

Knowing what
“percent” means will
help a lot.

“Percent” means “per 100” or “part of 100”

For example, 20% means “20 parts out of every 100 parts”. We could write 20% as $\frac{20}{100}$ or 0.20 (if we do that division).

Do you remember the
shortcut for turning
percents into decimals?

Below are 300 flowers. Consider 20 parts out of every 100. Circle them and find the total. That is 20% of 300.



Percent problems compare parts to the whole. The 300 flowers is our whole. And, 20% of that 300 would be a **part of that whole**. The trick is to figure out what is the part and what is the whole in these problems.

$$\text{percent} = \frac{\text{part}}{\text{whole}}$$

or

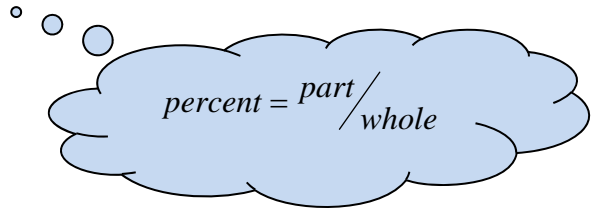
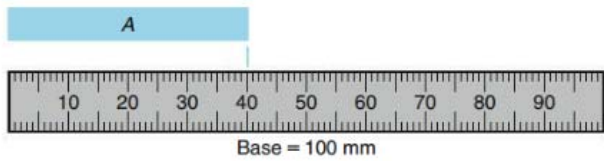
$$\text{percent} \cdot \text{whole} = \text{part}$$

Alternatively,

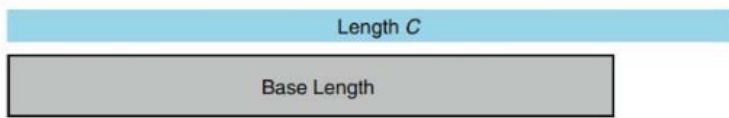
$$\frac{\text{percent number}}{100} = \frac{\text{part}}{\text{whole}}$$

We will work with the calculations needed to understand percents here. Later we will solve problems involving percents.

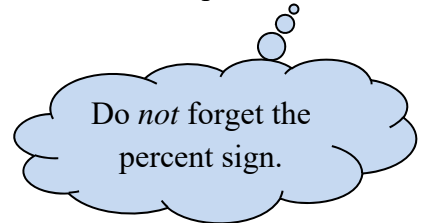
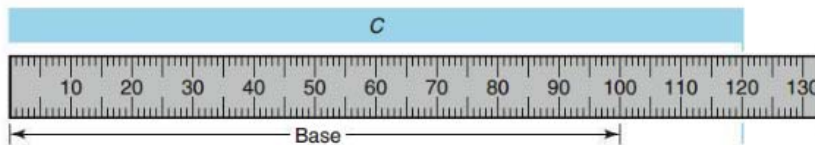
expl 1: What percent of the base length (ruler) is the length *A*?



expl 2: What percent of the base length (ruler) is the length *C*?

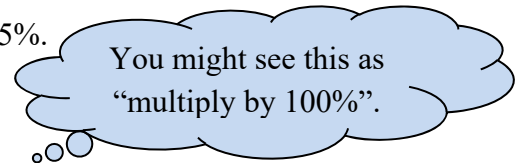


Here, we will line up the ruler with the base. The base happens to be 100 mm long. Let's compare the length of *C* with the base of 100 mm. Write this as a fraction and as a percent.



Converting Between Decimal and Percent Forms:

If we have a number like 0.45 that we need in percent form, we really just think of it as “forty-five hundredths” which would be written as $\frac{45}{100}$ or 45%.



Now, as far as a procedure to quickly convert a decimal number to percent form, we can move the decimal point over two places to the right and slap on a percent sign. Try these out.

expl 3: Convert to percent form.

- a.) 0.23 b.) 0.005 c.) 2.35 d.) 1.250

To go the other way, we will move the decimal place to the *left* two places and *remove* the percent sign.

