

Ratio: A relationship between two quantities, normally expressed as the quotient of one divided by the other: *The ratio of 7 to 4 is written 7:4 or 7/4.*

Ratios

Ratio - a comparison of _____ quantities

Ratios can be written _____ different ways:

$\frac{4}{9}$, 4 : 9 , 4 to 9 All of these ratios are read "4 to 9".

Write each ratio three different ways. Write in lowest terms if possible.

1. Kim scored 6 points in the first game and 14 points in the second.
2. Ben grew 5 inches one year and 2 inches the next year.
3. The number of boys in the class to the number of girls in the class.
4. The number of girls in the class to the number of students in the class.

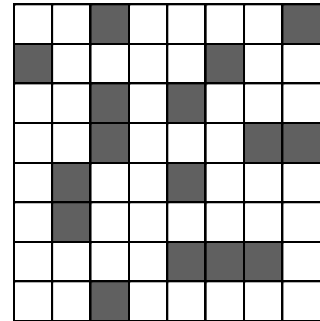
Use the table showing Ellen's points and the whole team's points in three basketball games to answer the following questions. Give each ratio of points.

| | Game 1 | Game 2 | Game 3 |
|-------|--------|--------|--------|
| Ellen | 12 | 16 | 15 |
| Team | 32 | 34 | 39 |

7. Ellen's to team's in Game 1
8. Team's to Ellen's in Game 3
9. Ellen's to rest of team's in Game 2
10. Ellen's total to team's total in all 3 games

- Write the ratio "13 out of 19" three different ways.
- Out of the 140 students, 107 are right-handed and 33 are left-handed. Find the ratio of right-handers to the total number of students.

Use the picture to the right to answer #3 and #4.



- Write a ratio comparing the number of shaded to the total number of squares.
- Write a ratio comparing the number of shaded to the number of un-shaded squares.

| Tenth Grade Students at Waverly High School | | | | |
|---|---------|------|---------|----------------|
| | English | Math | Science | Social Studies |
| Passed | 125 | 130 | 120 | 125 |
| Failed | 15 | 10 | 20 | 15 |

Use the table above and write each of the following ratios in lowest terms.

- Failed English to passed English.
- Passed science to failed science.
- Passed math to total math.
- Failed social studies to total social studies.
- Passed English to passed math.
- Passed science to passed social studies.

A proportion is a statement that shows two ratios are _____, or proportional.

Proportion: A statement of equality between two ratios. Four quantities, a , b , c , d , are said to be in proportion if $\frac{a}{b} = \frac{c}{d}$.

Tell whether each pair of ratios forms a proportion.

1. $\frac{6}{9}$ $\frac{10}{14}$

2. $\frac{6}{4}$ $\frac{12}{8}$

3. $\frac{2}{3}$ $\frac{6}{8}$

4. $\frac{27}{15}$ $\frac{45}{30}$

5. $\frac{8}{14}$ $\frac{20}{35}$

6. $\frac{3}{4}$ $\frac{27}{36}$

7. An elephant's heart rate was measured at 26 beats in 1 minute and 102 beats in 4 minutes. Are the rates proportional?

8. Karen makes 7 T-shirts in 10 days and Rob makes 21 T-Shirts in 30 days. Are the rates proportional?

9. Is the rate 32 apples in 6 boxes proportional to 4 boxes and 20 apples?

Write a proportion using the given ratio and another equivalent ratio.

1. $\frac{1}{2}$

2. $\frac{5}{9}$

3. $\frac{15}{20}$

Tell whether each pair of ratios forms a proportion. Show all work.

4. $\frac{1}{2}$ $\frac{4}{8}$

5. $\frac{7}{14}$ $\frac{10}{20}$

6. $\frac{9}{7}$ $\frac{7}{9}$

7. $\frac{1.5}{3}$ $\frac{20}{10}$

8. $\frac{6}{9}$ $\frac{20}{30}$

9. $\frac{5}{11}$ $\frac{6}{12}$

10. $\frac{8}{13}$ $\frac{10}{15}$

11. $\frac{10}{15}$ $\frac{2.2}{3.3}$

12. $\frac{12}{18}$ $\frac{48}{72}$

13. $\frac{13}{27}$ $\frac{13}{28}$

14. $\frac{50}{100}$ $\frac{3.2}{6.4}$

15. $\frac{14}{17}$ $\frac{56}{68}$

Tell whether each pair of ratios forms a proportion. Show all work

16. Is the ratio 32 birds in six nests proportional to the ratio twenty birds in four nests?

17. Is the ratio three pets in 15 houses proportional to the ratio ten pets in 50 houses?

18. The ratio of students to parents at a basketball game is 6 to 5. Is that proportional to 170 parents and 204 students?

19. The Star Gazette charges \$7.20 for 3 weeks. Is their 11-week charge of \$32.00 proportional to their 3-week charge?

20. Jacob paid \$5.50 for a movie ticket. Is this rate proportional to the 12-ticket book he bought for \$63.00?

Use the following steps to solve all proportions:

1. **Cross Multiply** - The product of the means equals the product of the extremes.
2. **Set the products equal to each other.**
3. **Solve for the variable by dividing by the number next to the variable.**

1.
$$\frac{x}{10} = \frac{3}{5}$$

2.
$$\frac{6}{9} = \frac{x}{15}$$

3.
$$\frac{27}{21} = \frac{p}{14}$$

4.
$$\frac{4}{7} = \frac{x}{84}$$

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

6.
$$\frac{t}{4} = \frac{5}{10}$$

Writing Proportions

Set up a proportion making sure both ratios are in the same order and solve.

