

THERMODYNAMICS

Worksheet 2

1. Heat flows from object A to object B. Heat flows from object C to object B. What does this information tell you about the temperatures of objects A, B and C?

2. Block A, at 100°C , and block B at 50°C , are brought together in a well-insulated container. The internal energy of block A will:

- a) Decrease, and the internal energy of block B will decrease
- b) Decrease, and the internal energy of block B will increase
- c) Increases and the internal energy of block B will decrease
- d) Increase, and the internal energy of block B will increase

Explain your answer:

3. During a process, the molecules in substance A increase their potential energy, and the molecules in substance B increase their kinetic energy. Which of the following statements is true:

- a) Substance A's temperature has increased, substance B's temperature has not increased, but the internal energy of BOTH has increased.
- b) Substance A's temperature has not increased, substance B's temperature has increased, and the internal energy of BOTH has increased.
- c) Substance A's temperature has increased, substance B's temperature has not increased, but the internal energy of ONLY A has increased.
- d) Substance A's temperature has not increased, substance B's temperature has increased, and the internal energy of ONLY B has increased.
- e) Substance A has undergone a change in temperature, and substance B has undergone a change of state.

Explain your answer:

4. The International Space Station must get rid of its unwanted heat by:

- a) conduction
- b) convection
- c) radiation

Explain your answer:

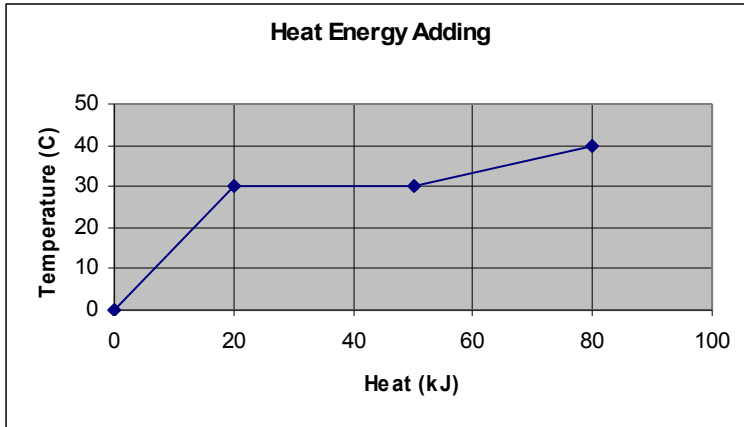
5. A concrete highway is built of slabs 12 m long. How much does the length change if the range of temperatures is -30 C to +50 C? ($\alpha=12 \times 10^{-6}$)

6. A steel tape measure gives the length of a brass rod as 102cm when both are at a temperature of 285 K. What would the tape measure read when the temperature increases to 318 K?

$\alpha=1.9 \times 10^{-5}$ for steel

$\alpha=1.1 \times 10^{-5}$ for brass

Use the graph below to answer the next three questions:



7. Based on the graph above, what is the melting point of the substance?

8. How much heat energy must be removed to lower the temperature of the substance in the liquid phase at 40 C to a liquid at 30 C?

9. What is the total amount of heat energy necessary to raise the temperature of the substance from a solid at 30 C to a liquid at 40 C?