Unit 1 • Observations, Models, & Experiments

S C I E N T I F I C   N O T A T I O N   &   U N I T   A N A L Y S I S

Change the following to Scientific Notation (maintain the number of significant figures):

1. 5.280 =   _____   11. 2,560 =   _____

2. 2,000 =   _____   12. .0009 =   _____

3. 15 =   _____   13. 8,900,000 =   _____

4. 6,589,000 =   _____   14. .0920 =   _____

5. 70,400,000,000 = _____   15. 6,300 =   _____

6. .00263 =   _____   16. .90 =   _____

7. .00589 =   _____   17. 250 =   _____

8. .006 =   _____   18. .006087 =   _____

9. .400 =   _____   19. 500,000 =   _____

10. .08060 =   _____   20. .0000000105 =   _____

Make the following Metric System conversions using "unit analysis" (you may use scientific notation):

1.   100 mg   _____ = _____ g

2.   20 cm   _____ = _____ m

3.   50 L   _____ = _____ kL

4.   22 g   _____ = _____ cg

5.   825 cm   _____ = _____ km

6.   2,350 kg   _____ = _____ g

7.   19 mL   _____ = _____ cL

8.   52 km   _____ = _____ m

9.   36 m   _____ = _____ cm

10. 18 cm   _____ = _____ mm

11. 6 g   _____ = _____ mg

12. 4,259 mg   _____ = _____ g

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SIGNIFICANT FIGURES & ROUNDING

A. Indicate the number of significant figures then round each to the number of significant figures indicated.

For example:

1.234   has _____4_____ significant figures and, rounded to   2   significant figures, is ____1.2____

1. 0.6034   has _____ significant figures and, rounded to   2   significant figures, is _____

2. 12,700   has _____ significant figures and, rounded to   2   significant figures, is _____

3. 12,700.00   has _____ significant figures and, rounded to   1   significant figures, is _____

4. 0.000983   has _____ significant figures and, rounded to   2   significant figures, is _____

5. 123342.9   has _____ significant figures and, rounded to   5   significant figures, is _____

6. 6.023×10^{23} has _____ significant figures and, rounded to   2   significant figures, is _____

7. .005600   has _____ significant figures and, rounded to   1   significant figures, is _____

8. 10000.5006 has _____ significant figures and, rounded to   5   significant figures, is _____

9. 2.0×10^{-3} has _____ significant figures and, rounded to   1   significant figures, is _____

10. 3.456110   has _____ significant figures and, rounded to   3   significant figures, is _____

B. Given calculations with the calculator answer, write the answers with the appropriate number of significant figures.

Example:

   6.00 x 3.00   = 18   The answer should be _____18.0_____

1. 23 + 46   = 69   The answer should be _____

2. 23.0 + 46.0   = 69   The answer should be _____

3. 253 + 345.8   = 598.8   The answer should be _____

4. 56 – 35   = 21   The answer should be _____

5. 56.00 – 35.0   = 21   The answer should be _____

6. 46 x 12   = 552   The answer should be _____

7. 3.24 x 5.63   = 18.2412   The answer should be _____

8 (2.355 + 2.645) x 10.00 = 50   The answer should be _____

9 654 ÷ 32   = 20.4375   The answer should be _____

10. .024 x .063   = 1.512×10^{-03} The answer should be _____

Change the following to Scientific Notation (maintain the number of significant figures):

1. 5.280 = 5.280 11. 2,560 = 2.56×10^3

2. 2,000 = 2×10^3 12. .0009 = 9×10^{-4}

3. 15 = 1.5×10^1 13. 8,900,000 = 8.9×10^6

4. 6,589,000 = 6.589×10^6 14. .0920 = 9.20×10^{-2}

5. 70,400,000,000 = 7.04×10^{10} 15. 6,300 = 6.3×10^3

6. .00263 = 2.63×10^{-3} 16. .90 = 9.0×10^{-1}

7. .00589 = 5.89×10^{-3} 17. 250 = 2.5×10^2

8. .006 = 6×10^{-3} 18. .006087 = 6.087×10^{-3}

9. .400 = 4.00×10^{-1} 19. 500,000 = 5×10^5

10. .08060 = 8.060×10^{-2} 20. .0000000105 = 1.05×10^{-8}

Make the following Metric System conversions using "unit analysis" (you may use scientific notation):

1. 100 mg $\times \dfrac{1 g}{1000 mg}$ = $.1$ g

2. 20 cm $\times \dfrac{1 m}{100 cm}$ = $.2$ m

3. 50 L $\times \dfrac{1 kL}{1000 L}$ = $.05$ kL

4. 22 g $\times \dfrac{100 cg}{1 g}$ = 2200 cg

5. 825 cm $\times \dfrac{1 m}{100 cm} \times \dfrac{1 km}{1000 m}$ = 8.25×10^{-3} km

6. 2,350 kg $\times \dfrac{1000 g}{1 kg}$ = 2.35×10^6 g

7. 19 mL $\times \dfrac{1 L}{1000 mL} \times \dfrac{100 cL}{1 L}$ = 1.9 cL

8. 52 km $\times \dfrac{1000 m}{1 km}$ = 52000 m

9. 36 m $\times \dfrac{100 cm}{1 m}$ = 3600 cm

10. 18 cm $\times \dfrac{1 m}{100 cm} \times \dfrac{1000 mm}{1 m}$ = 180 mm

11. 6 g $\times \dfrac{1000 mg}{1 g}$ = 6000 mg

12. 4,259 mg $\times \dfrac{1 g}{1000 mg}$ = 4.259 g

A. Indicate the number of significant figures then round each to the number of significant figures indicated.

For example:
1.234   has   **4**   significant figures and, rounded to   2   significant figures, is   **1.2**

1. 0.6034   has **4** significant figures and, rounded to 2 significant figures, is **.60**

2. 12,700   has **3** significant figures and, rounded to 2 significant figures, is **13000** 1.3×10^4 or

3. 12,700.00 has **7** significant figures and, rounded to 1 significant figures, is **10 000**

4. 0.000983 has **3** significant figures and, rounded to 2 significant figures, is **.00098** 9.8×10^{-4} or

5. 123342.9 has **7** significant figures and, rounded to 5 significant figures, is **123340**

6. 6.023×10^{23} has **4** significant figures and, rounded to 2 significant figures, is **6.0×10^{23}**

7. .005600   has **4** significant figures and, rounded to 1 significant figures, is **.006**

8. 10000.5006 has **9** significant figures and, rounded to 5 significant figures, is **10001**

9. 2.0×10^{-3} has **2** significant figures and, rounded to 1 significant figures, is **2×10^{-3}**

10. 3.456110 has **7** significant figures and, rounded to 3 significant figures, is **3.46**

B. Given calculations with the calculator answer, write the answers with the appropriate number of significant figures.

Example:
6.00 x 3.00   = 18   The answer should be   18.0

1. 23 + 46   = 69   The answer should be   **69**

2. 23.0 + 46.0   = 69   The answer should be   **69.0**

3. 253 + 345.8   = 598.8   The answer should be   **599**

4. 56 – 35   = 21   The answer should be   **21**

5. 56.00 – 35.0   = 21   The answer should be   **21.0**

6. 16 x 12   = 552   **192**   The answer should be   **550**   **190**

7. 3.24 x 5.63   = 18.2412   The answer should be   **18.2**

8. (2.355 + 2.645) x 10.00 = 50   The answer should be   **50.00**

9. 654 ÷ 32   = 20.4375   The answer should be   **20.** or **2.0×10^1**

10. .024 x .063   = 1.512^{-03} The answer should be   **1.5×10^{-3}**