

KEY.

Lesson 7: Thermal Energy Worksheet

Instructions: Answer the following questions using the formula $\Delta E_h = mC\Delta T$, where:

• ΔE_h = change in thermal energy (heat) measured in joules (J)

• m = mass measured in kilograms (kg)

• C = specific heat capacity measured in J/kg·K or J/kg·°C

• ΔT = change in temperature ($T_f - T_i$) measured in kelvin (K) or degrees Celsius (°C)

You will need to refer to a specific heat capacity table to find the values for "C" for different materials. An online table is available at this link: goo.gl/65gAMu1

Questions:

1. $\Delta E_h = 135000 \text{ J}$
How much heat energy is required to raise the temperature of 2.5 kg of aluminum from 20°C to 80°C?

2. $\Delta E_h = 162000 \text{ J}$
A 1.8 kg iron skillet is heated on a stovetop from 25°C to 225°C. How much heat energy is absorbed by the skillet?

3. $\Delta E_h = 23400 \text{ J}$
A 0.75 kg copper pot is placed on a burner and heated from 20°C to 100°C. Calculate the amount of heat energy absorbed by the pot.

4. $\Delta T = +1.8^\circ\text{C}$
If 5,000 J of heat energy is added to a 1.2 kg block of silver, what will be the change in temperature of the silver block?

5. $\Delta E_h = -58500 \text{ J}$
A 4.5 kg block of lead is cooled from 150°C to 50°C. How much heat energy is released by the lead block?

6. $C = 155.6 \text{ J/kg}\cdot^\circ\text{C}$
A piece of unknown metal with a mass of 1.5 kg absorbs 3,500 J of heat energy, causing its temperature to rise by 15°C. What is the specific heat capacity of the unknown metal?

7. $\Delta E_h = 837200000 \text{ J}$
A swimming pool containing 25,000 kg of water needs to be heated from 20°C to 28°C. How much heat energy is required to raise the temperature of the pool water?

8. $T_f = 24.8^\circ\text{C}$
A 0.5 kg glass of water is heated in a microwave. If the water absorbs 10,000 J of heat energy, what will be the final temperature of the water if it started at 20°C?

9. omit
A 10 kg block of ice at 0°C is exposed to the sun and melts completely into liquid water at 0°C. How much heat energy is absorbed by the ice during this process? (Hint: You will need to find the heat of fusion for water, which represents the energy required to change the state of water from solid to liquid without changing its temperature).

10. 1575000 J
A 5 kg piece of granite is heated in a kiln from 25°C to 400°C. Calculate the amount of heat energy absorbed by the granite.