16 A ball is thrown vertically upwards. Air resistance is negligible.

Which statement is correct?

A By the principle of conservation of energy, the total energy of the ball is constant throughout its motion.

B By the principle of conservation of momentum, the momentum of the ball is constant throughout its motion.

C The kinetic energy of the ball is greatest at the greatest height attained.

D The potential energy of the ball increases at a constant rate during its ascent.

17 A hammer with 10 J of kinetic energy hits a nail and pushes it 5.0 mm into a plank.

Both the hammer and nail come to rest after the collision.

What is the approximate average force that acts on the nail while it moves through 5.0 mm?

A 0.050 N **B** 2.0 N **C** 50 N **D** 2000 N

18 The change in gravitational potential energy ΔE of an object of mass m when moving through height Δh near the surface of the Earth is given by the equation shown.

$$\Delta E = mg\Delta h$$

Which equation is needed as part of the derivation of this expression?

A kinetic energy = $\frac{1}{2} \times$ mass $\times$ (speed)^2

B moment = force $\times$ distance

C weight = mass $\times$ acceleration of free fall

D work done = power $\times$ time

19 A racing car has an output power of 300 kW when travelling at a constant speed of 60 m s^{-1}.

What is the total resistive force acting on the car?

A 5 kN **B** 10 kN **C** 50 kN **D** 100 kN

20 A mass of 60.0 g is suspended from a spring and the distance from the bottom of the spring to the floor is measured to be 16.4 cm.

The mass is replaced with a 100.0 g mass and the distance from the bottom of the spring to the floor is now measured to be 12.6 cm. The spring obeys Hooke's law.

What is the spring constant of the spring?

A 1.05 N m^{-1} **B** 1.35 N m^{-1} **C** 10.3 N m^{-1} **D** 103 N m^{-1}