

PHYS 2311 Ch. 7 HW  
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MisConcQ 1.

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- 1. d
- 3. e
- 5. d
- 7. c
- 9. b
- 11. b
- 13. d

Problem 1.

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$$W = \vec{F}_g \cdot \Delta \vec{x}$$

$$F_g = mg$$

$$W = mg\Delta x = (280)(9.8)(3.80) = \boxed{10\,400\text{ J}}$$

Problem 2.

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$$W = \vec{F} \cdot \Delta \vec{x}$$

$$\Delta x = \frac{W}{F_g} = \frac{W}{mg} = \frac{70.0}{(1.85)(9.8)} = \boxed{3.86\text{ m}}$$

Problem 5.

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$$m = 46.0\text{ kg}, \quad \Delta x = 10.3\text{ m}, \quad \mu_k = 0.40$$

$$W = \vec{F} \cdot \Delta \vec{x}$$

$$\vec{F} = F_{app} - f_k = 0$$

$$f_k = F_N \mu_k = mg \mu_k = (46.0)(9.8)(0.40) = 180.32\text{ N}$$

$$\implies F_{app} = 180.32\text{ N}$$

$$W = (180.32)(10.3) = \boxed{1860\text{ J}}$$

**Problem 8.**

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$$m = 950 \text{ kg}, \quad \Delta x = 510 \text{ m}, \quad \theta = 9.0^\circ$$

$$F_g = mg \sin \theta$$

$$W = mg \sin \theta \Delta x$$

$$W = (950)(9.8) \sin(9.0)(510) = \boxed{7.4 \times 10^5 \text{ J}}$$

**Problem 12.**

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$$\vec{x}(t) = \vec{x}_0 + \vec{v}_0 t + \frac{1}{2} \vec{a} t^2$$

$$\Delta x = \frac{1}{2} a t^2$$

$$F = ma$$

$$W = F \Delta x = \frac{1}{2} a^2 t^2 m = \frac{1}{2} (2.0)^2 (8.0)^2 (4.0) = \boxed{512 \text{ J}}$$

**Problem 18.**

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$$\vec{A} \cdot \vec{B} = (2.0x^2)(11.0) + (-4.0x)(2.5x) + (5.0)(0)$$

$$= 22x^2 - 10x^2 = \boxed{12x^2 \text{ units}}$$

**Problem 20.**

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$$\vec{A} \cdot \vec{B} = (5.8)(8.2) + (-3.4)(4.3) + (-6.2)(-7.0) = 76.34$$

$$|\vec{A}| = \sqrt{(5.8)^2 + (-3.4)^2 + (-6.2)^2} = 9.15$$

$$|\vec{B}| = \sqrt{(8.2)^2 + (4.3)^2 + (-7.0)^2} = 11.61$$

$$\theta = \arccos \left( \frac{\vec{A} \cdot \vec{B}}{|\vec{A}| |\vec{B}|} \right)$$

$$\theta = \arccos \left( \frac{76.34}{9.15 \cdot 11.61} \right) = \boxed{44.2^\circ}$$

**Problem 22.**

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$$\vec{V}_1 = 0\hat{i} + 75\hat{k}$$

$$\vec{V}_2 = 48 \cos(-48^\circ)\hat{i} + 48 \sin(-48^\circ)\hat{k} = 32.11\hat{i} - 35.67\hat{k}$$

$$\vec{V}_1 \cdot \vec{V}_2 = (0)(32.11) + (75)(-35.67) = \boxed{-2675 \text{ units}}$$

**Problem 25.**

(a)

$$\vec{B} + \vec{C} = (-8.0 + 5.8)\hat{i} + (6.1 - 9.2)\hat{j} + 4.2\hat{k} = -2.2\hat{i} - 3.1\hat{j} + 4.2\hat{k}$$

$$\vec{A} \cdot (\vec{B} + \vec{C}) = (9.0)(-2.2) + (-8.5)(-3.1) + (0)(4.2) = \boxed{6.55}$$

(b)

$$\vec{A} + \vec{C} = (9.0 + 5.8)\hat{i} + (-8.5 - 9.2)\hat{j} = 14.8\hat{i} - 17.7\hat{j}$$

$$\vec{B} \cdot (\vec{A} + \vec{C}) = (-8.0)(14.8) + (6.1)(-17.7) + (4.2)(0) = \boxed{-226}$$

(c)

$$\vec{B} + \vec{A} = (-8.0 + 9.0)\hat{i} + (6.1 - 8.5)\hat{j} + (4.2 + 0)\hat{k} = 1\hat{i} - 2.4\hat{j} + 0\hat{k}$$

$$(\vec{B} + \vec{A}) \cdot \vec{C} = (1)(5.8) + (-2.4)(-9.2) + (0)(0) = \boxed{27.9}$$

**Problem 37.**