Name:

Physics 11 **Measurement - Solutions** Block:

Units

1. What are the 7 S.I. base units (and their abbreviations)?
   ampere (A), candela (cd), kelvin (K), kilogram (kg), metre (m), mole (mol), second (s)

2. Write the abbreviations for each of the following:
   a) mg b) kg c) µg d) ML
   e) cL f) km g) Gm h) nm

3. Write the name of the metric unit abbreviated below:
   a) millimetre b) centigram c) kilogram d) centimetre
   e) millilitre f) micrometre g) nanogram h) megalitre

4. Complete the following equivalences:
   a) 1.0 m = 1000 mm (or 1.0×10^3 mm)
   b) 30 mg = 0.03 g
   c) 12 L = 12 000 mL
   d) 0.025 kW = 25 W
   e) 9.55 ML = 9 550 000 L
   f) 120 000 V = 0.12 MV
   g) 0.000 025 25 g = 25.25 µg
   h) 450 nm = 0.000 000 45 m

5. Complete the following equivalences:
   a) 20 000 kL = 20 ML
   b) 1.5 km = 1 500 000 mm
   c) 34 500 mg = 0.0345 kg
   d) 0.000 004 4 ML = 4400 mL
   e) 2500 mJ = 0.0025 kJ
   f) 4.90 µg = 4900 ng
   g) 5 432 100 000 µm = 5.432 km
   h) 0.000 000 1 MV = 100 000 µV

Scientific Notation

6. Write each of the following numbers in scientific notation:
   a) 4.2×10^4
   b) 5×10^2
   c) 7.78×10^6
   d) 3×10^{-5}
   e) 1.2×10^1
   f) 4.00×10^{-3}
   g) 4.44×10^{-7}
   h) 1×10^{-9}

7. Change each of the following back to its non-exponential form:
   a) 6 000 000
   b) 44 000
   c) 0.000 123
   d) 7256.41
   e) 0.000 031 0
   f) 51 960
   g) 0.000 000 084
   h) 6.67

8. Add and subtract the following without using a calculator:
   a) 1.34×10^{7}
   b) 3.37×10^{-2}
   c) 3.52×10^{5} (or 3.5×10^{5})
   d) 4.11×10^{-4} (or 4.1×10^{-4})
   e) 5.38×10^{-9}
   f) 1.19×10^{10} (1.2×10^{9})

9. Multiply and divide the following without using a calculator:
   a) 10^{2}
   b) 4×10^{11}
   c) 2.0×10^{3}
   d) 6.0×10^{-11}
   e) 1.0×10^{6}
   f) 4.0×10^{4}

Significant Figures

10. How many significant figures are there in each of the following?
   a) 3
   b) 2
   c) 4
   d) 2
   e) 5
   f) 3
   g) 2
   h) 4
   i) 4
   j) 5
   k) 3
   l) 3

11. Round off each of the following to the number of significant figures (s.f.) indicated:
   a) 34.93
   b) 0.093
   c) 4.60
   d) 52 197
   e) 0.000 439 0
   f) 3000
   g) 9.30×10^{4}
   h) 2.0×10^{3}

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) 25.1
   b) 70.2
   c) 12.00
   d) 0.0200
   e) 91.6
   f) 10
   g) 2
   h) 2.0×10^{3}
   i) 4.99
   j) 4
   k) 0.010 75
   l) 6.2
   m) 270
   n) 0.020
   o) 100 000 (or 1×10^{5})
   p) 0.0180

13. Perform the following operations without using a calculator. Give your answers in scientific notation with the correct number of significant figures.
   a) 7.0×10^{5}
   b) 2×10^{10}

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 = 5.4 weeks

$$900 \text{ h} \times \frac{1 \text{ day}}{24 \text{ h}} \times \frac{1 \text{ week}}{7 \text{ day}} = 5.4 \text{ weeks}$$

   b) 1.3 years = 4.1×10^{7} s

$$1.3 \text{ years} \times \frac{365 \text{ days}}{1 \text{ year}} \times \frac{24 \text{ h}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ h}} \times \frac{60 \text{ s}}{1 \text{ min}} = 4.1 \times 10^{7} \text{ s}$$

c) 50 km/h = 13.9 m/s

$$\frac{50\ \text{km}}{\text{h}} \times \frac{1000\ \text{m}}{1\ \text{km}} \times \frac{1\ \text{h}}{60\ \text{min}} \times \frac{1\ \text{min}}{60\ \text{s}} = \frac{13.9\ \text{m}}{\text{s}}$$

d) 1 cm/s = 0.0006 km/min

$$\frac{1\ \text{cm}}{\text{s}} \times \frac{1\ \text{m}}{100\ \text{cm}} \times \frac{1\ \text{km}}{1000\ \text{m}} \times \frac{60\ \text{s}}{1\ \text{min}} = \frac{0.0006\ \text{km}}{\text{min}}$$