

Heat Transfer/ Specific Heat Problems Worksheet

Solving For Heat (q)

1. How many joules of heat are required to raise the temperature of 550 g of water from 12.0 °C to 18.0 °C?
2. How much heat is lost when a 64 g piece of copper cools from 375 °C, to 26 °C? (The specific heat of copper is 0.38452 J/g x °C). Place your answer in kJ.
3. The specific heat of iron is 0.4494 J/g x °C. How much heat is transferred when a 4.7 kg piece of iron is cooled from 180 °C to 13 °C? Remember you must use the same units so you will have to convert your mass to grams before you begin.

Solving For Mass (m)

4. 8750 J of heat are applied to a piece of aluminum, causing a 56.0 °C increase in its temperature. The specific heat of aluminum is 0.9025 J/g x °C. What is the mass of the aluminum?
5. Find the mass of a sample of water if its temperature dropped 24.8 °C when it lost 870 J of heat.
6. How many grams of water would require 92.048 kJ of heat to raise its temperature from 34.0 °C to 100.0 °C? (Remember to change units first)

Solving For Temperature (T)

7. How many degrees would the temperature of a 450 g piece of iron increase if 7600 J of energy are applied to it? (The specific heat of iron is 0.4494 J/g x °C)
8. A 250 g sample of water with an initial temperature of 98.8 °C **loses** 7500 joules of heat. What is the final temperature of the water?
9. How much change in temperature would the addition of 35 000 Joules of heat have on a 538.0 gram sample of copper? (Look up specific heat of copper)

Solving For Specific Heat Capacity (c)

10. Determine the specific heat of a certain metal if a 450 gram sample of it loses 34 500 Joules of heat as its temperature drops by 97 °C.
11. 4786 Joules of heat are transferred to a 89.0 gram sample of an unknown material, with an

initial temperature of 23.0 °C. What is the specific heat of the material if the final temperature is 89.5 °C?

12. The temperature of a 55 gram sample of a certain metal drops by 113 °C as it loses 3500 Joules of heat. What is the specific heat of the metal?

Solving For Final Temperature in an Insulated Calorimeter

13. Determine the final temperature when 450.2 grams of aluminum at 95.2°C is placed in an insulated calorimeter with 60.0 grams of water at 10.0°C.

14. What is the final temperature when 42.3 grams of water at 0.0 °C and 255.8 grams of water at 76.78 °C are mixed?

15. 5.00 grams of iron ($c = 0.444 \text{ J/g} \times ^\circ\text{C}$) at 75 °C is added to 150 grams of water at 15.0 °C in a calorimeter. What is the final temperature of the iron and the water?

Solving For Specific Heat/ Mass in an Insulated Calorimeter

16. A piece of metal with a mass of 15.3 grams has a temperature of 50.0 °C. When the metal is placed in 80.2 grams of water at 21.0 °C, the temperature rises by 4.3 °C. What is the specific heat capacity of the metal?

17. A piece of copper has a temperature of 73.6 °C. When the metal is placed in 96.2 grams of water at 17.1 °C, the temperature rises by 5.1 °C. What is the mass of the metal?

Answers:

1. $13807.2 \text{ J} = 1.38 \times 10^4 \text{ J}$

2. $-8588.63 \text{ J} = -8.6 \text{ kJ}$

3. $-352734.06 \text{ J} = -3.5 \times 10^5 \text{ J}$

4. 173 grams

5. 8.38 grams

6. 333 grams

7. 37.6 °C

8. 91.6 °C

9. 169.0 °C

10. $0.79 \text{ J/g} \times ^\circ\text{C}$

11. $0.809 \text{ J/g} \times ^\circ\text{C}$

12. $0.56 \text{ J/g} \times ^\circ\text{C}$

13. 21.7 °C

14. 65.9 °C

15. 15.2 °C

16. $4.15 \text{ J/g} \times ^\circ\text{C}$

17. 104 grams