WORK

1. Find the work done when a box is pushed 10 m across a floor with a constant speed against a frictional resistance of 24 N.

2. A force of 20 N acts on a 3 kg roller skate initially at rest on a frictionless table. The skate travels 5 m while the force acts.

   (a) How much work is done?
   (b) What is the final speed of the skate?

3. How much work is done when a 250 N force moves a mass of 12 kg a distance of 15 m in the direction of the force?

4. How much work is done in changing the velocity of a vehicle of mass 2 000 kg from 10 ms^{-1} to 40 ms^{-1} if the change occurs in 200 m?

5. How much work is done in stopping a vehicle of mass 5 000 kg in 100 m if the brakes apply a force of 1 000 N?

6. A body of mass 50 kg moving with a speed of 10 ms^{-1} is brought to rest by a constant force in a distance of 5.0 m. Calculate the work done by the force.

7. A force acts on a stationary vehicle of mass 3 000 kg for 20 seconds. In that time the vehicle moves 50 m and its velocity increases to 5 ms^{-1}.

   (a) What force acts on the vehicle?
   (b) How much work is done by the force?

8. How much work does a man who weighs 60 kg do against gravity when he climbs a 700 m hill?

9. How much work is done in pumping 4 000 litres of water from a depth of 15 m? The mass of a litre of water is 1 kg. (1 litre = 1 kg)

10. 100 J of energy are used to move a stationary box of mass 10 kg through a distance of 15 m in 5 seconds. Find the force used.

CHALLENGE: A 1 kg mass is slowly raised to a height of 10 m in 20 seconds. How much extra work is required if the lifting occurs in 1 second.

(9)

ANSWERS

1. 240 J
2. (a) 100 J
   (b) 8.16 ms^{-1}
3. 3 750 J
4. 12,000,000 J or 1.2×10^7
5. 1 000 000 J
6. 2 500 J
7. (a) 750 N
   (b) 37 500 J
8. 412 000 J
9. 588 000 J
10. 6.67 N