

# Chapter A

## General Questions

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

### A1 Using and Rearranging Equations

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Use the following equations:

$$\begin{array}{llll} s = ut & a = \frac{(v - u)}{t} & F = ma & v = f\lambda \\ V = IR & P = IV & E = Pt & Q = It \end{array}$$

where the letters have the following meanings:

$s$ = distance	$u, v$ = velocity	$t$ = time	$m$ = mass
$V$ = voltage	$I$ = current	$F$ = force	$a$ = acceleration
$Q$ = charge	$E$ = energy	$P$ = power	$f$ = frequency
$\lambda$ = wavelength	$R$ = resistance		

- A1.1    a)  $F = 3.0 \text{ N}$ ,  $m = 2.0 \text{ kg}$ , what is  $a$ ?  
          b)  $I = 0.20 \text{ A}$ ,  $t = 200 \text{ s}$ , what is  $Q$ ?
- A1.2    Calculate the resistance needed if you want  $0.030 \text{ A}$  to flow through a component when a  $9.0 \text{ V}$  battery is connected to it.
- A1.3    Calculate the distance travelled by a car going at  $30 \text{ m s}^{-1}$  in  $2.0$  minutes.
- A1.4    Calculate the wavelength of a wave that travels at  $3.0 \times 10^8 \text{ m s}^{-1}$  if its frequency is  $2.0 \text{ GHz}$  ( $2.0 \times 10^9 \text{ Hz}$ ).
- A1.5    a) Calculate the power of a  $0.25 \text{ A}$ ,  $240 \text{ V}$  light bulb.

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

- A1.6 A Corsa accelerates from  $15\ \text{m s}^{-1}$  to  $25\ \text{m s}^{-1}$  in 8.0 s. Calculate the acceleration.
- A1.7 If a jet has a maximum acceleration of  $20\ \text{m s}^{-2}$ , what is the time it would take to get from  $0\ \text{m s}^{-1}$  to  $100\ \text{m s}^{-1}$ ?
- 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  $13\ \text{m s}^{-1}$  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.