P4: Explaining motion

1. A heavy book of mass 2 kg is pushed 20 cm along a rough horizontal table using a force of 2.5 N. The work done is

A 4J
B 40 J
C 0.5 J
D 50 J
E impossible to determine since we don't know how long the task took

2. Which of the following units could be used to measure the rate at which a machine does work?

A joule
B newton
C newton metre
D watt
E newton per kilogram

3. An object is dropped from a tower 50 m high. When it is 10 m above the ground, what is the ratio of its GPE to its KE?

A 0.2
B 0.25
C 0.5
D 4
E 5

4. An electric crane does 1500 J of useful work when the energy input is 2000 J. Its efficiency is

A 25%
B 50%
C 75%
D 33%
E 100%

5. In a power station, a **boiler** converts water into steam to drive a **turbine**, which in turn operates a **generator** to transfer kinetic energy into electrical energy. The efficiency of these devices are 80%, 50% and 90% respectively. For every 1000 J of chemical energy input to the boiler, the useful energy output of the power station is

A 360 J
B 400 J
C 500 J
D 800 J
E 900 J

6. When an object is dropped from rest and falls, neglecting air resistance

A its acceleration is constant
B it reaches a final steady speed
C its speed is not proportional to the time for which it has been falling
D it travels the same distance every second for which it is falling
E it has a force of 10 N acting on it

7. The force of friction

A always acts in the same direction as an object moves
B is a constant 10 N/kg
C does not depend on the type of surface
D causes thermal energy to be created
E disappears if the surfaces are oiled

8. A 5kg mass is travelling with a speed of 5 m/s; it is brought to rest in 0.5 s. The average force acting in this time is

A 50 N
B 25 N
C 10 N
D 2.5 N
E 0.5 N

9. The acceleration of an object whose speed changes from 10 m/s to 20 m/s in 4 s is

A 15 m/s^2
B 10 m/s^2
C 60 m/s^2
D 2.5 m/s^2
E 5 m/s^2

10. A body accelerates from rest at a rate of 4 m/s^2 for 5 s. What is its final speed?

A 0.8 m/s
B 10 m/s
C 9 m/s
D 50 m/s
E 20 m/s

11. An aircraft in flight is subject to four forces: weight, lift (which act vertically) and thrust and drag (which act horizontally). In order for the aircraft to accelerate forwards in level flight

A drag must exceed thrust
B lift must exceed weight
C thrust must exceed drag
D thrust must exceed weight
E lift must exceed drag