

Phys 4A Chpt 7: 14, 26, 36

(14) $\vec{A} = 10 \cos 30^\circ \hat{i} + 10 \sin 30^\circ \hat{j}$
 $= 8.7 \hat{i} + 5 \hat{j}$

$\vec{B} = -4 \cos 80^\circ \hat{i} + 4 \sin 80^\circ \hat{j}$
 $= -.69 \hat{i} + 3.93 \hat{j}$

$\vec{C} = 5.6 \hat{i} - 3.1 \hat{j}$

$\vec{D} = 1.9 \hat{i} + 7.2 \hat{j}$

(a) $\vec{A} \cdot \vec{B} = (8.7)(-.69) + 5(3.93)$
 $= 13.7$

(b) $\vec{C} \cdot \vec{D} = (5.6)(1.9) + (-3.1)(7.2)$
 $= -11.68$

(c) $\vec{B} \cdot \vec{C} = (-.69)(5.6) + (3.93)(-3.1)$
 $= -18.5$

(26) (a) $Work = W = \int_{x_i}^{x_f} \vec{F} \cdot d\vec{x}$

$\left. \begin{array}{l} \text{~~~~~} \rightarrow F = kx \end{array} \right\} = \int_0^{x_f} kx \cdot dx = \text{NEXT} \Rightarrow$

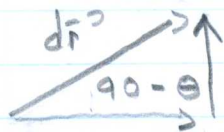
$$W = \int_0^{x_f} kx dx = \frac{1}{2} kx^2 \Big|_0^{x_f = .10} = \frac{1}{2} (200) (.10)^2$$

$$\Rightarrow W = 1 \text{ J}$$

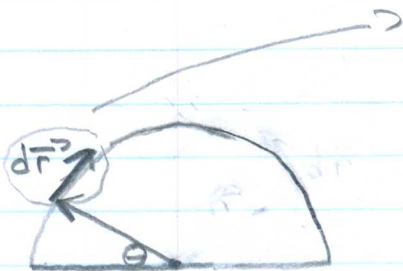
$$(26 \text{ b}) \quad W = \int_{x_i = .10}^{x_f = .20} kx dx = \frac{1}{2} (200) x^2 \Big|_{.10}^{.20}$$

$$= \frac{1}{2} (200) (.20)^2 - \frac{1}{2} (200) (.10)^2$$

$$\Rightarrow W = 3 \text{ J}$$



(36)



$$\vec{F} = 0\vec{i} - mg\vec{j}$$

$$|d\vec{r}| = R d\theta$$

$$d\vec{r} = R d\theta \sin\theta \vec{i} + R d\theta \cos\theta \vec{j}$$

$$\Rightarrow W = \int \vec{F} \cdot d\vec{r}$$

$$\begin{aligned} \vec{F} \cdot d\vec{r} &= (0) \cdot R d\theta \sin\theta - (mg) R d\theta \cos\theta \\ &= -mgR \cos\theta d\theta \end{aligned}$$

$$\begin{aligned}\Rightarrow W &= \int \vec{F} \cdot d\vec{r} = - \int_{\pi}^{\frac{\pi}{2}} mgR \cos \theta d\theta \\ &= -mgR \int_{\pi}^{\frac{\pi}{2}} \cos \theta d\theta \\ &= -mgR \left[\sin \theta \right]_{\pi}^{\frac{\pi}{2}} \\ &= -mgR\end{aligned}$$

EASIER METHOD

$$\begin{aligned}W &= -\Delta U = -(u_f - u_o) \\ &= -(mgR - 0) \\ &= -mgR\end{aligned}$$