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{Ch. 7: CQ 22, 30, 33 Ex 12, 15, 21 Ch 9: CQ 1, 5; Ex 1, 5.

7: CQ 22 The attractive force of earth upon the satellite always points towards the earth. Also, the satellite is closest to the earth at the perigee tip of its elliptical orbit, on the left side of the figure. As the satellite moves from that point towards its apogee point at the far tip of the ellipse (on the right in the figure), its distance from earth is increasing. Therefore at Points B and C the force opposes the displacement in direction, the work is negative and the kinetic energy is decreasing from its maximum at perigee to its minimum value at apogee. By the same reasoning, at point A the distance to earth is decreasing so that the work is positive and the kinetic energy is increasing.

7. CQ 30: The force of friction does negative work and converts mechanical energy into heat.

7. CQ 33: Gravitational PE is max at highest (end) points, and KE is MAX at lowest point of swing.

7. Ex 12: ZERO WORK is performed, because the Force is $\perp$ to the displacement.

7. Ex 15: (a) $W_G = F \cdot d \cdot \cos\theta = (0.145\,kg \times 10\,\frac{m}{sec^2})(6\,m)\cdot(-1) = -8.7\,J$

(b) $W_G = \Delta(KE) \Rightarrow (KE)_f - (KE)_i = -8.7\,J$

i.e. $(KE)_f = 8.7J - 8.7J = 0$ after 6m climb

(c) Since $(KE) = 0$, ball's speed is ZERO

7. Ex 21: $\text{Power} = \frac{\text{Work}}{\text{time}} = \frac{\Delta W}{\Delta t} = \frac{(300\,lb)(4\,ft)}{0.8\,sec} = \frac{1500\,ft\cdot lb}{sec} \times \frac{1\,hp}{550\,\frac{ft\cdot lb}{sec}} = 2.73\,hp$

[Sorry about the ENGLISH units! See inside back cover for conversion, $hp \leftrightarrow \frac{ft\cdot lb}{sec}$, factor]

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Home Work Problem Set # 6

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Solutions by

Ch 9: CQ 1,5 / Ex 1,5

9: CQ1. Newton's first law is true only in inertial frames of reference (and indeed serves to define such frames).

9: CQ5 Both frames of reference are inertial and therefore no experiment can distinguish between the two.

9: Ex1. a) $(v_0)_{ground} = (v_0)_{frame} + (v_{frame})_{ground}$

$= +15\,m/s + 25\,m/s$

$= 40\,m/s.$

$(v_0)_{ground} = (v_0)_{frame} + (v_{frame})_{ground}$

$= -15\,m/s + 25\,m/s$

$= +10\,m/s.$

9: Ex5) a) $a_{eff} = g - A_{EL} = -10\,m/s^2 - (-6\,m/s^2) = -4\,m/s^2$ (downward)

$a_{eff} = g - A_{EL} = -10\,m/s^2 - (-16\,m/s^2) = +6\,m/s^2$ (upward)

Note that we have chosen the + direction to be upward, away from the center of earth.