

- 1** Which of the following are renewable and non-renewable energy resources?
- | | |
|---------------------------|----------------------|
| a Nuclear fuels | f The Sun |
| b Water waves | g Geothermal |
| c Coal | h Oil |
| d Biofuel | i The tides |
| e Hydroelectricity | j Natural gas |
- 2** Rearrange the following equations to find m , e and h respectively:
- a** *kinetic energy* = $0.5 \times \text{mass} \times (\text{speed})^2$
 $E_k = \frac{1}{2} m v^2$
- b** *elastic potential energy* = $0.5 \times \text{spring constant} \times (\text{extension})^2$
 $E_e = \frac{1}{2} k e^2$
- c** *gravitational potential energy* = $\text{mass} \times \text{gravitational field strength} \times \text{height}$
 $E_p = m g h$
- 3** In the equation *change in thermal energy* = $\text{mass} \times \text{specific heat capacity} \times \text{temperature change}$ [$\Delta E = m c \Delta\theta$] the temperature is normally expressed in degrees Celsius ($^{\circ}\text{C}$). Explain why expressing $\Delta\theta$ in degrees kelvin (K) would not affect the results of your calculations.
- 4 a** Describe the difference between lift A which lifts a 70 kg load up three floors in 20 seconds and lift B which can lift the same load up three floors in 15 seconds.
- b** Assuming the lifts are operated in the same building and that the power of lift B is 343 W, what is the height of each floor in this building? ($g = 9.8 \text{ m/s}^2$)
- 5** Two ice cubes are placed on two blocks of equal size, but different materials. One block is made of aluminium and the other block is made of plastic. Which ice cube will melt first? Explain why this happens.
- 6** A battery powered toy car has a total power input 1.5 W. The mass of the car is 520 g and reaches a top speed of 2.2 m/s. Calculate the percentage efficiency of the toy car.