Rates with Fractions

Say the words first: unit means one, rate means how much of one thing for another, per means for each. For every problem, write the reciprocal you multiplied by, and show both amounts getting it.

Name _____ Date _____

Words we use

say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
Ratio	A comparison of two amounts, like $\frac{1}{2}$ mile to $\frac{1}{4}$ hour.	Write one amount on top of the other.
Reciprocal	The flip of a fraction: the reciprocal of $\frac{1}{4}$ is $\frac{4}{1}$, which is 4.	Ask: what do I multiply this amount by to get 1? Then multiply the other amount by the same number.
Rate	How much of one thing for another, like miles per hour.	Keep the units with the numbers.
Per	For each.	Read miles per hour as miles for each hour.
Unit rate	How much for one.	Make the per amount 1, and multiply the other amount by the same number.
Complex fraction	A fraction with a fraction on top, on the bottom, or both. It means divide.	Multiply top and bottom by the reciprocal of the bottom; the bottom becomes 1.

Part A Whole numbers, then fractions

1. A car goes 150 miles in 3 hours. Miles per hour?

2. Julia walks $\frac{1}{2}$ mile every $\frac{1}{4}$ hour. What do you multiply $\frac{1}{4}$ hour by to get 1 hour? Multiply the miles by the same number. Miles per hour?

3. Now make the miles 1 instead: what do you multiply $\frac{1}{2}$ mile by? Multiply the hours by it. Hours per mile?

Part B Find the unit rate

1. A recipe uses $\frac{3}{4}$ cup of sugar for $\frac{1}{2}$ batch. Cups per batch?

2. A snail crawls $\frac{2}{3}$ foot in $\frac{1}{2}$ minute. Feet per minute?

3. A printer prints 5 pages in $\frac{1}{3}$ minute. Pages per minute?

4. A half gallon of paint covers $\frac{1}{6}$ of a wall. Gallons per wall?

Part C Which rate answers it?

QUESTION	MILES PER HOUR, OR HOURS PER MILE?	ANSWER
Julia (2 mi per h, $\frac{1}{2}$ h per mi) walks for $1\frac{1}{3}$ hours. How far?		
Julia walks 5.2 miles. How long?		
Julia walks for 3 hours. How far?		

Part D Exit ticket

1. A runner goes $\frac{3}{4}$ mile in $\frac{1}{4}$ hour. Miles per hour?

2. What does per mean? What does unit mean?

3. What do you multiply $\frac{1}{4}$ by to get 1, and what is that number called?

Answer key

Part A. 1. 50 miles per hour. 2. Multiply by 4 (the reciprocal of $\frac{1}{4}$): $\frac{1}{2} \times 4 = 2$ miles per hour. 3. Multiply by 2: $\frac{1}{4} \times 2 = \frac{1}{2}$ hour per mile.

Part B. 1. $1\frac{1}{2}$ cups per batch. 2. $1\frac{1}{3}$ feet per minute. 3. 15 pages per minute. 4. 3 gallons per wall.

Part C. Miles per hour: $2\frac{2}{3}$ miles. Hours per mile: 2.6 hours. Miles per hour: 6 miles.

Part D. 1. 3 miles per hour. 2. Per means for each; unit means one. 3. Multiply by 4; it is the reciprocal of $\frac{1}{4}$.