

**Units**

1. What are the 7 S.I. base units (and their abbreviations)?
2. Write the abbreviations for each of the following:  
a) milligram                      b) kilogram                      c) microgram                      d) megaliter  
e) centiliter                      f) kilometer                      g) gigameter                      h) nanometer
3. Write the name of the metric unit abbreviated below:  
a) mm                      b) cg                      c) kg                      d) cm  
e) mL                      f)  $\mu\text{m}$                       g) ng                      h) ML
4. Complete the following equivalences:  
a)  $1.0 \text{ m} = \underline{\hspace{2cm}} \text{ mm}$                       b)  $30 \text{ mg} = \underline{\hspace{2cm}} \text{ g}$   
c)  $12 \text{ L} = \underline{\hspace{2cm}} \text{ mL}$                       d)  $0.025 \text{ kW} = \underline{\hspace{2cm}} \text{ W}$   
e)  $9.55 \text{ ML} = \underline{\hspace{2cm}} \text{ L}$                       f)  $120\,000 \text{ V} = \underline{\hspace{2cm}} \text{ MV}$   
g)  $0.000\,025\,25 \text{ g} = \underline{\hspace{2cm}} \mu\text{g}$                       h)  $450 \text{ nm} = \underline{\hspace{2cm}} \text{ m}$
5. Complete the following equivalences:  
a)  $20\,000 \text{ kL} = \underline{\hspace{2cm}} \text{ ML}$                       b)  $1.5 \text{ km} = \underline{\hspace{2cm}} \text{ mm}$   
c)  $34\,500 \text{ mg} = \underline{\hspace{2cm}} \text{ kg}$                       d)  $0.000\,004\,4 \text{ ML} = \underline{\hspace{2cm}} \text{ mL}$   
e)  $2500 \text{ mJ} = \underline{\hspace{2cm}} \text{ kJ}$                       f)  $4.90 \mu\text{g} = \underline{\hspace{2cm}} \text{ ng}$   
g)  $5\,432\,100\,000 \mu\text{m} = \underline{\hspace{2cm}} \text{ km}$                       h)  $0.000\,000\,1 \text{ MV} = \underline{\hspace{2cm}} \mu\text{V}$

**Scientific Notation**

6. Write each of the following numbers in scientific notation:  
a) 42 000                      b) 500  
c) 7 780 000                      d) 0.000 03  
e) 12                      f) 0.004 00  
g) 0.000 000 444                      h) 0.000 000 001
7. Change each of the following back to its non-exponential form:  
a)  $6 \times 10^6$                       b)  $4.4 \times 10^4$   
c)  $1.23 \times 10^{-4}$                       d)  $7.256\,41 \times 10^3$   
e)  $3.10 \times 10^{-5}$                       f)  $5.196 \times 10^4$   
g)  $8.4 \times 10^{-8}$                       h)  $6.67 \times 10^0$
8. Add and subtract the following without using a calculator:  
a)  $8.8 \times 10^6 + 4.6 \times 10^6$                       b)  $5.48 \times 10^{-2} - 2.11 \times 10^{-2}$   
c)  $2.2 \times 10^4 + 3.3 \times 10^5$                       d)  $3.3 \times 10^{-4} + 8.1 \times 10^{-5}$   
e)  $6.23 \times 10^{-9} - 8.5 \times 10^{-10}$                       f)  $1.6 \times 10^{10} - 4.1 \times 10^9$

9. Multiply and divide the following without using a calculator.:
- |  |   |
|--|---|
| a) $10^5 \div 10^3$                                | b) $(2 \times 10^7)(2 \times 10^4)$                 |
| c) $(2.5 \times 10^4) \times (8.0 \times 10^{-2})$ | d) $(7.2 \times 10^{-6}) \div (1.2 \times 10^5)$    |
| e) $(2.5 \times 10^8) \times (4.0 \times 10^{-3})$ | f) $(6.0 \times 10^{-5}) \div (1.5 \times 10^{-9})$ |

### Significant Figures

10. How many significant figures are there in each of the following?
- |           |                |            |                          |
|-----------|----------------|------------|--------------------------|
| a) 443    | b) 0.51        | c) 50 050  | d) 0.0081                |
| e) 1.0203 | f) 0.0100      | g) 5400    | h) 600.0                 |
| i) 99.99  | j) 0.004 011 0 | k) 0.09 60 | l) $7.00 \times 10^{12}$ |
11. Round off each of the following to the number of significant figures (s.f.) indicated:
- |                           |                        |
|---------------------------|------------------------|
| a) 34.9255 to 4 s.f.      | b) 0.09 31 to 2 s.f.   |
| c) 4.6039 to 3 s.f.       | d) 52 196.92 to 5 s.f. |
| e) 0.000 439 00 to 4 s.f. | f) 3394.2 to 1 s.f.    |
| g) 93 000. to 3 s.f.      | h) 1999.99 to 2 s.f.   |
12. Calculate and give the answers to the correct precision (in the case of addition or subtractions) or to the correct number of significant figures (in the case of multiplication or division). Use scientific notation if appropriate.
- |                                 |   |
|---------------------------------|---|
| a) $15.91 + 9.2$                | b) $79.3 - 9.094$                       |
| c) $12.03 - 0.0264$             | d) $0.0190 + 0.0010$                    |
| e) $10.03 + 9.128 + 72.4$       | f) $18.77 + 8.75 - 20$                  |
| g) $17 \times 0.09$             | h) $128 \times 16$                      |
| i) $40.0 \div 8.02$             | j) $16.55 \div 4$                       |
| k) $0.000 881 20 \div 0.082 00$ | l) $12.5 \times 0.50$                   |
| m) $800.0 \div 3.0$             | n) $0.025 \times 0.82$                  |
| o) $9000 \times 15.62$          | p) $0.000 0400 \times 5.00 \times 90.0$ |
13. Perform the following operations without using a calculator. Give your answers in scientific notation with the correct number of significant figures.
- |  |  |
|--|--|
| a) $6.4 \times 10^4 + 6.4 \times 10^5$ | b) $1.002 \times 10^{13} - 9.997 \times 10^{12}$ |
|--|--|
14. Do the following problems using the factor-label method. Show your work even if you can do the problem in your head.
- |                          |
|--------------------------|
| a) 900 h = _____ weeks   |
| b) 1.3 years = _____ s   |
| c) 50 km/h = _____ m/s   |
| d) 1 cm/s = _____ km/min |