7. If 18 plums weigh 54 ounces, then 27 plums weigh how many ounces?

8. Gary can type three pages in 18 minutes. How many pages can he type in 33 minutes?

Solve each proportion for the indicated variable. Show all three steps.

1. $\frac{2}{5} = \frac{4}{x}$

2. $\frac{3}{4} = \frac{x}{12}$

3. $\frac{5}{y} = \frac{10}{12}$

4. $\frac{21}{30} = \frac{m}{10}$

5. $\frac{14}{16} = \frac{21}{x}$

6. $\frac{27}{15} = \frac{x}{20}$

7. $\frac{t}{9} = \frac{20}{45}$

8. $\frac{7}{3} = \frac{35}{f}$

9. $\frac{n}{10} = \frac{45}{25}$

10. $\frac{80}{15} = \frac{w}{60}$

Solve each proportion for the indicated variable. Show all three steps.

11. $\frac{y}{2} = \frac{2}{5}$

12. $\frac{16}{0.5} = \frac{p}{4}$

13. $\frac{w}{3} = \frac{18}{8}$

14. $\frac{14.6}{10} = \frac{x}{15}$

15. $\frac{9.3}{6} = \frac{x}{24}$

16. $\frac{y}{6} = \frac{2}{5}$

Write a proportion and then solve for the variable.

17. Three shirts for \$54. W shirts for \$135.

18. Five hours for \$75. Three hours for u dollars.

Each problem must to be set up this way:

- | | |
|---|-------------------------------------|
| 1. Write the proportion. | $\frac{8}{3} = \frac{192}{n}$ |
| 2. Write the cross products | $8 * n = 192 * 3$ |
| 3. Multiply | $8n = 576$ |
| 4. Undo multiplication by using division | $8n = 576$ $\div 8 \quad \div 8$ |
| 5. Divide | $n = 72$ |

Solve each proportion. Be sure to set it up the correct way and show all work.

$$1. \frac{4}{9} = \frac{10}{x}$$

$$2. \frac{5}{2} = \frac{6}{x}$$

$$3. \frac{5}{2} = \frac{2}{x}$$

$$4. \frac{21}{27} = \frac{x}{18}$$

$$5. \frac{15}{21} = \frac{20}{y}$$

$$6. \frac{26}{b} = \frac{39}{9}$$

$$7. \frac{h}{108} = \frac{7}{18}$$

$$8. \frac{45}{792} = \frac{70}{w}$$

$$9. \frac{16}{120} = \frac{j}{15}$$

$$10. \frac{350}{p} = \frac{1050}{60}$$

$$11. \frac{g}{1134} = \frac{27}{729}$$

$$12. \frac{40}{65} = \frac{z}{104}$$

$$13. \frac{15}{y} = \frac{40}{12}$$

$$14. \frac{y}{32} = \frac{16}{10}$$

$$15. \frac{32.5}{25} = \frac{97.5}{q}$$

$$16. \frac{y}{42.3} = \frac{144}{56.4}$$

$$17. \frac{126}{k} = \frac{14}{3}$$

$$18. \frac{30}{x} = \frac{16}{40}$$

19-22. For each word problem, write and then solve the proportion to find the answer. Be sure to set it up the correct way and show all work.

19. A 380-cubic-centimeter sample of titanium has a mass of 1710 grams. Find the weight of a titanium sample that has a volume of 532 cubic centimeters. Write and then solve a proportion to find the answer.

20. The Bigtown football team outscored its opponents 5:2 last season. If their opponents scored 38 points, how many points did Bigtown score?

21. In the local coed softball league, the male to female ratio is 6:6. If there are 160 players in the league, how many are female?

22. In a certain desert environment there are a lot of small rodents. There also happen to be a lot of snakes that feed on the rodents. The ratio of rodents to rodent eating snakes is 13 to 3. If there are 4,000 snakes in the area, about how many rodents are there?

On a tour guide map of Madagascar, the scale states that 3 inches represent 125 miles. Two beaches are 5.2 inches apart on the map. What is the approximate distance in miles between the two beaches? Round your answer to the nearest tenth.

A ornithologist is studying hawks in the Adirondack Mountains. She catches 24 hawks over a period of one month, tags them, and frees them back into the wild. The next month, she catches 20 hawks and finds that 12 are already tagged. Estimate the number of hawks in this part of the mountains.

You have a friend who weighs 155 pounds but is only 5 feet 4 inches tall. What is the height-to-weight ratio of your pal?

I own a cleaning company and am having trouble figuring cost per square foot. If I clean a 3200 square foot building five nights per week for a sum of \$575.00 per month, what is the cost per square foot?

A common foodstuff is found to contain .00125% iron. The serving size is 87.0 grams. If the recommended daily allowance is 18mg of iron, how many servings would a person have to eat to get 100% of the daily allowance of iron?

If a doctor prescribes 30 units of insulin in 500 ml to be administered over 2 hours, how many drops per minute should be administered if the set is calibrated to deliver 20 drops per ml?