

# Exercise 2.3b(H)

## Chemistry Math Worksheet - Answers

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Per: \_\_\_\_\_

**DIRECTIONS:** Answer the following in the space provided.

Complete the following table of SI base units.

Quantity	Base unit	Symbol
1. Time	second	s
2. Mass	kilogram	kg
3. Temperature	kelvin	K
4. Length	meter	m

5. Arrange the following prefixes in order from largest to smallest.

centi-      deci-      kilo-      mega-      milli-      hecto-      micro-

1. mega-      2. kilo-      3. hecto-      4. deci-      5. centi-      6. milli-      7. micro-

6. Convert the following:

a. 236 K to °C      -37 °C      d. 67 °C to kelvins      340. K  
 b. 34 °C to kelvins      307 K      e. 458 K to °C      185 °C  
 c. 298 K to °C      25 °C      f. 67.5 °C to kelvins      340 K (340.6 K if 273.15)

7. Convert the following into scientific notation:

a. 0.003467       $3.467 \times 10^{-3}$       e. 2 300 000       $2.3 \times 10^6$   
 b. 34.3445       $3.43445 \times 10^1$       f. 0.000 070 16       $7.016 \times 10^{-5}$   
 c. 0.000 001 2       $1.2 \times 10^{-6}$       g. 570 002 000       $5.70002 \times 10^8$   
 d. 0.03501       $3.501 \times 10^{-2}$       h. 1.00       $1.00 \times 10^0$

8. Convert the following into standard notation:

a.  $2.65 \times 10^{-7}$       0.000 000 265      e.  $4.106 \times 10^8$       410 600 000  
 b.  $1.45 \times 10^3$       1 450      f.  $7.105 \times 10^{-3}$       0.007 105  
 c.  $7.13 \times 10^{-2}$       0.071 3      g.  $1.4 \times 10^{-2}$       0.014  
 d.  $3.33 \times 10^7$       33 300 000      h.  $6.47 \times 10^{-7}$       0.000 000 647

9. Use the following information to perform the conversions below:

1 widget(wg) = 13 thingamajigs(tm)      3 doohickies (dh) = 0.75 watchamacallits(wm)  
 4 thingamajigs(tm) = 7 doohickies (dh)      2.3 watchamacallit(wm) = 71 thingabobs(tb)

a. 48.5 widgets to watchamacallits

$$\frac{48.5 \text{ wg}}{1 \text{ wg}} \times \frac{13 \text{ tm}}{7 \text{ dh}} \times \frac{0.75 \text{ wm}}{3 \text{ dh}} = 275.84375 \text{ wm} \quad \boxed{276 \text{ wm}}$$

b. 0.95 doohickies to thingabobs

$$\frac{0.95 \text{ dh}}{3 \text{ dh}} \times \frac{0.75 \text{ wm}}{2.3 \text{ wm}} \times \frac{71 \text{ tb}}{1 \text{ wm}} = 7.331521739 \text{ tb} \quad \boxed{7.3 \text{ tb}}$$

10. Use dimensional analysis to convert 6.2 days into minutes.

$$\frac{6.2 \text{ d}}{1 \text{ d}} \times \frac{24 \text{ hr}}{1 \text{ hr}} \times \frac{60 \text{ min}}{1 \text{ hr}} = 8928 \text{ min} \quad \boxed{8900 \text{ min}}$$

11. Calculate the percent error for each of the following boiling points of water (accepted value 100.0°C)

a. 101.4 °C

$$\frac{101.4 \text{ °C} - 100.0 \text{ °C}}{100.0 \text{ °C}} \times 100 = 1.4 \% \quad \boxed{1.4 \%}$$

b. 95.8 °C

$$\frac{95.8 \text{ °C} - 100.0 \text{ °C}}{100.0 \text{ °C}} \times 100 = -4.2 \% \quad \boxed{-4.2 \%}$$

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**Directions:** Complete the following calculations including units.

