P B7 (pg 1 of 2) **Scientific Notation - Accuracy and Precision**
Area and Volume

Name_____

1. Put the following numbers into proper scientific notation.

   a 9,754
   b 0.000 0840
   c 0.000 000 065 8
   d 30,710,000,000
   e 0.000 000 000 000 000 20
   f 602,000,000,000,000,000,000,000

2. Put the following numbers back into standard notation.

   a 3.56×10^{12}
   b 2.040×10^{-9}
   c 6.99×10^{5}
   d 3×10^{-5}
   e 4×10^{3}
   f 8.075×10^{-4}

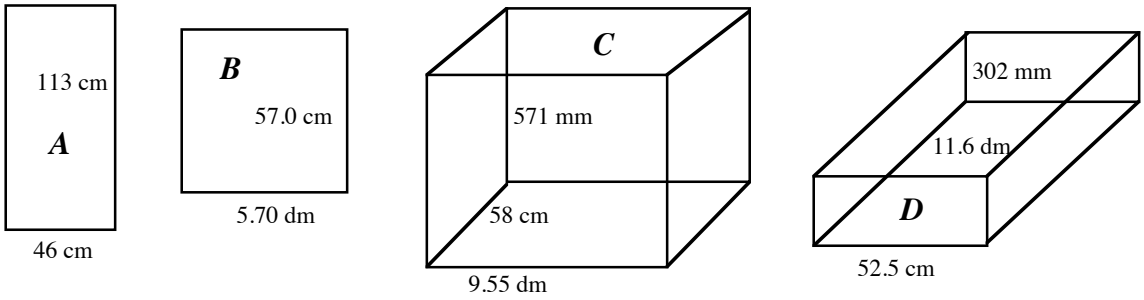
3. Make the following calculations, report the answer in scientific notation, and round off to the appropriate number of significant figures.

   a $(4.59 \times 10^{-14}) \times (3.1 \times 10^{6}) =$
   b $\dfrac{7.08 \times 10^{-14}}{8 \times 10^{-11}} =$
   c $(2.303 \times 10^{23}) \times (3.4 \times 10^{-4}) =$
   d $\dfrac{6.30 \times 10^{15}}{3.02 \times 10^{9}} =$
   e $(5 \times 10^{-10}) \times (6.07 \times 10^{3}) =$
   f $\dfrac{4.56 \times 10^{26}}{6.02 \times 10^{23}} =$
   g $(7.80 \times 10^{-9}) \times (5.3 \times 10^{-15}) =$
   h $\dfrac{4.0 \times 10^{26}}{5.87 \times 10^{-15}} =$

4. A group of 5 state trooper recruits were on the side of the highway learning to use the radar devices. Their results for 4 different cars are listed below, with the car's speedometer listed in bold at the top. Comment on the accuracy and precision of their individual results and the average of their results. Do you notice any systematic errors?

	car 1	**car 2**	**car 3**	**car 4**	
	46	**55**	**74**	**82**	**actual reading on speedometer in car**
A	27	55	73	58	
B	10	36	74	63	
C	29	54	72	95	
D	28	55	76	78	
E	27	56	74	113	
	24.2	**51.2**	**73.8**	**81.4**	**average of the 5 radar readings**

5. Calculate the size of the squares and boxes below. Be careful of different units.
   Be sure and put unit labels on your number answers. NO NAKED NUMBERS!
   Hint: area = length × width volume = length × width × height



Scientific Notation - Accuracy and Precision
Area and Volume

ANSWERS

1. a 9.754×10^{3} c 6.58×10^{-8} e 2.0×10^{-16}
   b 8.40×10^{-5} d 3.071×10^{10} f 6.02×10^{23}

2. a 3,560,000,000,000 c 699,000 e 4,000
   b 0.000 000 002 040 d 0.00 003 f 0.000 807 5

3. a $1.4229 \times 10^{-7} = 1.4 \times 10^{-7}$ (2 sf)
   b $8.85 \times 10^{3} \Rightarrow 9 \times 10^{3}$ (1 sf)
   c $7.8302 \times 10^{19} \Rightarrow 7.8 \times 10^{19}$ (2 sf)
   d $2.086092715 \times 10^{6} \Rightarrow 2.09 \times 10^{6}$ (3 sf)
   e $3.035 \times 10^{-6} \Rightarrow 3 \times 10^{-6}$ (1 sf)
   f $757.4750831 \Rightarrow 757$ or 7.57×10^{2} (3 sf)
   g $4.134 \times 10^{-23} \Rightarrow 4.1 \times 10^{-23}$ (2 sf)
   h $6.814310051 \times 10^{40} \Rightarrow 6.8 \times 10^{40}$ (2 sf)

4. for car 1 the average is not accurate but as a group the troopers are precise (except for trooper B)
   for car 2 the average is fairly accurate and as a group the troopers are precise (except for trooper B)
   for car 3 the average is both very precise and accurate (even trooper B seems to have gotten his act together)
   for car 4 the average is very accurate but as a group the troopers are not precise (nor are they accurate individually)

   Because 3 out of 4 of his radar readings are low, it appears as if trooper B was is making a systematic error.
   Because all of the results for car 1 are low, it appears if there is a systematic error. One might wonder if in fact it is the speedometer on the car could be 18 or 20 mph to high.

5. a 5,198 cm^2 => 5,200 cm^2 (2 sf) b 3249 cm^2 => 3,250 cm^2 or 32.5 dm^2 or (3 sf)

   c 316,276.9 cm^3 => 320,000 cm^3 or 320 dm^3 or 320,000,000 mm^3 (2 sf)

   d 183,918 cm^3 => 184,000 cm^3 or 184 dm^3 or 184,000,000 mm^3 (3sf)