

Chapter 1 Worksheet 1 and KEY

Significant Figures, Scientific Notation, and Rounding

1) Determine the number of significant figures in the following values:

Value	# of sig. figures	Value	# of sig. figures
140.74		4	
0.0041		3.70×10^{14}	
31.00		1.05×10^{12}	
1300		7.0400×10^3	
847.040		2495	

2) Round the following values to 3 significant figures.

3.76411 →	0.0411984 →
3.76811 →	150.6142 →
3.76511 →	0.013877 →
11.048176 →	4.88223×10^9 →
8.75510 →	2.0097×10^{-12} →

3) Perform the following calculations and round the final answer to the correct number of significant figures.

Calculation	Rounded Answer	Calculation	Rounded Answer
$18.7644 - 3.472 + 0.4101$	=	$0.87 + 4.061 + 10.4$	=
$17.441 \div 3$	=	$16 \times 841.1 \div 16.300$	=
$14.044 + 8.11 + 3.4$	=	21.01×2.0	=
$3.41 - 0.086652$	=	$18.4 + 12.99 + 13.772 + 9.704$	=

4. Convert the following into scientific notation or standard notation

Standard notation	Scientific notation
47,000	
0.0008	
675,000,000	
157,000,000,000,000,000,000,000	
0.0000003407	
	7.66×10^{-2}
	7.8×10^5
	4.75×10^{-4}
	6×10^{-3}
	9×10^8

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Conversions Within the Metric System:

Perform the following metric conversions. Show your conversion factors. Use correct number of significant figures. If you need more room, do calculations on separate page(s).

0.50 m = _____ mm	2.00 km = _____ m	0.4000 L = _____ mL
1.00 g = _____ kg	01.00 cm = _____ m	8.00 mm = _____ cm
22.4 L = _____ mL	5.00 g = _____ kg	4.245 L = _____ mL
345 g = _____ kg	10.0 nm = _____ m	3.22 Gg = _____ kg
3.001 cg = _____ mg	1.2 m = _____ μ m	455 nm = _____ m

English-Metric Conversions (show your work)

10.0 cm = _____ in	15.0 lb = _____ kg (1kg = 2.20 lb)
1.00 yd = _____ cm (1 yard = exactly 36 in)	16.9 fl. oz = _____ L (0.0338 fl oz.= 1 mL)
1.00 qt = _____ L(1qt = 946 mL)	6.00 in = _____ cm
0.800 kg = _____ oz (16 oz = exactly 1 lb and 1kg = 2.20 lb)	1.83 kg = _____ lb (1kg = 2.20 lb)
25.00 mL = _____ qt (1qt = .946L)	1.40 L = _____ = cm^3 note: 1 mL = exactly 1cm^3

Temperature Conversions

Recall the Temperature Conversions from Chapter 1 lecture notes:

- $^{\circ}\text{F} = (1.8 \times ^{\circ}\text{C}) + 32$
- $^{\circ}\text{C} = (^{\circ}\text{F} - 32) \left[\frac{1}{1.8} \right]$
- $\text{K} = ^{\circ}\text{C} + 273.15$

NOTE: In temperature conversion equations, the 273.15, 32 and 1.8 are *exact*.

IMPORTANT: When doing a calculation that involves **only** multiplication and/or division, you can do the entire calculation then round the answer to the correct number of significant figures at the end. The same is true for a calculation that involves **only** addition and/or subtraction.

But what about a calculation that involves mixed operations: **both** multiplication or division *and* addition or subtraction?

When doing calculations that involve **both** multiplication or division *and* addition or subtraction, first do a calculation for the operation *shown in parenthesis* and round that value to the correct number of significant figures, **then** use the rounded number to carry out the next operation.

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Perform the following temperature conversions (show your calculation)

$$75^{\circ}\text{C} = \underline{\hspace{2cm}} \text{ K}$$

$$-15^{\circ}\text{C} = \underline{\hspace{2cm}} \text{ K}$$

$$0.00 \text{ K} = \underline{\hspace{2cm}} ^{\circ}\text{C} = \underline{\hspace{2cm}} ^{\circ}\text{F}$$

$$25^{\circ}\text{C (room temperature)} = \underline{\hspace{2cm}} \text{ K}$$

$$98.6 ^{\circ}\text{F (body temperature)} = \underline{\hspace{2cm}} ^{\circ}\text{C}$$

$$25^{\circ}\text{C} = \underline{\hspace{2cm}} ^{\circ}\text{F}$$

$$-40.0 ^{\circ}\text{C} = \underline{\hspace{2cm}} ^{\circ}\text{F}$$

$$412 \text{ K} = \underline{\hspace{2cm}} ^{\circ}\text{F}$$

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Significant Figures, Scientific Notation, and Rounding

1) Determine the number of significant figures in the following values:

Value	# of sig. figures	Value	# of sig. figures
140.74	5	4	1
0.0041	2	3.70×10^{14}	3
31.00	4	1.05×10^{12}	3
1300	2	7.0400×10^3	5
847.040	6	2495	4

2) Round the following values to 3 significant figures.

