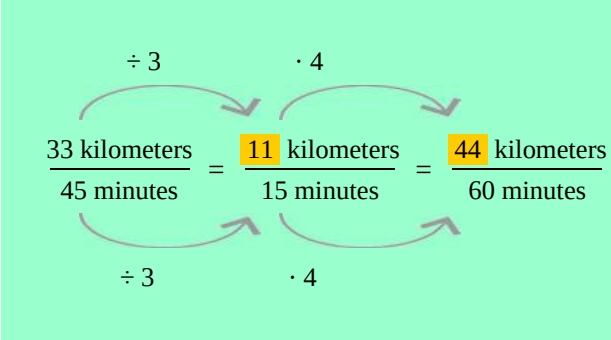
Using Equivalent Rates

Example 1. If Jake can ride his bike to a town that is 33 kilometers away in 45 minutes, how far can he ride in 1 hour?

Let's form some equivalent rates, starting with 33 kilometers per 45 minutes and hoping to arrive at so many kilometers per 60 minutes.

However, it is not easy to go directly from 45 minutes to 60 minutes (1 hour). So, first you figure the rate for 15 minutes, which *is* easy.

Why? Because to get from 45 minutes to 15 minutes you simply divide both terms of the rate by 3.



Then from 15 minutes, we can easily get to 60 minutes: Just multiply both terms by 4. We find that he can ride 44 kilometers in one hour.

1. Write the equivalent rates.

a. $\frac{15\text{ km}}{3\text{ hr}} = \frac{\quad}{1\text{ hr}} = \frac{\quad}{15\text{ min}} = \frac{\quad}{45\text{ min}}$	**b.** $\frac{\$6}{45\text{ min}} = \frac{\quad}{15\text{ min}} = \frac{\quad}{1\text{ hr}} = \frac{\quad}{1\text{ hr }45\text{ min}}$
c. $\frac{3\text{ cm}}{8\text{ m}} = \frac{\quad}{2\text{ m}} = \frac{\quad}{12\text{ m}} = \frac{\quad}{20\text{ m}}$	**d.** $\frac{115\text{ words}}{2\text{ min}} = \frac{\quad}{1\text{ min}} = \frac{\quad}{3\text{ min}}$

2. **a.** James can ride 10 kilometers in 16 minutes. How long will it take him to ride 55 kilometers? Use the equivalent rates.

$$\frac{10\text{ kilometers}}{16\text{ minutes}} = \frac{5\text{ kilometers}}{\quad\text{ minutes}} = \frac{55\text{ kilometers}}{\quad\text{ minutes}}$$

b. How many kilometers can James ride in 40 minutes?

3. An automobile can go 80 kilometers on 8 liters of gasoline.

a. How many liters of gas would the automobile need for a trip of 95 kilometers? Use the equivalent rates below.

$$\frac{80\text{ kilometers}}{8\text{ liters}} = \frac{10\text{ kilometers}}{\quad\text{ liters}} = \frac{95\text{ kilometers}}{\quad\text{ liters}}$$

b. How far can the automobile travel on 15 liters of gas?

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