Ratios and Rates Problems Notes

How can you use ratios and rates to solve problems?

You can use bar diagrams or equations with equivalent ratios to solve ratio and rate problems.

Examples

Equivalent Ratios

Notice that the numerators of both fractions in Method 2 refer to the number of students who like gel toothpaste. The denominators of both fractions refer to the total number of students being referenced.

1. Heritage Middle School has 150 students. Two out of three students in Mrs. Mason's class prefer gel toothpaste. Use this ratio to predict how many students in the entire middle school prefer gel toothpaste.

Method 1: *Ratio Tables*	Method 2: *Equivalent Fractions*	Method 3: *Unit Rates*
 Prefer Gel $\begin{array}{c}\times 5 \quad \times 10\\ \hline 2 \mid 10 \mid \textcircled{100}\end{array}$ Total $\quad 3 \mid 15 \mid 150$ $\quad\quad \times 5 \quad \times 10$ 100 students most likely prefer gel toothpaste	$\dfrac{\text{Prefer Gel}}{\text{Total}} \Rightarrow \dfrac{2 \times 50}{3 \times 50} = \dfrac{\textcircled{100}}{150}$ 100 students most likely prefer gel toothpaste.	$\dfrac{2 \div 3}{3 \div 3} = \dfrac{\frac{2}{3}}{1}$ $\dfrac{2}{3} \times \dfrac{150}{1} = \dfrac{300}{3} = 100$ 100 students most likely prefer gel toothpaste.

2. The ratio of the number of text messages sent by Lucas to the number of text messages sent by his sister is 3 to 4. Lucas sent 18 text messages. How many text messages did his sister send?

Lucas	3		18
Sister	4		24

×6

24 text messages
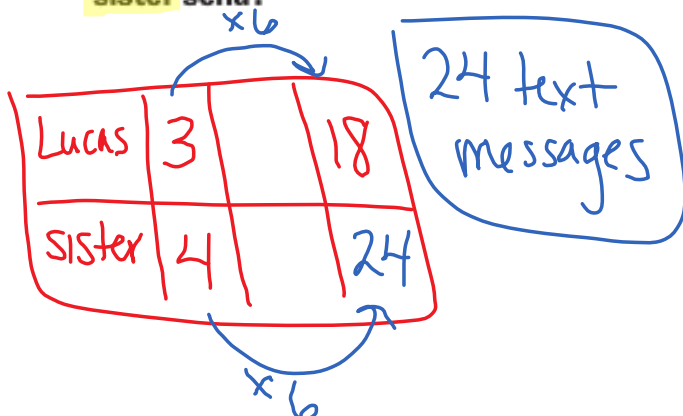
$\dfrac{L}{S} \Rightarrow \dfrac{3 \times 6}{4 \times 6} = \dfrac{18}{?}$

$\textcircled{24}$

3. The Millers drove **105 miles** on **4 gallons of gas**. At this rate, how many **miles** can they drive on **6 gallons of gas**?

$$\frac{105\ mi \div 4}{4\ gal \div 4} = \frac{26.25\ mi \times 6}{1\ gal \times 6} = \boxed{157.5\ mi}$$

$$\begin{array}{r} \times 26.25 \\ 4\overline{)105.00} \\ 8 \\ \overline{25} \\ -24 \\ \hline 10 \\ 20 \\ 0 \end{array}$$

$$\begin{array}{r} \overset{3}{2}\overset{1}{6}.\overset{3}{2}5 \\ \times\ \ \ \ 6 \\ \hline 157.50 \end{array}$$

Miles	105	315	157.5
Gal	4	12	6

×3 ÷2 (top)
×3 ÷2 (bottom)

$$\begin{array}{r} 157.5 \\ 2\overline{)315.0} \\ -2 \\ \hline 11 \\ -10 \\ \hline 15 \\ -14 \\ \hline 10 \\ -10 \\ \hline 0 \end{array}$$
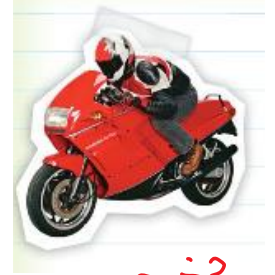
4. Jeremy drove his motorcycle **120 miles in 3 hours**. At this rate, how many **miles** can he drive in **5 hours**? At what rate did he drive his motorcycle? → **40mph**

$$\frac{120\ mi \div 3}{3\ h \div 3} = \frac{40\ mi \times 5}{1\ h \times 5} = \frac{200\ mi}{5\ h}\quad \boxed{200\ mi}$$ in 5h

Miles	120	600	200
hours	3	15	5

×5 ÷3 (top)
×5 ÷3 (bottom)

Got It? Do these problems to find out.

a. In a survey, four out of five people preferred creamy over chunky peanut butter. There are 120 people shopping at the grocery store. Use the survey to predict how many people in the store would prefer creamy peanut butter.

×4   ×6

Creamy	4	16	96
Total	5	20	120

×4   ×6

96 people

b. A survey found that 12 out of every 15 people in the United States prefer eating at a restaurant over cooking at home. If 400 people selected eating at a restaurant on the survey, how many people took the survey?

÷3   ×100

Restaurant	12	4	400
Total	15	5	500

÷3   ×100

500 people