

Grade 5 - Area of Rectangles with Fractional Sides - Lesson

Common Core 5.NF.B.4b · maths-pdf.fr/en/

To find the area of a rectangle with fractional sides, multiply the length by the width. You can also tile a unit square with small equal tiles and count how many tiles the rectangle covers. For example, a rectangle $\frac{3}{4}$ foot by $\frac{2}{3}$ foot covers 6 tiles of $\frac{1}{12}$ square foot, so its area is $\frac{1}{2}$ square foot.

Grade 5 · Common Core State Standards: 5.NF.B.4b

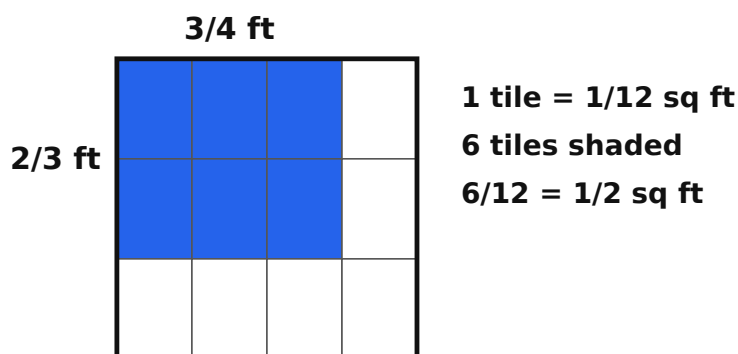
Key facts

- A unit square has area 1 square unit.
- Cutting a unit square into equal tiles gives tiles with a unit fraction area.
- Area = length times width, even when the sides are fractions.
- Counting tiles and multiplying the side lengths give the same area.
- Always write square units, such as square feet, in the answer.

What is the area of a rectangle with fractional sides?

Area tells how many square units cover a flat shape. A unit square is 1 unit long and 1 unit wide, so its area is 1 square unit. A rectangle with fractional sides, such as $\frac{3}{4}$ foot by $\frac{2}{3}$ foot, covers only part of a unit square.

Cut a unit square into 4 equal columns and 3 equal rows. This makes 12 equal tiles. Each tile has area $\frac{1}{12}$ square foot. The rectangle is 3 tiles wide and 2 tiles tall, so it covers 6 tiles.



A 1 foot by 1 foot unit square is cut into 12 tiles. The shaded rectangle uses 6 of them.

Area with fractional sides

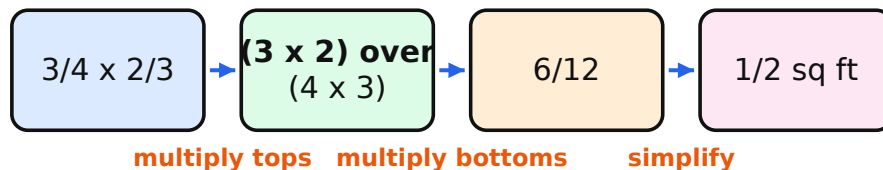
Area = length times width. When the sides are fractions, multiply them. The area equals the number of tiles times the area of one tile: $\frac{3}{4} \times \frac{2}{3} = \frac{6}{12} = \frac{1}{2}$ square foot.

Why does multiplying the side lengths work?

The width has 3 tiles because it is 3 fourths of a foot. The height has 2 tiles because it is 2 thirds of a foot. The number of tiles is $3 \times 2 = 6$. Each tile is one fourth of one third of a square foot, so it is $\frac{1}{4} \times \frac{1}{3} = \frac{1}{12}$. Counting tiles and multiplying the sides always give the same answer.

How do you find the area step by step?

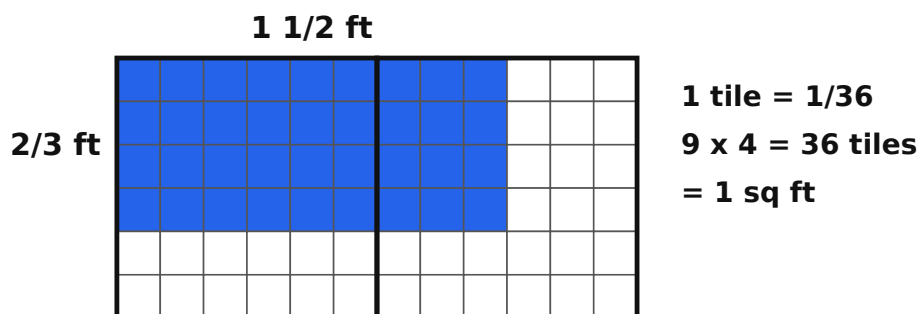
1. Write the length and the width as fractions.
2. Multiply the numerators, then multiply the denominators.
3. Simplify the product.
4. Write the answer with square units, such as sq ft or sq yd.
5. Check by tiling a unit square with the right number of tiles.



Multiplying the side lengths gives the same area as counting tiles.

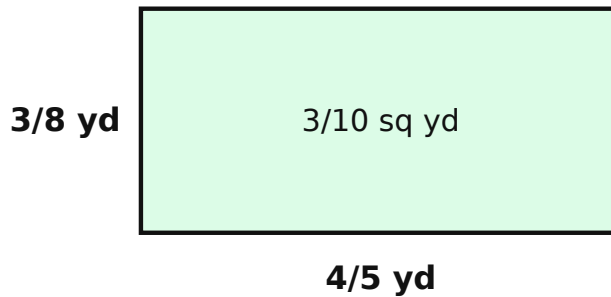
What if a side is longer than 1 unit?

Use more than one unit square. A rectangle that is $1\frac{1}{2}$ feet by $\frac{2}{3}$ foot needs tiles with side $\frac{1}{6}$ foot, because 6 is a multiple of both 2 and 3. The width is 9 tiles and the height is 4 tiles. That is 36 tiles, and 36 tiles of $\frac{1}{36}$ square foot make 1 square foot. Multiplying gives the same: $\frac{3}{2} \times \frac{2}{3} = \frac{6}{6} = 1$.



Two unit squares side by side. The shaded rectangle is 9 tiles wide and 4 tiles tall: 36 tiles of $\frac{1}{36}$ square foot.

Worked example: A banner is $\frac{4}{5}$ yard long and $\frac{3}{8}$ yard wide. Its area is $\frac{4}{5} \times \frac{3}{8} = \frac{12}{40} = \frac{3}{10}$ square yard.



The area is $\frac{4}{5} \times \frac{3}{8} = \frac{12}{40} = \frac{3}{10}$ square yard.

Questions about area of rectangles with fractional sides

Why is the area of a rectangle with fractional sides less than 1?

If both sides are less than 1 unit, the rectangle fits inside a unit square. It covers only part of that square, so its area is less than 1 square unit.

How do you tile a unit square for $\frac{3}{4}$ by $\frac{2}{3}$?

Cut the unit square into 4 equal columns and 3 equal rows. That makes 12 tiles of $\frac{1}{12}$ square unit each. The rectangle covers 3 columns and 2 rows, which is 6 tiles.

Do I need a common denominator to find area?

No. The tiles for each side use their own denominator. Multiply the numerators and the denominators, then simplify.

What do I do when a side is a mixed number?

Use more than one unit square for tiling, or change the mixed number to an improper fraction and multiply. Both methods give the same area.

Why must the answer have square units?

Area measures the number of unit squares that cover a shape. Square feet, square yards, and square inches all describe squares, not lengths.