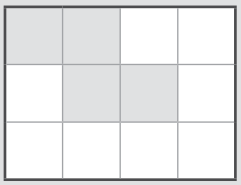
In a **Rectivide** puzzle, the goal is to divide a single rectangle into ***three*** smaller rectangles so that each small rectangle has the same ratio of gray squares to white squares as the original rectangle.

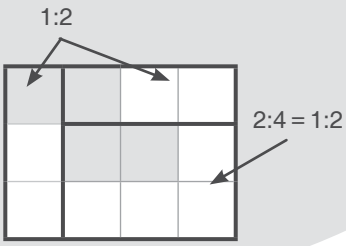
EXAMPLE | Solve the Rectivide puzzle below.



The ratio of gray squares to white squares in the original rectangle is 4:8 = 1:2. So, we can make groups of 3 squares in each of the smaller rectangles, with 1 gray and 2 white squares. Therefore, the area of each small rectangle is a multiple of 3.

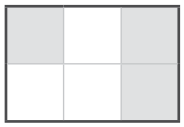
We can split the rectangle into three smaller rectangles as shown below so that the ratio of gray squares to white squares is 1:2 in each smaller rectangle.

This is the only solution.

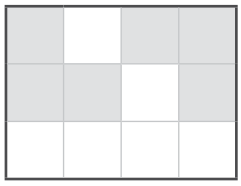


PRACTICE | Solve each Rectivide puzzle below.

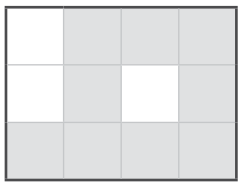
43.



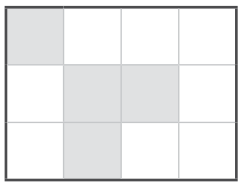
44.



45.

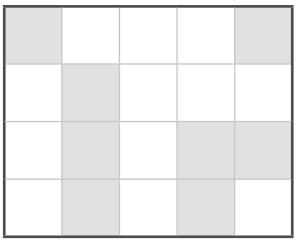


46.

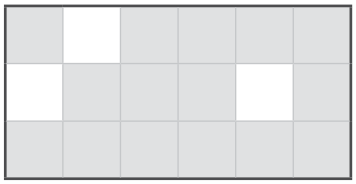


PRACTICE | Solve each Rectivide puzzle below.

47.

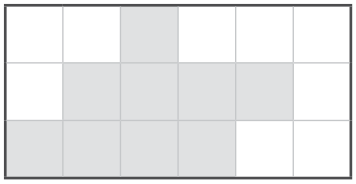


48.

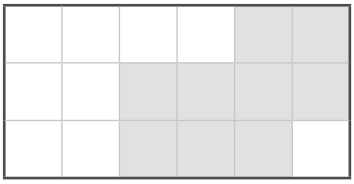


49.

50.



51.



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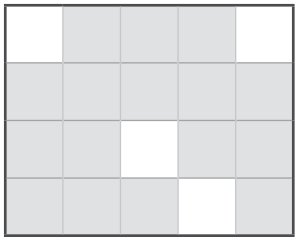
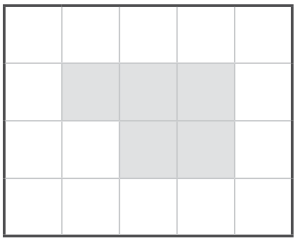
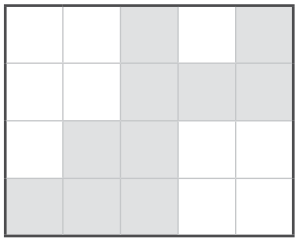


53.



54.



We often use fractions when working with ratios. For example, a boy:girl ratio of 2:3 can be written as

$$\frac{\text{boys}}{\text{girls}} = \frac{2}{3}.$$

This means that the number of boys divided by the number of girls equals $\frac{2}{3}$.

A ***proportion*** is an equation showing that two ratios are equal. There are many ways to find the missing value in a proportion.

To solve for x in the proportion $4:7 = x:21$, we can solve for x in the equation $\frac{4}{7} = \frac{x}{21}$.

EXAMPLE | What is the value of x in the equation below?

$$\frac{4}{7} = \frac{x}{21}$$

We can convert the fraction.

We can write $\frac{4}{7}$ with a denominator of 21 by multiplying the numerator and denominator by 3.

$$\frac{4}{7} \overset{\cdot 3}{=} \frac{x}{21} \quad (\cdot 3)$$

$\frac{4}{7} = \frac{12}{21}$, so $x = \mathbf{12}$.

— ***or*** —

We can isolate the variable.

To isolate the variable x, we multiply both sides of the equation by 21.

$$\frac{4}{7} \cdot 21 = \frac{x}{21} \cdot 21$$

$$\frac{4}{\cancel{7}} \cdot \cancel{21}^{3} = \frac{x}{\cancel{21}} \cdot \cancel{21}$$

$$12 = x$$

On the left side, we get $4 \cdot 3 = 12$. So, $x = \mathbf{12}$.

PRACTICE | Fill in the missing value in each equation below.

55. $\frac{2}{3} = \frac{\quad}{15}$ **56.** $\frac{15}{\quad} = \frac{5}{12}$ **57.** $\frac{\quad}{32} = \frac{7}{8}$ **58.** $\frac{19}{11} = \frac{\quad}{88}$

PRACTICE | Solve for the variable in each equation below.

59. $\frac{3}{7} = \frac{x}{42}$ **60.** $\frac{13}{9} = \frac{a}{45}$

61. $\frac{w}{35} = \frac{21}{15}$ **62.** $\frac{m}{21} = \frac{9}{4}$

59. $x =$ _____

60. $a =$ _____

61. $w =$ _____

62. $m =$ _____

EXAMPLE | What is the value of x in the equation below?

$$\frac{5}{9}=\frac{8}{x}$$

We can eliminate the denominators.

We eliminate the denominators of $\frac{5}{9}$ and $\frac{8}{x}$ by multiplying both sides of the equation by a common multiple of their denominators: $9x$.

This gives $5x = 72$.

We divide both sides by 5 to get $x = \frac{72}{5} = 14\frac{2}{5}$.

$$\frac{5}{\cancel{9}} \cdot \cancel{9}x = \frac{8}{\cancel{x}} \cdot 9\cancel{x}$$

$$5 \cdot x = 8 \cdot 9$$

$$5x = 72$$

$$x = \frac{72}{5}$$

$$x = 14\frac{2}{5}$$

For any equation $\frac{a}{b}=\frac{c}{d}$, we have $ad = bc$.

PRACTICE | Solve for the variable in each equation below. Write your answer in simplest form.

63. $\frac{2}{3}=\frac{15}{m}$

64. $\frac{12}{s}=\frac{5}{8}$

63. $m =$ _____

64. $s =$ _____

65. $\frac{7}{4}=\frac{15}{c}$

66. $\frac{14}{a}=\frac{4}{9}$

65. $c =$ _____

66. $a =$ _____

67. $\frac{2}{5}=\frac{15}{z}$

68. $\frac{3}{10}=\frac{10}{v}$

67. $z =$ _____

68. $v =$ _____

69. $\frac{8}{n}=\frac{11}{6}$

70. $\frac{10}{7}=\frac{6}{r}$

69. $n =$ _____

70. $r =$ _____