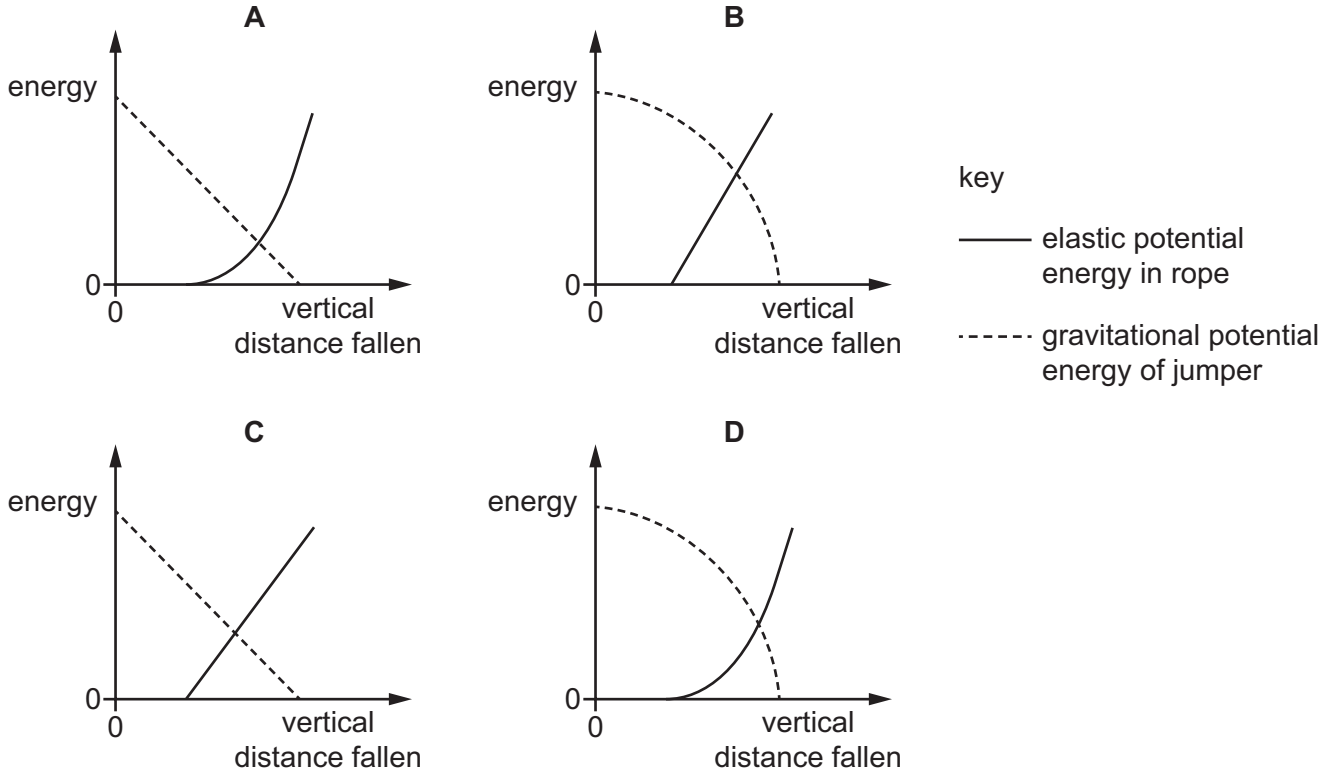
18 A bungee jumper jumps off a high bridge, when attached to it by a long elastic rope which obeys Hooke's law.

The gravitational potential energy of the jumper is measured relative to the lowest point reached by the jumper.

Which graph shows the variation of the gravitational potential energy of the jumper, and the elastic potential energy in the rope, with the vertical distance fallen from the top of the bridge?



19 A train on a mountain railway is carrying 200 people of average mass 70 kg up a slope at an angle of 30° to the horizontal and at a speed of 6.0 m s^{-1}. The train itself has a mass of 80 000 kg. The percentage of the power from the engine which is used to raise the passengers and the train is 40%.

What is the power of the engine?

A 1.1 MW **B** 2.8 MW **C** 6.9 MW **D** 14 MW

20 A wire X is stretched by a force and gains elastic potential energy *E*.

The same force is applied to wire Y of the same material, with the same initial length but twice the diameter of wire X. Both wires obey Hooke's law.

What is the gain in elastic potential energy of wire Y?

A 0.25*E* **B** 0.5*E* **C** 2*E* **D** 4*E*