- |     |   |                                     |     |  |   |
|-----|---|-------------------------------------|-----|--|---|
| 12. | $\frac{(100 \text{ g})}{(15 \text{ mL})}$                             | $6.7 \text{ g/mL}$                  | 17. | $\frac{(41.7 \text{ kg})}{(1.3 \text{ dm} \cdot 3.4 \text{ dm} \cdot 2.1 \text{ dm})}$ | $4.5 \text{ kg/dm}^3$                           |
| 13. | $(5.3 \text{ m})(1.3 \text{ m})$                                      | $6.9 \text{ m}^2$                   | 18. | $\frac{2.45 \text{ mol}}{1.25 \text{ liter}}$  | $1.96 \text{ mol/liter}$                        |
| 14. | $\frac{(340 \text{ km})}{(175 \text{ s})}$                            | $1.9 \text{ km/s}$                  | 19. | $\frac{45.6 \text{ mg}}{21.4 \text{ mg}}$  | $2.13$  |
| 15. | $\frac{(25 \text{ kg})(6.0 \text{ m})}{(15 \text{ s})(20 \text{ s})}$ | $0.5 \text{ kg} \cdot \text{m/s}^2$ | 20. | $\frac{120.1 \text{ g}}{12 \text{ kg}}$  | $0.01$  |
| 16. | $(21 \text{ cm})(30 \text{ cm})(15 \text{ cm})$                       | $9450 \text{ cm}^3$                 | 21. | $\frac{1400 \text{ J}}{(45 \text{ g})(37 \text{ }^\circ\text{C})}$                     | $0.84 \text{ J/g} \cdot \text{ }^\circ\text{C}$ |

**Directions:** Solve each of the following expressions for x. ( $x = ?$ )

- |     |                             |            |     |                         |                 |
|-----|-----------------------------|------------|-----|-------------------------|-----------------|
| 22. | $2x - 15 = 8$               | $x = 11.5$ | 25. | $x + 8 = 23FG$          | $x = 23FG - 8$  |
| 23. | $4x = 3y + 8$ (if $y = 2$ ) | $x = 3.5$  | 26. | $\frac{18KRx}{F^2} = E$ | $x = EF^2/18KR$ |
| 24. | $H = WQx$                   | $x = H/WQ$ | 27. | $15G - x = U$           | $x = 15G - U$   |

**Directions:** For those values in standard form, express in scientific notation. For those terms in scientific notation, express in standard form.

- |     |                       |                       |     |                      |                        |
|-----|-----------------------|-----------------------|-----|----------------------|------------------------|
| 28. | $5.46 \times 10^4$    | $54\,600$             | 33. | $213\,000\,000\,000$ | $2.13 \times 10^{11}$  |
| 29. | $2.1 \times 10^{-2}$  | $0.021$               | 34. | $4.5 \times 10^{-9}$ | $0.000\,000\,004\,5$   |
| 30. | $0.00341$             | $3.41 \times 10^{-3}$ | 35. | $1.0 \times 10^{-8}$ | $0.000\,000\,010$      |
| 31. | $240\,100$            | $2.401 \times 10^5$   | 36. | $0.0001200$          | $1.200 \times 10^{-4}$ |
| 31. | $7.32 \times 10^{-1}$ | $0.732$               | 37. | $340\,001$           | $3.40001 \times 10^5$  |

**Directions:** Using the exponential expression function (EE, EXP,  $x10^x$ ) on your calculator to calculate the following.

- |     |  |                       |     |  |                        |
|-----|--|-----------------------|-----|--|------------------------|
| 38. | $(6.02 \times 10^{23})(3.65 \times 10^2)$                          | $2.20 \times 10^{26}$ | 41. | $\frac{1.0 \times 10^{-14}}{4.2 \times 10^{-6}}$                           | $2.4 \times 10^{-9}$   |
| 39. | $\frac{(1.4 \times 10^{-4})(3.2 \times 10^9)}{4.5 \times 10^{-5}}$ | $1.0 \times 10^{10}$  | 42. | $\frac{(-1.6 \times 10^5)(-2.4 \times 10^{15})}{8.9 \times 10^3}$          | $4.3 \times 10^{16}$   |
| 40. | $(-4.12 \times 10^{-4})(7.33 \times 10^{12})$                      | $-3.02 \times 10^9$   | 43. | $\frac{(6.02 \times 10^{23})(-1.42 \times 10^{-15})}{6.54 \times 10^{-6}}$ | $-1.31 \times 10^{14}$ |