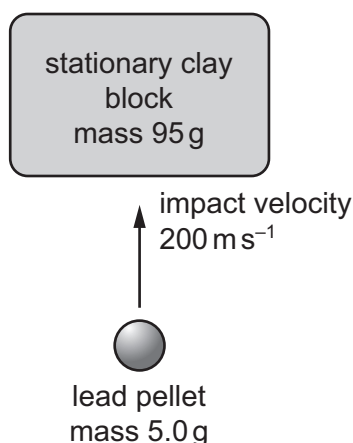**17** A lead pellet is shot vertically upwards into a clay block that is stationary at the moment of impact but is able to rise freely after impact.



The mass of the pellet is 5.0 g and the mass of the clay block is 95 g.

The pellet hits the block with an initial vertical velocity of 200 m s⁻¹. It embeds itself in the block and does not emerge.

How high above its initial position will the block rise?

**A**   5.1 m          **B**   5.6 m          **C**   10 m          **D**   100 m

**18** On the surface of a planet, 30 J of work is done against gravity to raise a mass of 1.0 kg through a height of 10 m.

How much work must be done to raise a mass of 4.0 kg through a height of 5.0 m on this planet?

**A**   15 J          **B**   60 J          **C**   120 J          **D**   200 J

**19** Four solid steel rods, each of length 2.0 m and cross-sectional area 250 mm², equally support an object weighing 10 kN. The weight of the object causes the rods to contract by 0.10 mm. The rods obey Hooke's law.

What is the Young modulus of steel?

**A**   $2.0 \times 10^{8} \, \text{N m}^{-2}$

**B**   $2.0 \times 10^{11} \, \text{N m}^{-2}$

**C**   $8.0 \times 10^{8} \, \text{N m}^{-2}$

**D**   $8.0 \times 10^{11} \, \text{N m}^{-2}$