$$K_{system} = \sum_i \underbrace{\frac{1}{2} m_i v_i^2}_{\text{scalar}}$$

Ex/ Constant net Force $F_x^{net} = \sum F_x$ in x direction on mass m

Work done <u>on</u> m <u>by</u> F^{net}

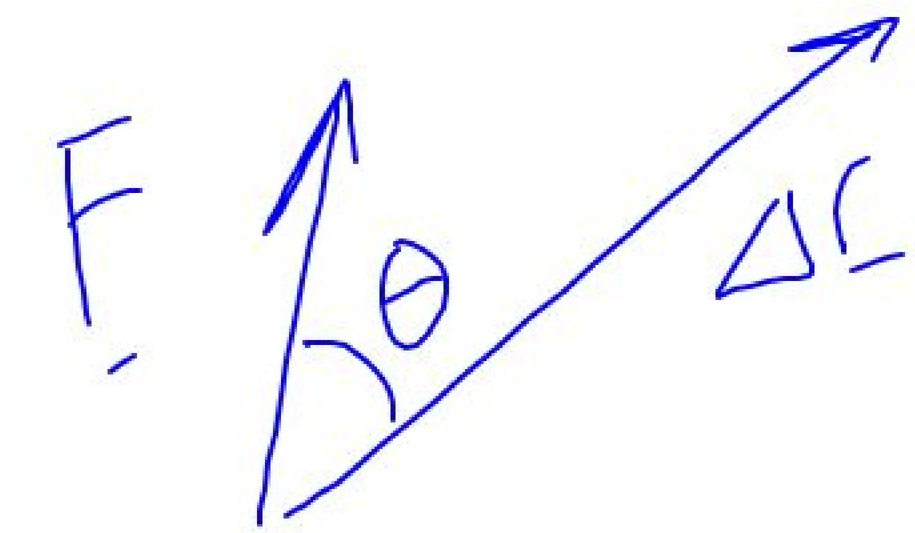
$$W = F_x^{net} \Delta x = m a_x \left(\frac{v_x^2 - v_{0x}^2}{2 a_x} \right)$$

$$= \frac{1}{2} m v_x^2 - \frac{1}{2} m v_{0x}^2 = \Delta K$$

$$W_{net} = F_x^{net}\Delta x = \frac{1}{2}\cancel{m}v_x^2 - \frac{1}{2}mv_{0x}^2 = \Delta K = K_f - K_i$$

const $\times 4$ 0 $\times 4$

units J = Nm



$\neq F\Delta r$

Constant Force in 3D

$$\underline{F} = F_x\underline{i} + F_y\underline{j} + F_z\underline{k}$$

$$\Delta\underline{r} = \Delta x\,\underline{i} + \Delta y\,\underline{j} + \Delta z\,\underline{k}$$

$$= \underline{r}_2 - \underline{r}_1$$

$$= (2\underline{i} + \underline{j}) - (\underline{i} - 2\underline{j})$$

$$= (\underline{i} + 3\underline{j})\,m$$

$$W = \underline{F}\cdot\Delta\underline{r}$$ dot product

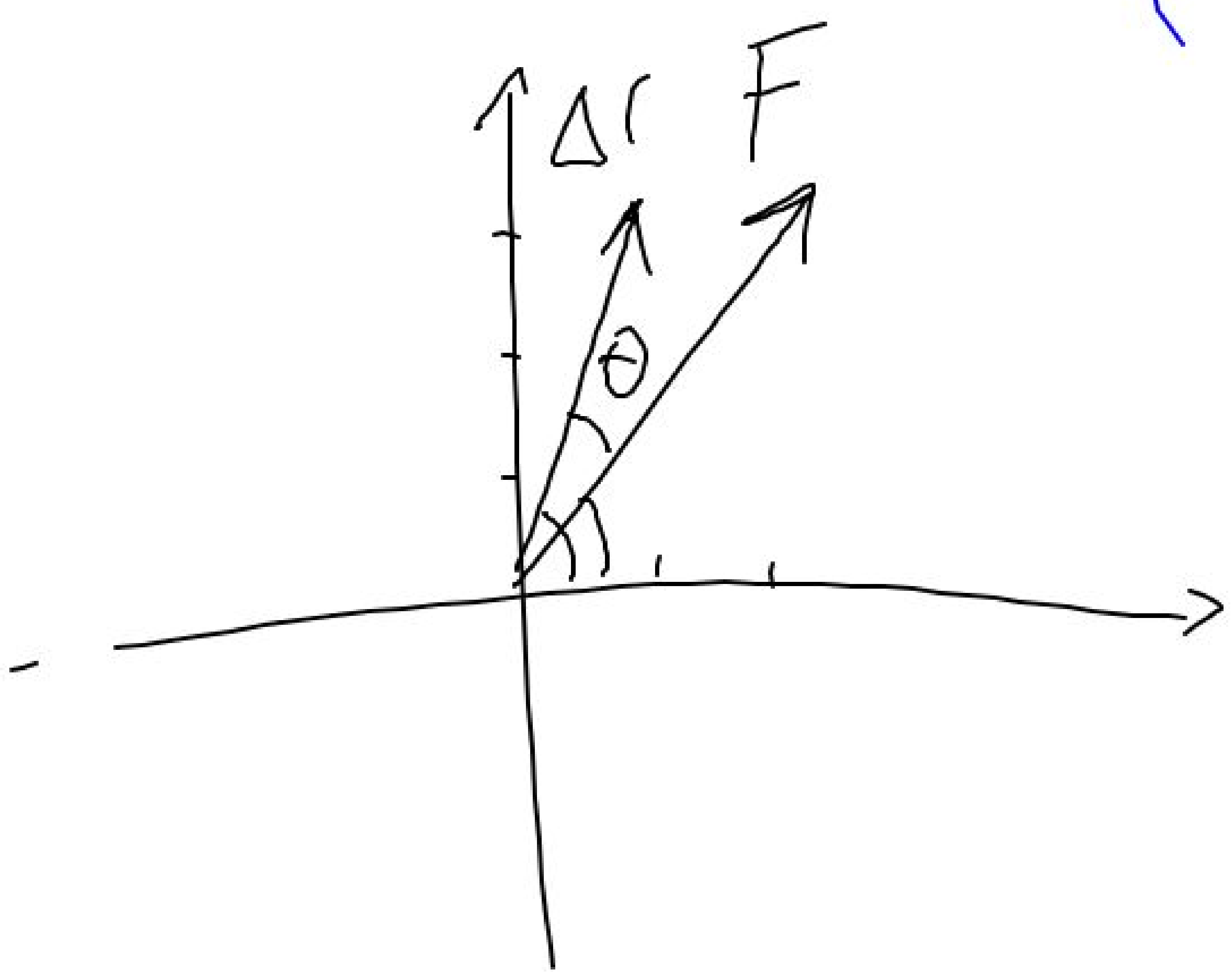
$$= F\Delta r\cos\theta$$

or $$= F_x\Delta x + F_y\Delta y + F_z\Delta z$$

Note $F = \sqrt{F_x^2 + F_y^2 + F_z^2}$

Angle between $\underline{F}$ and $\Delta \underline{r}$? $= 15 \cdot 3^\circ = \theta$

$= (2\underline{i} + 3\underline{j})\,N$ $\qquad$ $= (\underline{i} + 3\underline{j})\,m$



$F = 3 \cdot 6 \ldots N$ $\qquad$ $\Delta r = 3 \cdot 1 \ldots m$

$W = \Delta r F \cos\theta = 11 J$?