Step-by-step
in plain English

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St. Petersburg Times

MATH and STATISTICS TOOLBOX RECIPE CARDS

- Percent

- Two classic
  percent questions

- Timed Math Drills
  (test your mettle)
  Note: electronic only

DETAIL SHEETS

- Reducing a fraction

- Order of operations

- Terminology and
  math style

COMING ATTRACTIONS:

- More percent questions including: markdown (decrease), markup (increase), percent of total and percent change

- Millage rates

- Percent and percentage points

- Currency exchange Rates

- Mean, median & mode

- Metric conversions

- Consumer Price Index

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How a ratio is written:

2 to 3
2:3

ratio:

Definition: Used to show a relationship between parts in comparison to the whole. It is the first step in calculating a **percent** (see separate card). **Notes:** A mathematician would also write a ratio as a fraction: 2/3. Fractions are generally not the correct style for use in news copy but we will use this number form to learn about math because it clearly shows when we need to perform a calculation using division.

Common Illustration: If you were mixing lemonade and the recipe called for 2 cans of lemon juice and 3 cans of water, the ratio of lemon juice to water would be 2:3. The recipe would contain a total of 5 cans of liquid.
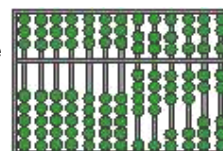
Classic math example:

A) A die has six sides numbered 1, 2, 3, 4, 5 and 6. The number "3" occurs once so the ratio of 3s compared to the other numbers is said to be 1 to 6, 1:6 or 1/6. To determine the probability or chance of rolling a "3"

Step 1. find the ratio in a situation where you want to know how often you will roll 1 particular number out of a group of 6; in this case, the ratio is 1/6 because there is one "3" and six total sides

Step 2. divide the numerator (1) by the denominator (6) to get the decimal 0.167

Step 3. multiply the decimal (0.167) by 100 to get the percent which is 16.7 (remember, percent means parts per hundred so that is why you multiply by 100.

If the die is perfectly weighted (not loaded!) the chances of rolling a "3" are about 17 percent. You could also say: The chances of throwing a "3" are 1 to 6, one chance for every six throws of the die.

TIP: To know where to place the decimal point in the answer, add the number of decimal places in the numbers you are multiplying and count over that many places in the answer starting at the far **right** and moving **left**. The illustration shows there are six decimal places, so you would need to count over six places to get the correct answer. This "long way" shows you the "why" behind the...

FAMOUS SHORTCUT -- You can skip the longhand math and move the decimal point **two** places to the **left** to change a percent to a decimal. To change a decimal to a percent, move the decimal point **two** places to the **right**. Now you know how the shortcut works and how to do it longhand too!

Longhand math example:

```
   100.000      multiply the decimal by
x      .167      100 to get the
   700 000       percent
  6000 000
 10000 000                  STEP 3
 16700 000                  detail
```

```
  100.000    adds up as
x   .167     6 decimal places
```

```
16700000    so, move the decimal
            point over 6 places
            in the final answer
            starting at the right and
            moving left
```

16.7 percent = the decimal **.167**

Practical story example:

Use a combination of ratios to find an unknown number.
B) A rumor says the number of fish in a popular fishing lake are decreasing. Is this true? You obtain historical data for the fish population and join an environmental official at the lake shore to get a recent count. The official catches and tags 270 fish. All fish are returned to the lake. The next day, the official catches 122 fish and 24 of them are tagged. Now, you have enough to write your story. Here's how:

1. Set up two ratios, one on either side of an equals sign -- this is called a proportion. In the example, the proportion would be: 270 / ? = 24 / 122 where "?" is the total number of fish in the lake -- the unknown number.

2. Multiply both ratios by the lowest common denominator which is: 122? So, 122? (270 / ?) = 122? (24 / 122) To simplify, cross out the duplicates on both sides of the equals sign to get: 122 * 270 = ? * 24

3. Your next mission is to get the ? by itself. To do this, divide BOTH sides by 24: (122 * 270) / 24 = (? * 24) / 24. To simplify, since 24/24 = 1 and any number multiplied by 1 equals itself, just cross out the duplicate numerator and denominator to get: (122 * 270) / 24 = ?

4. The current total fish population = 1,372.5 or 1,373 (you can't have half a fish!) Compare this to historical data to prove or disprove the rumor.

Another practical use for using ratios:

C) find expected school test scores for a district as compared to the state