Chapter A

General Questions

The boxed fraction shows how many questions need to be answered correctly to achieve mastery.

A1 Using and Rearranging Equations

Use the following equations:

$$s = ut \qquad a = \frac{(v - u)}{t} \qquad F = ma \qquad v = f\lambda$$

$$V = IR \qquad P = IV \qquad E = Pt \qquad Q = It$$

where the letters have the following meanings:

s = distance $\qquad u, v$ = velocity $\qquad t$ = time $\qquad m$ = mass

V = voltage $\qquad I$ = current $\qquad F$ = force $\qquad a$ = acceleration

Q = charge $\qquad E$ = energy $\qquad P$ = power $\qquad f$ = frequency

λ = wavelength $\qquad R$ = resistance

A1.1   a) $F = 3.0$ N, $m = 2.0$ kg, what is a?

         b) $I = 0.20$ A, $t = 200$ s, what is Q?

A1.2   Calculate the resistance needed if you want 0.030 A to flow through a component when a 9.0 V battery is connected to it.

A1.3   Calculate the distance travelled by a car going at 30 m s^{-1} in 2.0 minutes.

A1.4   Calculate the wavelength of a wave that travels at 3.0×10^8 m s^{-1} if its frequency is 2.0 GHz (2.0×10^9 Hz).

A1.5   a) Calculate the power of a 0.25 A, 240 V light bulb.

b) Calculate the power if 5.0 A flows through a $2.0\,\Omega$ resistor.

A1.6   A Corsa accelerates from 15 m s^{-1} to 25 m s^{-1} in 8.0 s. Calculate the acceleration.

A1.7   If a jet has a maximum acceleration of 20 m s^{-2}, what is the time it would take to get from 0 m s^{-1} to 100 m s^{-1}?

A1.8   My kettle needs to be able to give $672\,000$ J of heat energy to water in 240 s. Assuming that it is connected to the 240 V mains, what current is needed?

A1.9   Calculate the force needed if my 750 kg car needs to accelerate from rest to 13 m s^{-1} in 5.0 s.

A1.10   Calculate the electrical energy used by a 240 V light bulb with a resistance of $60\,\Omega$ in 600 s.

A2   Derived and Base SI Units

Express the following derived units in terms of the SI base units. The first one has been done for you:

	Derived unit	In base units	Power of each base unit			
			m	s	kg	A
	m s^{-2}	m s^{-2}	1	−2	0	0
A2.1	J		(a)	(b)	(c)	(d)
A2.2	N		(a)	(b)	(c)	(d)
A2.3	C		(a)	(b)	(c)	(d)
A2.4	V		(a)	(b)	(c)	(d)
A2.5	Ω		(a)	(b)	(c)	(d)
A2.6	Pa		(a)	(b)	(c)	(d)
A2.7	N C^{-1}		(a)	(b)	(c)	(d)
A2.8	V m^{-1}		(a)	(b)	(c)	(d)

Express the following derived units in terms of the unit specified and base units. The first one has been done for you.