$\therefore$ if we double the mass and halve the speed, we halve the kinetic energy.

C is the answer.

6. $Fd = \Delta E_k$

$$= \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2$$
$$= -\frac{1}{2}mv_0^2 \quad (v = 0)$$

$d \propto v_0^2 \quad (v_0 = \text{doubles})$

$\therefore$ d increases $2^2 = 4$ times

$d' = 4.0d$

D is the answer.

7. Work = $F_g d$, but F_g and d are perpendicular, $(F_g)x = 0$

$\therefore$ work = 0

C is the answer.

8. Work = $F_{net} d$

$= mad$

A is the answer

9. $E_k = \frac{1}{2}mv^2$

$E_k \propto v^2 \quad (\text{velocity triples})$

$\therefore$ E_k increases 9 times

$E_k = 9E$

D is the answer.

10. $E_k = \frac{1}{2}mv^2$

$\therefore$ units: $\text{kg}\cdot\text{m}^2/\text{s}^2$

C is the answer.

11. Work = ΔE_k

$$= \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2$$
$$= \frac{1}{2}(2.50\text{ kg})(10.0\text{ m/s})^2$$
$$= 125\text{ J}$$

C is the answer.

12. Work = ΔE_k

$$= \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2$$
$$= -\frac{1}{2}mv_0^2 \quad (v = 0)$$
$$= -\frac{1}{2}(10\times10^{-3}\text{ kg})(335\text{ m/s})^2$$
$$= -5.61\times10^2\text{ J}$$

B is the answer.

13. $E_p = mgh$

Note that from this equation, the potential energy of the student does not depend on the speed.

A is the answer.

14. The law of conservation of mechanical energy states that if there is no friction, mechanical energy is conserved. Remember mechanical energy is the sum of gravitational potential energy and the kinetic energy, i.e. the mechanical energy is the same at all points.

D is the answer.

15. $\Delta E_k + \Delta E_p = 0$

$$\frac{1}{2}mv^2 - \frac{1}{2}mv_0^2 + mg\Delta h = 0$$
$$\frac{1}{2}v^2(9.81\text{ m/s}^2)(-0.40\text{ m}) = 0$$
$$v_f = 2.8\text{ m/s}$$

A is the answer.

16. $P = \frac{\text{Work}}{t}$

Since there was no work done on the wall, the power output is zero.

A is the answer.