

- 8 A satellite of mass  $6.9 \times 10^2 \text{ kg}$  orbits the Earth along a circular path of radius  $7.2 \times 10^6 \text{ m}$ . Its orbital speed is  $7.5 \text{ km s}^{-1}$ .

A rocket engine on the satellite is fired. The satellite falls into a lower orbit of radius  $6.5 \times 10^6 \text{ m}$  where its orbital speed becomes  $7.9 \text{ km s}^{-1}$ .

Which statement about the change to the total energy of the satellite caused by the rocket burn is correct?

mass of the Earth =  $6.0 \times 10^{24} \text{ kg}$

- A The satellite gains approximately  $2 \times 10^9 \text{ J}$ .
- B The satellite gains approximately  $3 \times 10^9 \text{ J}$ .
- C The satellite loses approximately  $2 \times 10^9 \text{ J}$ .
- D The satellite loses approximately  $4 \times 10^9 \text{ J}$ .

