Physics 101Rec
Quiz#5c
Chapter 7

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Name: Key Id: Sect:

(a) What is the work done by a force $\vec{F} = 2x\,\hat{i} - 3y\,\hat{j}$ (N) that moves a particle of mass m = 2 kg from a coordinates (2 m, 3 m) to (-4 m, -3 m).

$\vec{F}$ is a varying force $\Rightarrow$ $W = \int \vec{F} \cdot d\vec{r}$

$$W = \int_{x_i}^{x_f} F_x\,dx + \int_{y_i}^{y_f} F_y\,dy$$

$$= \int_{2}^{-4} 2x\,dx - \int_{3}^{-3} 3y\,dy$$

$$= 2\frac{x^2}{2}\Big|_{2}^{-4} - 3\frac{y^2}{2}\Big|_{3}^{-3} = \left[(-4)^2 - (2)^2\right] - \frac{3}{2}\left[(-3)^2 - (3)^2\right]$$

$$= 12 - (13.5 - 13.5) = 12\,J$$

(b) If this particle starts from rest, what is its final ~~kinetic energy~~ speed?

$$W = \Delta K = \frac{1}{2}mv_f^2 - \frac{1}{2}m\cancel{v_i^2}^{\,0}$$

$$v_f = \sqrt{\frac{2W}{m}} = \sqrt{\frac{2\times 12}{2}} = 3.5\ m/s$$