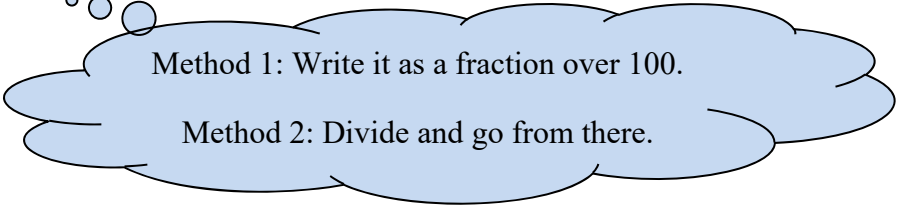
expl 4: Convert to decimal form.

- a.) 65% b.) 6% c.) $6\frac{1}{4}\%$ d.) 1000% e.) 0.33%

Converting Between Fraction and Percent Forms:

When finding percents, we really are just comparing two numbers (like a fraction or ratio we have been dealing with) and writing it as an equivalent fraction where the bottom (denominator) is 100. You have a choice between two common methods.

expl 5: What percent is equal to $\frac{3}{4}$?

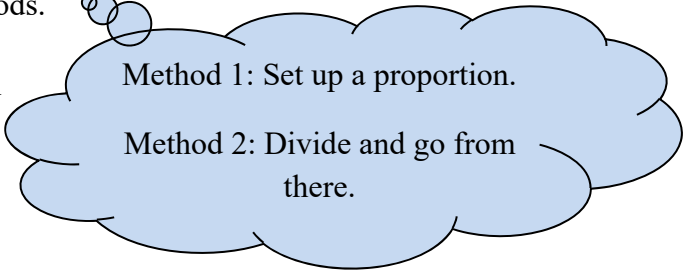


Method 1: Write it as a fraction over 100.

Method 2: Divide and go from there.

However, if the denominator is *not* a factor of 100, like 4 was, we may have to work a little more. You have a choice between two common methods.

expl 6: What percent is equal to $\frac{5}{6}$? Write answer in two different forms: as a percent involving a mixed number *and* rounded to the nearest tenth of a percent.



Method 1: Set up a proportion.

Method 2: Divide and go from there.

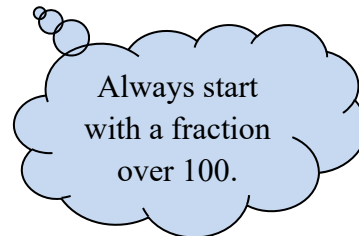
expl 7: Rewrite each percent as a fraction in lowest terms.

a.) 250%

b.) 55%

c.) 10%

d.) 0.05%



We will see certain fractions (and their percent and decimal forms) quite a lot. Here is a table of common values. You should *not* try to memorize them but rather appreciate their ubiquity.

Percent Equivalents

Percent	Decimal	Fraction
5%	0.05	$\frac{1}{20}$
$6\frac{1}{4}\%$	0.0625	$\frac{1}{16}$
$8\frac{1}{3}\%$	$0.08\bar{3}$	$\frac{1}{12}$
10%	0.10	$\frac{1}{10}$
$12\frac{1}{2}\%$	0.125	$\frac{1}{8}$
$16\frac{2}{3}\%$	$0.1\bar{6}$	$\frac{1}{6}$
20%	0.20	$\frac{1}{5}$
25%	0.25	$\frac{1}{4}$
30%	0.30	$\frac{3}{10}$
$33\frac{1}{3}\%$	$0.\bar{3}$	$\frac{1}{3}$
$37\frac{1}{2}\%$	0.375	$\frac{3}{8}$
40%	0.40	$\frac{2}{5}$

Percent	Decimal	Fraction
50%	0.50	$\frac{1}{2}$
60%	0.60	$\frac{3}{5}$
$62\frac{1}{2}\%$	0.625	$\frac{5}{8}$
$66\frac{2}{3}\%$	$0.\bar{6}$	$\frac{2}{3}$
70%	0.70	$\frac{7}{10}$
75%	0.75	$\frac{3}{4}$
80%	0.80	$\frac{4}{5}$
$83\frac{1}{3}\%$	$0.8\bar{3}$	$\frac{5}{6}$
$87\frac{1}{2}\%$	0.875	$\frac{7}{8}$
90%	0.90	$\frac{9}{10}$
100%	1.00	$\frac{10}{10}$