After watching the *Scale Factor* video, make sense of the mathematics by taking a closer look at the problem situation and solutions. Use the questions and comments in bold to help you use scale factor and solve the problems.

Erica helped her friend select and purchase a toy Humvee that is a replica of a real Humvee. The scale factor of the toy Humvee to the real Humvee is 1:18.

Problem 1: Erica measured the diameter of the front tire, the length of the front bumper, and the overall length of the toy Humvee. Use the dimensions of the toy to determine the dimensions of the real Humvee.

HUMVEE	TOY	REAL
SCALE	1	18
Diameter of the front tire	2 inches	
Length of the front bumper	$4\frac{1}{2}$ inches	
Overall length	10 inches	

What does the scale factor of 1 to 18 tell you? It means that the size of the replica is 1/18 the size of a real Humvee. It also tells you that the dimensions of the real Humvee are 18 times larger than the dimensions of the replica.

How can you use the scale factor to determine the dimensions of the real Humvee?
- Since the real front tire is 18 times the diameter of the model, the real front tire is 18 x 2 or 36 inches in diameter.
- Since the length of the front bumper of the Humvee is 18 times the length of the model, the real front bumper is 18 x 4½ or 81 inches.
- Since the overall length of the real Humvee is 18 times the length of the model, the real Humvee's length is 18 x 10 or 180 inches.

HUMVEE	TOY	REAL
SCALE	1	18
Diameter of the front tire	2 inches x 18	36 inches
Length of the front bumper	$4\frac{1}{2}$ inches x 18	81 inches
Overall length	10 inches x 18	180 inches

MakingSense

You can also use scale factor to find the dimensions of the replica if you know the size of the real Humvee.

Problem 2: Erica also measured the height of the real Humvee. Use this height to determine the height of the toy.

HUMVEE	TOY	REAL
SCALE	**1**	**18**
Overall height		72 inches

How can you use the scale factor to determine the height of the toy Humvee?
Since the overall height of the real Humvee is 18 times the height of the model, the model's height would be 1/18 of the real Humvee's height. Seventy-two inches divided by 18 is 4 inches. Therefore, the height of the model is 4 inches.

HUMVEE	TOY	REAL
SCALE	**1**	**18**
Overall height	4 inches ÷18	72 inches

It doesn't matter if you are measuring dimensions in inches, feet, or centimeters, the scale factor doesn't change. Proportional reasoning helps you make sense of mathematics any time you are examining scale factor, especially when dealing with maps, blueprints, or replicas like the Humvee seen in this problem.