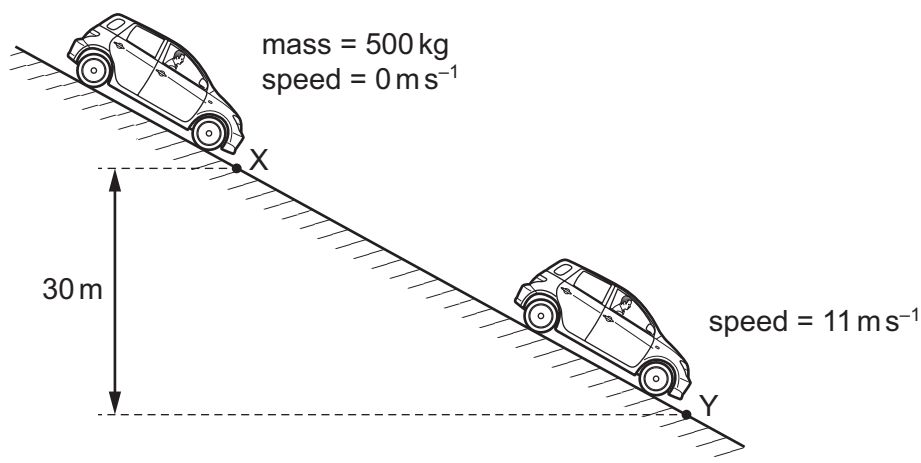


- 19 A car of mass 500 kg is at rest at point X on a slope, as shown.

The car's brakes are released and the car rolls down the slope with its engine switched off. At point Y the car has moved through a vertical height of 30 m and has a speed of  $11 \text{ m s}^{-1}$ .



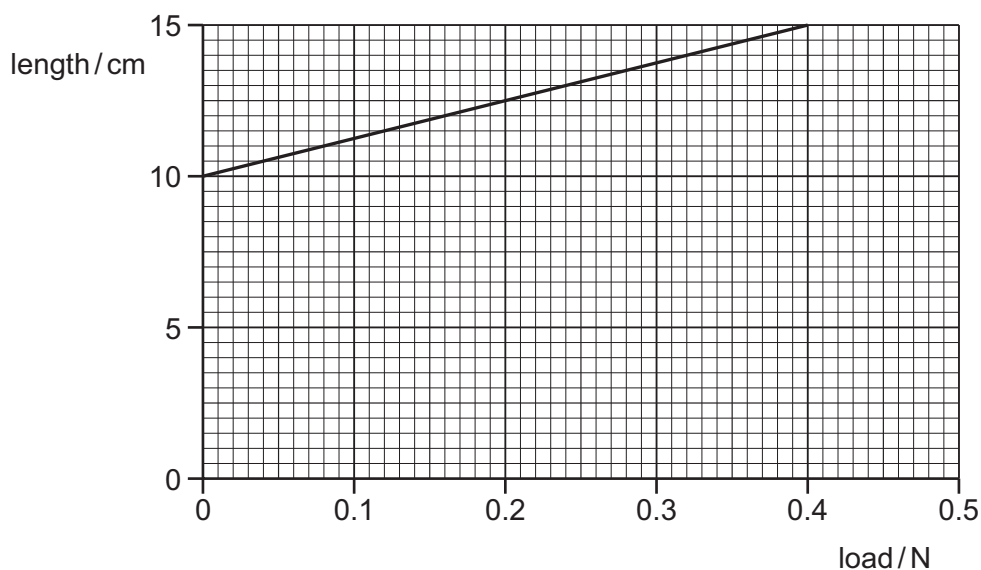
What is the energy dissipated by frictional forces when the car moves from X to Y?

- A  $3.0 \times 10^4 \text{ J}$     B  $1.2 \times 10^5 \text{ J}$     C  $1.5 \times 10^5 \text{ J}$     D  $1.8 \times 10^5 \text{ J}$
- 20 An elastic material with Young modulus  $E$  is subjected to a tensile stress  $S$ . Hooke's law is obeyed.

What is the expression for the elastic energy stored per unit volume of the material?

- A  $\frac{E}{2S^2}$     B  $\frac{2E}{S^2}$     C  $\frac{S^2}{E}$     D  $\frac{S^2}{2E}$

- 21 The graph shows the length of a spring as it is stretched by an increasing load.



What is the spring constant of the spring?

- A  $0.080 \text{ N m}^{-1}$     B  $0.13 \text{ N m}^{-1}$     C  $2.7 \text{ N m}^{-1}$     D  $8.0 \text{ N m}^{-1}$