Recognizing and Using Fractions

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Arranging Quantities into Fractions:

When you have two quantities which measure a set and its subset, those two quantities can be written as a fraction.

Example 1: Eight hundred people live in a rural community. 200 of those people own a truck.

The 200 people who own trucks form a subset of the total population of the community. Therefore $\frac{200}{800}$ or $\frac{1}{4}$ of the people in the community own trucks.

Example 2: Three in every five students at a certain college own a laptop computer. This can be restated as $\frac{3}{5}$ of the student population at that school own a laptop computer.

Interpreting the word "per":

Frequently, statistics are given as a quantity "per capita". This means the given statistic is written over the total population.

Example 3: In the fictional country of Paia, the national debt is $\$5,000$ per capita.

This means that the country owes five thousand dollars for each person who lives there. If we know how many people lived in Paia, we could calculate the national dept. In general, "per" is used when giving one quantity in terms of another.

Example 4: A particular park employs approximately two gardeners per hectare. They each work 20 hours per week.

If we knew how many hectares were in the park, we could decide how many gardeners work there. Knowing the total number of gardeners would enable us to calculate the number of hours worked by employees each week. This brings us to:

Using Fractions to Gain Extra Information:

In Example 4, we know there are two gardeners for every three hectares. This information can be written $\frac{2}{1}$. This fraction is meaningless unless we are given the total number of hectares or the total number of gardeners.

If there are 7 hectares, we can let "x" be the total number of gardeners. The number of gardeners goes across from the number 2 which is also a quantity of gardeners. Likewise, the number of hectares goes on the bottom of each respective fraction.

$\frac{2}{3} = \frac{x}{7}$

The next step is to *cross multiply* – in other words, multiply the top left with the bottom right on one side of the equal sign and multiply the bottom left with the top right on the other.

$2 \times 7 = 3 \times x$
$14 = 3x$ which is the same as $3x = 14$.
That is to say $\frac{3x}{3} = \frac{14}{3}$.
Therefore, $x = \frac{14}{3}$ which is approximately 4.7. Since it makes little sense to hire 0.7 of a full time gardener, we round up. There are approximately 5 gardeners employed at this particular park.

To calculate the number of hours, we create the fraction $\frac{1}{20}$ representing the one gardener which works 20 hours. Let "y" be the total number of hours worked. Putting the number of gardeners on top and the number of hours on the bottom, we get the two equal fractions:

$\frac{1}{20} = \frac{5}{y}$
$1 \times y = 20 \times 5$
$y = 100$.

Therefore, in total, 100 hours are worked by gardeners in this particular park.

Likewise, returning to Example 3, if we knew that 200, 000 people lived in Paia, we could calculate the national debt by placing the money amounts on the bottom and the number of people on the top:

$\frac{1}{5000} = \frac{200{,}000}{z}$
$z = 5000 \times 200{,}000 = \$1{,}000{,}000{,}000$
where "z" is the national debt.

Therefore, Paia owes one billion dollars.