Text Book
Chapter 9

① A Energy changes require work.

② D

③ A

④ A

⑤ D

$$E_p = E_k$$
$$mgh = \frac{1}{2} mv^2$$
$$v = \sqrt{2gh}$$

⑥ C Assuming the runners run up the hill.

⑨ D A force is exerted equal to the force of gravity to keep the object at that height. Since the height does not change, gravitational potential energy does not change. Since the velocity is constant, kinetic energy does not change.

⑩ A (same reasoning as 9)

⑪ A

(14) C

$$W = \frac{1}{2} m v^2$$

$$Fd = \frac{1}{2} m v^2$$

$$v = \sqrt{\frac{2Fd}{m}} = \sqrt{\frac{2(100N)(0.5m)}{.15kg}} = 25.8 \text{ m/s}$$

(15) D

$$P = \frac{W}{t} \qquad W = Fd \qquad F = ma \qquad v_f^2 = v_i^2 + 2ad$$

$$a = \frac{v_f^2 - \cancel{v_i^2}}{2d}$$

$$F = \frac{m v_f^2}{2d}$$

$$W = \frac{m v_f^2 \cancel{d}}{2 \cancel{d}}$$

$$P = \frac{m v_f^2}{2t} \qquad t = \frac{m v_f^2}{2P} = \frac{(40)(3.2)^2}{2(18)} = 11.4 s$$

(16) C

$$E_k = \frac{1}{2} m v^2 = \frac{1}{2}(.01)(700)^2 = 2450 \text{ J}$$

(17) B

$$E_k = E_p$$

$$\frac{1}{2} \cancel{m} v^2 = \cancel{m} g h$$

$$h = \frac{v^2}{2g} = \frac{(2)^2}{2(10)} = 0.2 \text{ m}$$

(18) B

only need mass of object and length the spring has stretched.

(22) D

(23) A

(24) D $P = \frac{W}{t}$ $W = Fd$ $F = ma$ $V_f^2 = V_i^2 + 2ad$

$$a = \frac{V_f^2 - \cancel{V_i^2}}{2d}$$

$$F = \frac{m V_f^2}{2d}$$

$$W = \frac{m V_f^2 \cancel{d}}{2\cancel{d}}$$

$$P = \frac{m V_f^2}{2t} \quad t = \frac{m V_f^2}{2P} = \frac{60(5)^2}{2(250)} = 3s$$

(25) C $P = \frac{W}{t}$ $W = Fd$

$$P = \frac{Fd}{t} \quad t = \frac{Fd}{P} = \frac{(10000)(100)}{100000} = 10s$$

(26) C

(27) B $E_k = \frac{1}{2}mv^2 = \frac{1}{2}(10)(2)^2 = 20J$

(28) B

(29) A

(34) A (35) A (36) A (37) A

(38) A $mgh \rightarrow (kg)\left(\frac{m}{s^2}\right)(m)$

(39) A

(40) B The kinetic energy is transferred to the ground, but due to the mass of the Earth, the change in velocity is negligible.

(41) A

(46) B decelerating → decreasing velocity.
falling → decreasing altitude.

(47) D Work = Fd adds energy (Work-Energy Theorem)
$\Delta E_k = \frac{1}{2} m (\Delta v)^2$ (conservation of energy)

(48) A
$\Delta U = \Delta K$
$mgh = \frac{1}{2} mv^2$
$v = \sqrt{2gh} = \sqrt{2(1.6)(7.8)} = 5.0$ m/s

→ No friction and therefore no "loss" of energy

(49) C