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WORK AND ENERGY PRACTICE

FHW WORK AND ENERGY PRACTICE (2.1)

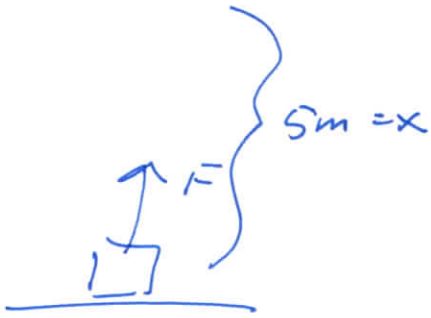
Directions: Solve the following problems to get ready for the test on Monday.

1) A 40kg object is lifted to a height of 5 m in a time of 20seconds. How much work is done to lift the object?

$PE = W = F_x = mgx$

$W = (40kg)(9.8 m/s^2)(5m)$

$W = 1960 J$



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2) A 40kg object is lifted to a height of 5 m in a time of 20seconds. What is the potential energy of the object at the 5 m height?

$PE = mgh$

$(40kg)(9.8 m/s^2)(5m) = 1960 Jm$

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3) A 40kg object is lifted to a height of 5 m in a time of 20seconds. How much power is needed to lift the object?

$$P = \frac{\text{work}}{\text{time}} = \frac{mgx}{t} = \frac{(40\text{kg})(9.8\text{m/s}^2)(5\text{m})}{20\text{s}}$$

$$P = 98\text{ watts}$$

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4) If the object were to be dropped, how fast would it be going just before it hits the ground?

$PE = KE$

$mgh = \frac{1}{2}mv^2$

$gh = \frac{1}{2}v^2$

$2gh = v^2$

$\sqrt{2gh} = v$

$\sqrt{(2)(9.8\ m/s^2)(5\ m)} = 9.9\ m/s$

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5) How much work would need to be "done" to stop the object?

$PE = KE = Work$

$mgh = Work$

$(40kg)(9.8 m/s^2)(5m) = Work$

$1960 J = Work$

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6) If the object makes a "dent" in the ground when it hits that is 3cm deep, determine the force exerted on the ground to the object.

$W_{ork} = F_x$

$1960\,Nm = F(.03m)$

$65{,}333\,N = F$

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7) A 10kg cart is moving at 5 m/s. How much work must be done to stop the cart?

$\Delta KE = Work$

$\frac{1}{2}mv^2 = Work$

$\left(\frac{1}{2}\right)(10kg)\left(5\frac{m}{s}\right)^2 = Work$

$125\ J = Work$

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8) A 10 kg cart is moving at 5 m/s. It is slowed to 2 m/s in a distance of 3 m. What force is need to slow the cart?

$$KE_0 = Work + KE$$

$$KE_0 - KE = F_x$$

$$\frac{1}{2}mv_0^2 - \frac{1}{2}mv^2 = F_x$$

$$\frac{\frac{1}{2}m(v_0^2 - v^2)}{x} = F$$

$$\frac{\left(\frac{1}{2}\right)(10kg)\left((5m/s)^2 - (2m/s)^2\right)}{3m} = 35N$$