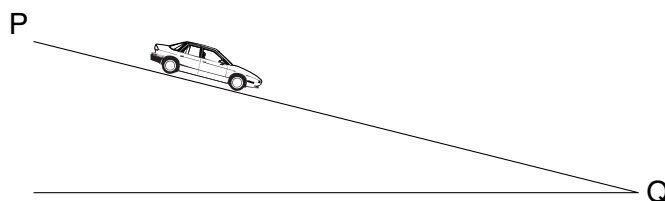


- 17 A car driver adjusts the pressure on a car's brakes so that the car travels at constant speed down a hill from P to Q.



The magnitude of the change in the car's kinetic energy is  $\Delta E_k$ . The magnitude of the change in its gravitational potential energy is  $\Delta E_p$ .

Which statement is correct?

- A**  $\Delta E_k > \Delta E_p$       **B**  $\Delta E_k = \Delta E_p$       **C**  $\Delta E_p > \Delta E_k > 0$       **D**  $\Delta E_k = 0$
- 18 An area of land is an average of 2.0 m below sea level. To prevent flooding, pumps are used to lift rainwater up to sea level.

What is the minimum pump output power required to deal with  $1.3 \times 10^9$  kg of rain per day?

- A** 15 kW      **B** 30 kW      **C** 150 kW      **D** 300 kW
- 19 A twig from a tree drops from a 200 m high cliff on to a beach below. During its fall, 40% of the twig's energy is converted into thermal energy.

What is the speed with which the twig hits the beach?

- A**  $35 \text{ m s}^{-1}$       **B**  $40 \text{ m s}^{-1}$       **C**  $49 \text{ m s}^{-1}$       **D**  $63 \text{ m s}^{-1}$
- 20 Pollen grains are suspended in a liquid and are illuminated strongly. When observed under a microscope they are seen to be in continuous random motion.

What is the reason for this?

- A** convection currents in the liquid  
**B** evaporation of the liquid  
**C** molecules of the liquid colliding with the pollen grains  
**D** pollen grains colliding with each other