fractions. If you have forgotten, one approach is to cross-multiply: if $\frac{a}{b} = \frac{c}{d}$, then $ad = bc$. If one fraction is a multiple of the other, you may use a more direct method. Let's look at a few examples.

Example C

If you work for two weeks and earn \$380, how much will you earn in 15 weeks?

$$\frac{380}{2} = \frac{x}{15}$$
$$2x = (380)(15)$$
$$x = \frac{(380)(15)}{2}$$
$$x = 2850$$ You will earn \$2850 in 15 weeks.

Example D

Solve for x in $\frac{26}{50} = \frac{x}{75}$.

Before you cross-multiply, ask yourself, Can I reduce fractions? In this case, you can. Rewrite $\frac{26}{50}$ as $\frac{13}{25}$. You then get the equation $\frac{13}{25} = \frac{x}{75}$.

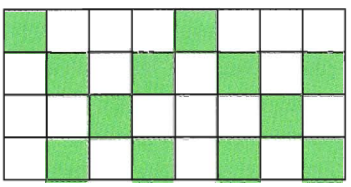
Next, before you cross-multiply, check to see if one numerator (or denominator) is a multiple of the numerator (or denominator) in the other fraction. In this problem, because $25 \cdot 3 = 75$, x must be $13 \cdot 3$, or 39.

Therefore $x = 39$.

Exercise Set 12.1

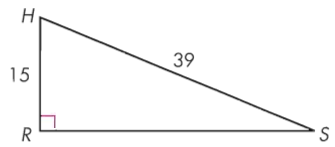
1. Find the ratio of  to  .

2.* Find the ratio of the shaded area to the area of the whole figure.

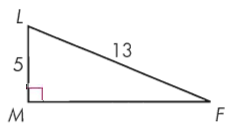


3. Use the figure below to find these ratios: *AC/CD*, *CD/BD*, and *BD/BC*.

4. Find the ratio of the perimeter of triangle *RSH* to the perimeter of triangle *MFL*.



5. Find the ratio of the area of triangle *RSH* to the area of triangle *MFL*.



In Exercises 6–11, find the missing number in each proportion.

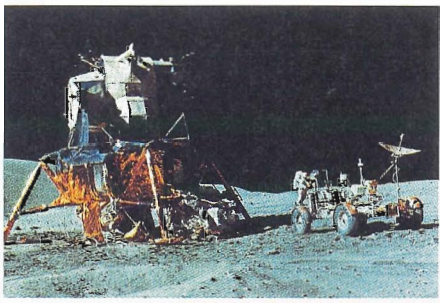
6. $\frac{7}{21} = \frac{a}{18}$ **7.** $\frac{10}{b} = \frac{15}{24}$ **8.** $\frac{20}{13} = \frac{60}{c}$

9. $\frac{4}{5} = \frac{x}{7}$ **10.*** $\frac{2}{y} = \frac{y}{32}$ **11.*** $\frac{10}{10 + z} = \frac{35}{56}$

Use a proportion to solve each of Exercises 12–18.

12. A car travels 106 miles on 4 gallons of gas. How far can it be expected to travel on a full tank of 12 gallons?

13. If a 425-pound lunar vehicle weighs 68 pounds on the moon, how much does 150-pound astronaut Luna Luz weigh on the moon? How much would you weigh on the moon?



14.* Pitcher Ernie Runz gave up 34 runs in 106 innings of baseball. What is Ernie Runz's earned run average? In other words, how many runs would he give up in 9 innings? Give your answer accurate to two decimal places.

15. A recipe for 6 dozen cookies calls for $2\frac{1}{2}$ cups of flour. How many cups of flour are needed for 10 dozen cookies?

16. The floor plan of a house is drawn to the scale of $\frac{1}{4}'' = 1'$. The master bedroom measures 3″ by $3\frac{3}{4}''$ on the blueprints. What is the actual size of the room?

17. The famous consulting detective Hemlock Bones is studying the evidence in the theft of a rare stamp. His client, Sir Osborne Chatsworth III, has an envelope with an 1889 Belgian 6-franc commemorative stamp on it. When Chatsworth bought the stamp, he believed it to be valuable, but an appraiser, Thaddeus O'Malley, claims it is nearly worthless. Hemlock recalls that there were two types of Belgian commemorative stamps made in 1889, slightly different in size. The stamp on Chatsworth's envelope, unfortunately, is indeed the worthless one, measuring 3 cm square. The valuable stamp measures 4 cm square. Prompted by Hemlock's questioning, Chatsworth admits that he let Thaddeus out of his sight during the appraisal. Hemlock suspects that Thaddeus may have removed the valuable stamp from the envelope, replacing it with the worthless stamp! But how can he prove this theory? Fortunately, there's another important piece of evidence: a photograph of the envelope taken for insurance purposes the day before the stamp was appraised. Hemlock must figure out the actual size of the stamp in the photo to determine whether or not Thaddeus made the switch. The length of the actual envelope is 24 cm. In the photo the envelope measures 1.6 cm in length. The stamp in the photo measures 0.2 cm on each edge. Is the stamp on the envelope in the photo rare or worthless? Is Thaddeus O'Malley guilty of the old stamp switch swindle?

The case of the Belgian stamp theft