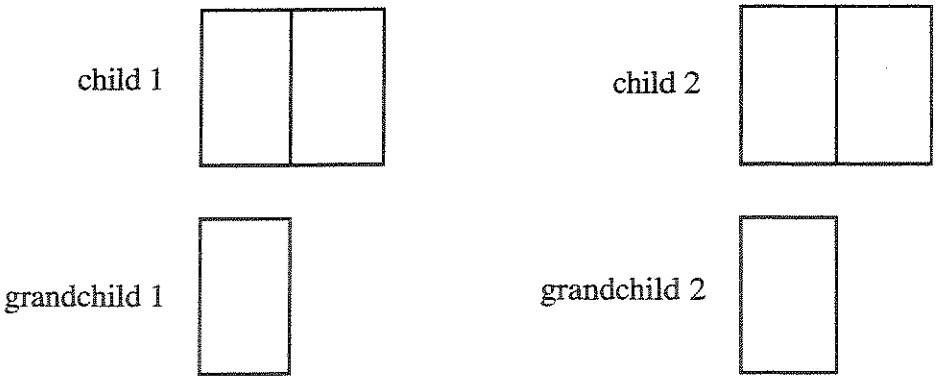


Definition: The result of comparing two quantities multiplicatively is called a ratio. If x is the value of quantity A, and y is the value of another quantity B, then the ratio $x : y$ or $\frac{x}{y}$, tells us how many times as large as B, A is. $x : y$ is often pronounced "x to y" or "x is to y."

A \$140,000 estate was sold and the money was split among 2 children and 2 grandchildren. The two grandchildren get the same amount of money and each child gets two times as much as each grandchild. How much did each child get?

Observe from this activity that there are many ways of expressing multiplicative relationships between quantities. For example, "Each child gets twice as much as each grandchild." Also, notice that many questions (although not all) about quantitative relationships can be answered when one simply knows the ratio of two quantities, even without actually knowing the values of the individual quantities.

To help students see the relationships between the quantities in this situation, have them start by drawing a diagram of the children's inheritance and the grandchildren's inheritance:



Since all of these parts together constitute the entire estate, we can think of the estate as cut up into six equal parts, with each child getting two parts and each grandchild getting one.

Activity 1: Candy Bars

Below are diagrams of regions. Consider each region as a candy bar that is being shared between two people. Cut each of the candy bars into two pieces, A and B, so that . . .



- a. Part A is $\frac{1}{2}$ as large as Part B.
- b. Part B is ___ times as large as Part A.
- c. Part A is how much of the bar?
- d. What is the ratio of Part A to Part B?

- a. Part A is $\frac{1}{4}$ as large as Part B.
- b. Part B is ___ times as large as Part A.
- c. Part A is how much of the bar?
- d. What is the ratio of Part B to Part A.



- a. Part A is $\frac{2}{3}$ as large as Part B.
- b. Part B is ___ times as large as Part A.
- c. Part A is how much of the bar?
- d. What is the ratio of Part A to Part B?

- a. Part A is $\frac{1}{5}$ as large as Part B.
- b. Part B is ___ times as large as Part A.
- c. Part A is how much of the bar?
- d. What is the ratio of Part B to Part A.



- a. The ratio of Part A to Part B is $\frac{3}{2}$.
- b. Part A is ___ times as large as Part B.
- c. Part B is how much of the bar?
- d. Part B is how many times as large as Part A?

- a. The ratio of Part A to Part B is $\frac{3}{4}$.
- b. Part B is ___ times as large as Part A.
- c. Part A is how much of the bar?
- d. Part A is how many times as large as Part B?

Drawings will help here.

1. Four of every 5 dentists interviewed recommend Yucky Gum.
 - a. Among those interviewed, what is the ratio of those who recommend Yucky Gum to those who do not?
 - b. Among those interviewed, there are _____ times as many dentists who do not recommend Yucky Gum as dentists who do.
 - c. What fraction of the dentists interviewed recommend Yucky Gum?
2. In Mensville, for every 3 women there are 4 men.
 - a. What is the ratio of men to women in Mensville?
 - b. The number of women is _____ times the number of men.
 - c. The number of men is _____ times the number of women.
 - d. Women make up what fraction of the total population of Mensville?
 - e. What fraction of the total population of Mensville are men?
3. Two of every 3 seniors at Lewis H.S. apply for college. Three of every 5 seniors who apply for college at Lewis High are female students.
 - a. How does the number of seniors who apply for college compare to the number of seniors at Lewis High?
 - b. How does the number of seniors who apply for college compare to those who don't?
 - c. What fraction of the graduating seniors at Lewis High do not apply to college?
 - d. What fraction of the seniors are males who apply for college? How does the number of males who apply for college compare to the number of graduating seniors?
 - e. The number of females who apply for college is _____ times as large as the number of students in the senior class. What part of the senior class consists of females who apply for college?
 - f. How does the number of males who apply for college compare to the number of females who apply?
 - g. For every _____ females who apply for college, there are _____ males who apply.
 - h. The number of males who apply for college is _____ times as large as the number of females who apply for college.
 - i. The number of females who apply for college is _____ times as large as the number of males who apply.
 - j. What is the ratio of female seniors who do not apply for college to males who do not apply for college?

j. not enough information is given to answer.

1. a. 4:1 or $\frac{1}{4}$ b. $\frac{4}{1}$ c. $\frac{5}{4}$
2. a. 4:3 or $\frac{3}{4}$ b. $\frac{4}{3}$ c. $\frac{3}{4}$ d. $\frac{7}{3}$ e. $\frac{7}{4}$
3. a. $\frac{3}{2}$ b. Twice as many, or 2:1 c. $\frac{3}{1}$ d. $\frac{15}{4}$; 4:15
- e. $\frac{15}{6}$; 6:15 f. 2:3 g. 3:2 h. $\frac{3}{2}$ i. $\frac{2}{3}$; or $1\frac{2}{3}$

RATIO PROBLEMS

- Two children take a hike carrying one backpack. Carlita carries the backpack first, then Don. When the hike is over, Don says, "You carried it only $\frac{3}{5}$ as far as I did!" If the rectangle shows the whole hike, mark accurately where Carlita carried the backpack, and where Don carried it.



Don carried the backpack _____ (fraction) of the whole trip.

Carlita carried the backpack _____ (fraction) of the whole trip.

- Three people share the cost of renting a sailboat. Because they used it different amounts of time, person A's share was $\frac{2}{3}$ of person B's share, and $\frac{1}{4}$ of person C's share. If the sailboat rental cost was \$273, how much did each person pay?
- Mary used 14 meters of ribbon to make bows and strips. She used $\frac{3}{4}$ as much ribbon for bows as she did for strips. How many meters of ribbon did she use for bows and how many for strips?
- The big dog weighs 5 times as much as the little dog. The little dog weighs ~~378~~ $\frac{2}{3}$ as much as the medium sized dog. The medium sized dog weighs 12 pounds more than the little dog. How much does the big dog weigh?
- This problem is from an SAT exam, and very few students could solve it. Can you now solve this problem?
 A flock of geese on a pond were being observed constantly.
 At 1:00 pm, $\frac{1}{5}$ of the geese flew away.
 At 2:00 pm, $\frac{1}{8}$ of the geese that remained flew away
 At 3:00 pm, 3 times as many geese as had flew away at 1:00pm flew away, leaving 28 geese on the pond. At no other time did geese arrive or fly away (or die).
 How many geese were in the original flock?