Partitioning Shapes into Equal Areas

Explore ideas and representations

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Equal-area parts cover the same amount of surface, even if their shapes differ. Divide the total area by the number of equal parts. One of n equal parts covers $\frac{1}{n}$ of the whole. Unequal parts do not give equal shares.

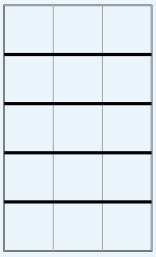
Worked example

The garden has five equal horizontal strips. How many unit squares are in one strip, and what fraction is it?

1. The 5 rows each contain 3 squares, for $5 \times 3 = 15$ in all.

2. One strip holds $15 \div 5 = 3$ squares. It is one of 5 equal parts, or $\frac{1}{5}$.

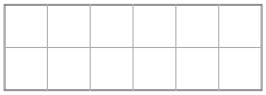
Answer: 3 square units; $\frac{1}{5}$ of the garden.



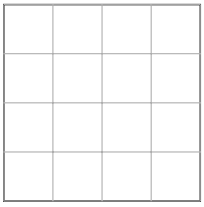
Practice Problems

Show your thinking.

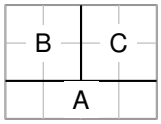
1. Divide this rectangle into 3 equal-area parts using vertical lines. Name the fraction in each part.



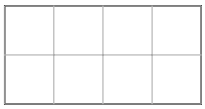
2. Divide this rectangle into 4 equal-area parts using horizontal lines. Name the fraction in each part.



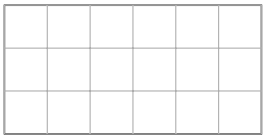
3. A is a strip; B and C are squares. Are these three equal-area parts? Name each fraction of the whole.



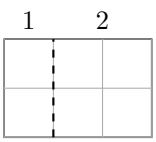
4. Draw one diagonal to split this rectangle into two equal-area triangles. Name each triangle as a fraction and find its area.



5. Draw boundaries to make 3 equal-area parts. Each part must contain whole unit squares. Label each part with its unit fraction.



6. A student calls both parts halves. Count squares in each part and decide if the partition is fair.



Answer Key

1. Each part is $\frac{1}{3}$; 4 squares per part.
2. Each part is $\frac{1}{4}$; 4 squares per part.
3. Yes; each has area 4 square units and is $\frac{1}{3}$ of the whole.
4. Each is $\frac{1}{2}$; 4 square units.
5. 6 squares per part; each is $\frac{1}{3}$.
6. Not halves; the two areas are unequal.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The rectangle has $6 \times 2 = 12$ unit squares, so each of 3 parts needs $12 \div 3 = 4$ squares.

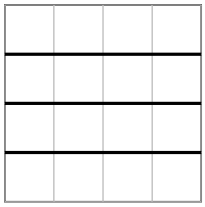
2. Make 3 vertical strips, each 2 columns wide. Each is 1 of 3 equal areas, or $\frac{1}{3}$.



Problem 2

1. The rectangle has $4 \times 4 = 16$ unit squares, so each of 4 parts needs $16 \div 4 = 4$ squares.

2. Make 4 horizontal strips, each 1 rows tall. Each is 1 of 4 equal areas, or $\frac{1}{4}$.



Problem 3

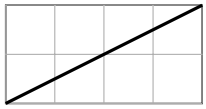
1. A has $4 \times 1 = 4$ squares; B and C each have $2 \times 2 = 4$ squares.

2. The whole has $4 + 4 + 4 = 12$ squares. Each part covers $\frac{4}{12} = \frac{1}{3}$; equal area does not require the same shape.

Problem 4

1. The rectangle has $4 \times 2 = 8$ square units.

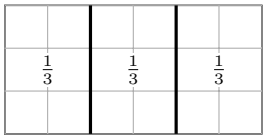
2. Join opposite corners. The diagonal makes two matching triangles, so each is $8 \div 2 = 4$ square units, or $\frac{1}{2}$ of the whole.



Problem 5

1. Count $6 \times 3 = 18$ squares. Equal areas require $18 \div 3 = 6$ squares in each group.

2. One possible design uses 2 columns in each group. Label each group $\frac{1}{3}$ of the whole.



Problem 6

1. The narrow part has $1 \times 2 = 2$ squares. The wider part has $2 \times 2 = 4$ squares.

2. Since $2 \neq 4$, the parts are not equal in area. Two pieces are halves only when their areas match.

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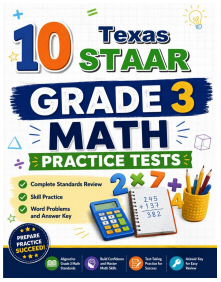

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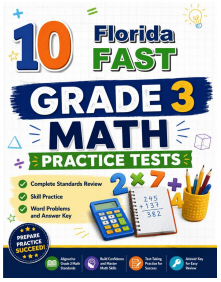

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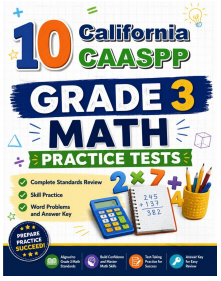

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