3.76411 → 3.76	0.0411984 → 0.0412
3.76811 → 3.77	150.6142 → 151
3.76511 → 3.77	0.013877 → 0.0139
11.048176 → 11.0	$4.88223 \times 10^9 \rightarrow 4.88 \times 10^9$
8.75510 → 8.76	$2.0097 \times 10^{-12} \rightarrow 2.01 \times 10^{-12}$

3) Perform the following calculations and round the final answer to the correct number of significant figures.

Calculation	Rounded Answer	Calculation	Rounded Answer
$18.7644 - 3.472 + 0.4101$	= 15.703	$0.87 + 4.061 + 10.4$	= 15.3
$17.441 \div 3$	= 6	$16 \times 841.1 \div 16.300$	= 830
$14.044 + 8.11 + 3.4$	= 25.6	21.01×2.0	= 42
$3.41 - 0.086652$	= 3.32	$18.4 + 12.99 + 13.772 + 9.704$	= 54.9

4. Convert the following into scientific notation or standard notation

Standard notation	Scientific notation
47,000	4.7×10^4
0.0008	8×10^{-4}
675,000,000	6.75×10^8
157,000,000,000,000,000,000,000	1.57×10^{23}
0.0000003407	3.407×10^{-7}
0.0766	7.66×10^{-2}
780,000	7.8×10^5
0.000475	4.75×10^{-4}
0.006	6×10^{-3}
900,000,000	9×10^8

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Metric System:

Perform the following metric conversions. Show your conversion factors. Use correct number of significant figures. If you need more room, do calculations on separate page(s).

0.50 m = <u>5.0 x 10²</u> mm	2.00 km = <u>2.00 x 10³</u> m	0.4000 L = <u>4.000 x 10²</u> mL or <u>400.0 mL</u>
1.00 g = <u>1.00 x 10⁻³</u> kg or <u>.00100 kg</u>	01.00 cm = <u>0.0100</u> m or <u>1.00 x 10⁻²</u> m	8.00 mm = <u>0.800</u> cm or <u>8.00 x 10⁻¹</u> cm
22.4 L = <u>2.24 x 10⁴</u> mL or <u>22400 mL</u>	5.00 g = <u>5.00 x 10⁻³</u> kg or <u>.00500 kg</u>	4.245 L = <u>4245</u> mL or <u>4.245 x 10³</u> mL
345 g = <u>0.345</u> kg or <u>3.45 x 10⁻¹</u> kg	10.0 nm = <u>1.00 x 10⁻⁸</u> m or <u>.0000000100 m</u>	3.22 Gg = <u>3.22 x 10⁶</u> kg or <u>3220000 kg</u>
3.001 cg = <u>30.01</u> mg or <u>3.001 x 10¹</u> mg	1.2 m = <u>1.2 x 10⁶</u> μm or <u>1200000 μm</u>	455 nm = <u>4.55 x 10⁻⁷</u> m or <u>.000000455 m</u>

English-Metric Conversions (show your work)

10.0 cm = <u>3.94</u> in	15.0 lb = <u>6.82</u> kg
1.00 yd = <u>91.4</u> cm	16.9 fl. oz = <u>0.500</u> L (0.0338 fl oz. = 1 mL)
1.00 qt = <u>0.946</u> L	6.00 in = <u>15.2</u> cm
0.800 kg = <u>28.2</u> oz (16 oz = exactly 1 lb and 1kg = 2.20 lb)	1.83 kg = <u>4.03</u> lb
25.00 mL = <u>0.0264</u> qt (1qt = .946L)	1.40 L = <u>1.40 x 10³</u> = cm ³ note: 1 mL = 1cm ³

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Temperature Conversions

Perform the following temperature conversions (show your calculation)

$$75^{\circ}\text{C} = \underline{348} \text{ K}$$

$$-15^{\circ}\text{C} = \underline{258} \text{ K}$$

$$0.00 \text{ K} = \underline{-273.15}^{\circ}\text{C} = \underline{-459.67}^{\circ}\text{F}$$

$$25^{\circ}\text{C} \text{ (room temperature)} = \underline{298} \text{ K}$$

$$98.6^{\circ}\text{F} \text{ (body temperature)} = \underline{37.0}^{\circ}\text{C}$$

$$25^{\circ}\text{C} = \underline{77}^{\circ}\text{F}$$

$$-40.0^{\circ}\text{C} = \underline{-40.0}^{\circ}\text{F}$$

$$412 \text{ K} = \underline{282}^{\circ}\text{F}$$

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