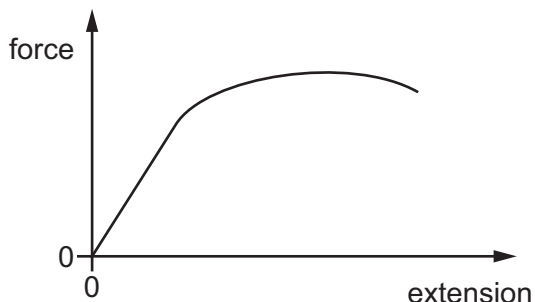17 The pump of a water pumping system uses 2.0 kW of electrical power when raising water. The pumping system lifts 16 kg of water per second through a vertical height of 7.0 m.

What is the efficiency of the pumping system?

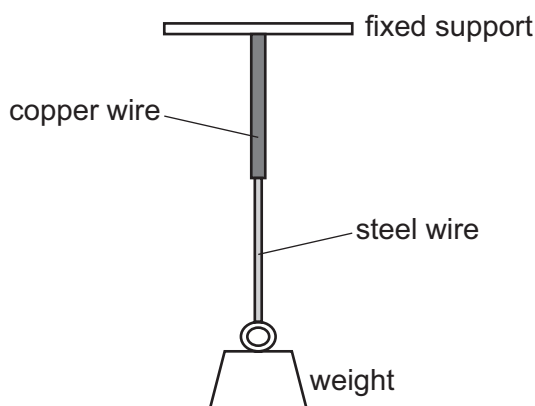**A** 1.8%   **B** 5.6%   **C** 22%   **D** 55%

18 A metal wire is stretched by a load. The force-extension graph is shown.

What is represented by the area under the whole graph?

A the change in gravitational potential energy of the wire

B the energy that would be released from the wire if the final load was removed

C the energy transferred into heat energy in the wire

D the work done in stretching the wire

19 The Young modulus of steel is twice that of copper.

A 50 cm length of copper wire of diameter 2.0 mm is joined to a 50 cm length of steel wire of diameter 1.0 mm, making a combination wire of length 1.0 m, as shown.

The combination wire is stretched by a weight added to its end. Both the copper and the steel wires obey Hooke's law.

What is the ratio $\dfrac{\text{extension of steel wire}}{\text{extension of copper wire}}$?

A 4   **B** 2   **C** 1   **D** 0.5