

Q1 - Answer = c

Q2 - Problem A - Last name A-K

The thermal conductivity of goose down is  $0.02 \text{ W/(m K)}$ . Assuming a body area of  $2.5 \text{ m}^2$ , what is the rate of heat loss for a person sleeping outside in a down,  $10 \text{ cm}$  thick sleeping bag when the temperature is  $-50^\circ\text{C}$ ? (Body temperature =  $37^\circ\text{C}$ )

A.  $0.435 \text{ W}$

B.  **$43.5 \text{ W}$**

C.  $18.5 \text{ W}$

D.  $25 \text{ W}$

E.  $435 \text{ W}$

$$Q/t = k A \Delta T/d; d = 10 \text{ cm} = 0.1 \text{ m}$$

$$Q/t = 0.02 \times 2.5 \times (37+50)/0.1 \\ = 43.5 \text{ W}$$

Q1 - Answer = c

Q2 - Problem B - Last Name L-Z

- The thermal conductivity of flannel is  $0.096 \text{ W/(m K)}$ . Assuming a body area of  $2.0 \text{ m}^2$ , what is the rate of heat loss for a person walking outside in  $2 \text{ mm}$  thick flannel pajamas when the temperature is  $-40^\circ\text{C}$ ? (Body temperature =  $37^\circ\text{C}$ )

A.  $7.4 \text{ W}$

$$Q/t = k A \quad T/d; \quad d = 2\text{mm} = 2 \times 10^{-3}\text{m}$$

B.  $1848 \text{ W}$

$$Q/t = 0.096 \times 2.0 \times (37+40)/2 \times 10^{-3}$$

C.  $355 \text{ W}$

$$= 7392 \text{ W}$$

D.  $3840 \text{ W}$

E. **7392 W**