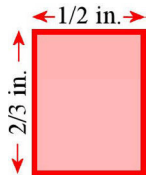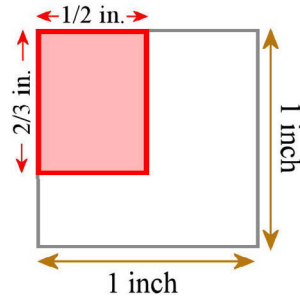# Fraction Multiplication and Area
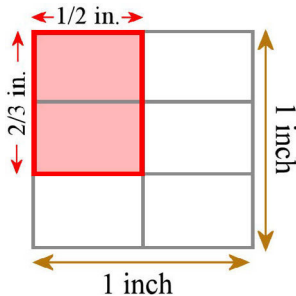
What is the area of this rectangle?

Notice, its side lengths are *fractional* (1/2 inch and 2/3 inch).

Let's extend its sides and draw a square inch around it.

Surely the area of our rectangle is less than a half square inch. But how much is the area exactly?

To solve this problem, let's draw a grid inside our square inch:

Now it is easy to see that the area of the colored rectangle is exactly 2/6 or 1/3 of the square inch.

(Why? Because the square inch is divided into 6 equal parts, and our rectangle covers two of them).

Notice that we get the same result (1/3 square inch) if we *multiply* the side lengths, using fraction multiplication:

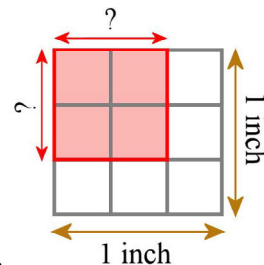$$\frac{2}{3} \text{ in} \times \frac{1}{2} \text{ in} = \frac{2}{6} \text{ in}^2 = \frac{1}{3} \text{ in}^2$$

1. Each picture shows some kind of square unit, and a colored rectangle. Figure out the side lengths and the area of the rectangle from the picture.

a.
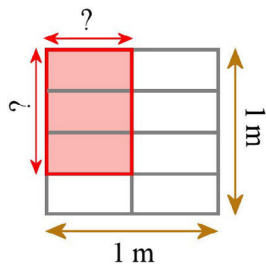
Side lengths: ⎯⎯ m and ⎯⎯ m

Area (from the picture): ⎯⎯ m^2
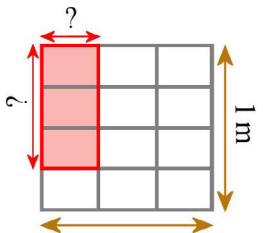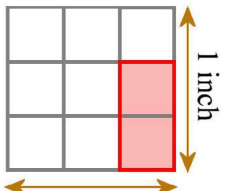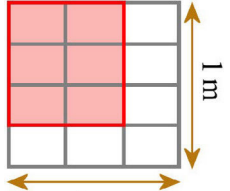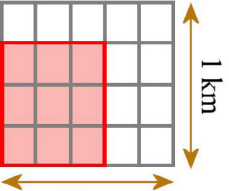
b.
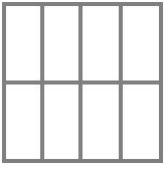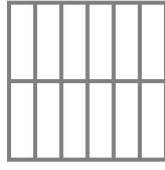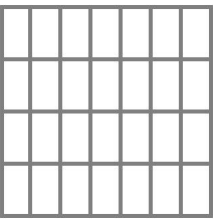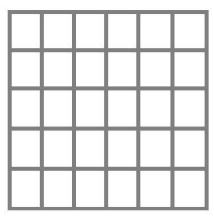
Side lengths: ⎯⎯ in and ⎯⎯ in

Area (from the picture): ⎯⎯ in^2

2. Again, figure out the side lengths of the colored rectangle from the picture. Then multiply the side lengths to find its area. <u>Check that the area you get by multiplying is the same as what you can see from the picture.</u>

a.

Side lengths: $\dfrac{}{}$ m and $\dfrac{}{}$ m

Area (by multiplication):

$\dfrac{}{}$ m × $\dfrac{}{}$ m =

b. 1 inch

Side lengths: $\dfrac{}{}$ in and $\dfrac{}{}$ in

Area (by multiplication):

$\dfrac{}{}$ in × $\dfrac{}{}$ in =

c. 1 m

Side lengths: $\dfrac{}{}$ m and $\dfrac{}{}$ m

Area (by multiplication):

$\dfrac{}{}$ m × $\dfrac{}{}$ m =

d. 1 km

Side lengths: $\dfrac{}{}$ km and $\dfrac{}{}$ km

Area (by multiplication):

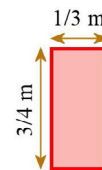$\dfrac{}{}$ km × $\dfrac{}{}$ km =

3. Shade a rectangle inside the square so that its area can be found by the fraction multiplication.

a. $\dfrac{1}{4}$ m × $\dfrac{1}{2}$ m = $\dfrac{1}{8}$ m^2

b. $\dfrac{1}{2}$ in × $\dfrac{4}{6}$ in = $\dfrac{4}{12}$ in^2

c. $\dfrac{3}{4}$ ft × $\dfrac{2}{7}$ ft =

d. $\dfrac{3}{5}$ km × $\dfrac{5}{6}$ km =

The area of this rectangle *can* be found by multiplication:

$\frac{3}{4}$ m $\times$ $\frac{1}{3}$ m $=$ $\frac{1}{4}$ m^2; however, we want to <u>verify</u> this using a visual method.

For that reason, let's sketch a unit square around the rectangle and tile it.
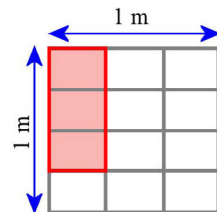
We need to extend the sides of the rectangle to draw the square. The 1/3-meter side simply needs to be three times as long to make it 1 meter.

Then, divide the side that is 3/4 meters long into three equal parts— each part is 1/4 m long. Then extend that side by another 1/4 meter.
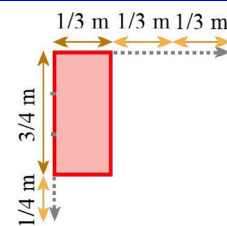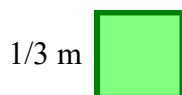
Lastly, draw the entire square. Draw gridlines to show the tiles within the square meter: one side is divided into 3 equal parts, and the other into 4 equal parts. We get 12 tiles.

Now it is easy to see that the area of the colored rectangle is 3 tiles out of 12, or 3/12 of a square meter. That simplifies to 1/4 of a square meter.
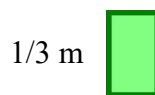
4. Extend the sides of the rectangle so you get a square meter (unit square). Draw gridlines into the square as in the example above. Write a multiplication for the area of the colored rectangle. <u>Verify</u> that the area you get by multiplying is the same as what you can see in the picture.
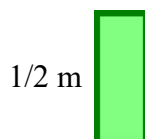
a.   1/3 m

1/3 m

Area: ⬜⬜ m × ⬜⬜ m =

b.   1/5 m

1/3 m

c.   1/5 m

1/2 m

d.   1/4 m

1/4 m