The conversion factor method
(once more with feeling)

The relationship between centimeters and millimeters:

There is a simple relationship between centimeters and millimeters: 1 centimeter is equal to 10 millimeters.

$$1 \text{ cm} = 10 \text{ mm}$$

Since one centimeter is equal to 10 millimeters, the following equations must also be true (remember that two things that are equal divided by one another equals 1)

$$\frac{1 \text{ cm}}{10 \text{ mm}} = 1 \qquad \underline{AND} \qquad \frac{10 \text{ mm}}{1 \text{ cm}} = 1$$

Since these fractions are equal to 1, any measurement multiplied by them *will not* be changed—only the number will be changed to match the new units!

For example, to convert 2.7 centimeters (cm) to millimeters (mm) and to show your work you would need to use a conversion factor. But which one do you use?

$$\left(\frac{1 \text{ cm}}{10 \text{ mm}}\right) \qquad \underline{OR} \qquad \left(\frac{10 \text{ mm}}{1 \text{ cm}}\right)$$

You want to choose the conversion factor that will cancel the given units. If you do the following:

$$2.7 \text{ cm} \times \left(\frac{1 \text{ cm}}{10 \text{ mm}}\right) = 0.27 \ \frac{\text{cm}^2}{\text{mm}}$$

the units <u>do not</u> cancel, and you end up with very ugly units that don't make sense. But if instead you do:

$$2.7 \ \cancel{\text{cm}} \times \left(\frac{10 \text{ mm}}{1 \ \cancel{\text{cm}}}\right) = 27 \text{ mm}$$

the centimeters <u>do</u> cancel out! It will help you to keep track of things if you actually cross out the units that cancel; the ones that are not crossed out are the ones your final answer is left with.

Sample Conversions:

EX 1:   5 cm = $\underline{50\ mm}$

Work: $5\ \cancel{cm}\ \times\ \dfrac{10\ mm}{1\ \cancel{cm}}\ =\ 50\ mm$

EX 2:   25 mm = $\underline{2.5\ cm}$

Work: $25\ \cancel{mm}\ \times\ \dfrac{1\ cm}{10\ \cancel{mm}}\ =\ 2.5\ cm$

Try the following conversions (show your work in the space below each question)**:**

1)   18 cm = _____ mm

2)   147 cm = _____ mm

3)   52 mm = _____ cm

4)   236 mm = _____ cm