

- 20 A railway engine accelerates a train of total mass 800 tonnes (1 tonne = 1000 kg) from rest to a speed of  $50 \text{ ms}^{-1}$ .

How much work must be done on the train to reach this speed?

- A  $1.0 \times 10^6 \text{ J}$       B  $2.0 \times 10^6 \text{ J}$       C  $1.0 \times 10^9 \text{ J}$       D  $2.0 \times 10^9 \text{ J}$

- 21 Water from a reservoir is fed to the turbine of a hydroelectric system at a rate of  $500 \text{ kg s}^{-1}$ . The reservoir is 300 m above the level of the turbine.

The electrical output from the generator driven by the turbine is 200 A at a potential difference of 6000 V.

What is the efficiency of the system?

- A 8.0 %      B 8.2 %      C 80 %      D 82 %

- 22 Which row correctly describes the spacing, ordering and motion of the molecules in water and in ice when both are at a temperature of  $0^\circ\text{C}$ ?

	spacing	ordering	motion
A	molecules in ice are closer together than molecules in water	a regular pattern of molecules in both ice and water	molecules in both ice and water have the same average speed
B	molecules in ice are closer together than molecules in water	a regular pattern of molecules in ice but not in water	molecules in ice travel more slowly than those in water
C	molecules in ice are further apart than molecules in water	a regular pattern of molecules in both ice and water	molecules in ice travel more slowly than those in water
D	molecules in ice are further apart than molecules in water	a regular pattern of molecules in ice but not in water	molecules in both ice and water have the same average speed

Space for working