Explain your answer.

Yes, the pool will be full of water in time for the first practice because gallons of water can be pumped in hours at a rate of gallons per hour. Since gallons is more water than the pool needs, we know that the swim club will have enough water.