Specific Heat Worksheet

1. A beaker contains 610.0 g of water at 15.0°C. After being heated for 22 minutes the water's temperature rose to 48.0°C. Calculate the heat energy absorbed.

$Q = mc\Delta T$ $610 \times 4.19 \times (48.0 - 15.0)$

$= 84\,300\,J$

2. A beaker contains 270 g of water at 15°C. The water absorbs 24 000 J of energy. What is the water's final temperature?

$FT = IT + \Delta T$

$15 + 21 =$ 36°C

$\Delta T = \frac{Q}{mc}$ $\frac{24000}{(270 \times 4.19)} = 21°C$

3. Oil has a specific heat capacity of 2.0 J/g.°C. If 200 g of oil absorbs 5 005 J of heat energy to reach a final temperature of 40.0°C, what was its initial temperature?

$IT = FT - \Delta T$

$40.0 - 10$

$= 30°C$

$\Delta T = \frac{Q}{mc}$ $\frac{5005}{(200 \times 2.0)} = 10°C$

4. A beaker contains 405 g of water at 19°C. After being heated for 42 minutes the water's temperature reaches 55°C. Calculate the heat energy absorbed.

$Q = mc\Delta T$ $405 \times 4.19 \times (55 - 19)$

$61\,000\,J$

5. You pour 250 ml of water into a glass just out of the freezer. After a while, you notice that the temperature of the water has fallen from 18°C to 12°C.

a- Is this an energy transfer or transformation?

TRANSFER

b- Calculate the heat energy transfer.

$Q = mc\Delta T$ $250 \times 4.19 \times (12 - 18) = -6300\,J$

c- Explain if the water gives off or absorbs energy.

Water is warmer so gives off heat.

d- Explain of the glass gave off or absorbed energy.

glass was colder so absorbed heat.

6. Syrup has a specific heat capacity of 1.3 J/g.°C. If 200 g of syrup absorbs 5 000 J of heat energy to reach a final temperature of 55°C, what was its initial temperature?

$IT = FT - \Delta T$

$55 - 20$

40°C

$\Delta T = \frac{Q}{mc}$ $\frac{5000}{(200 \times 1.3)} = 20°C$

7. What is the mass of water if it absorbs 65 000 J of heat energy to go from a temperature of 75°C to 94°C?

$M = \frac{Q}{\Delta T C}$ $\frac{65000}{((94-75) \times 4.19)} = 820g$

8. What is honey's specific heat if 90.0 g are heated for 18.0 minutes and experience a temperature change of 40.0°C absorbing 7 500.0 J of heat?

$C = \frac{Q}{m\Delta T}$ $\frac{7500.0}{(90.0 \times 40.0)} = 2.08 J/g.°C$

9. Water's specific heat is 4.19 J/g.°C. Olive oil's specific heat is 1.9 J/g.°C.
   a- Which one would get hotter faster? olive oil
   b- Which one would keep its heat for longer? WATER
   c- Why would we put water in a car's cooling system over olive oil?

WATER, has a higher SH ∴ takes longer to absorb heat & get hot. Will not overheat

10. Horseshoes are made of different metals and are shaped using high temperatures. To solidify the metal, horseshoes are dipped into water to rapidly cool them. A horseshoe was heated to 452°C. It was then dipped into 0.50 kg of water at a temperature of 22°C. After the horseshoe was removed from the water, the temperature of the water had increased and the water had absorbed 2 514 J of energy. What was the final temperature of the water?

$FT = IT + \Delta T$

$22C + 1.2 =$ 23°C

$\Delta T = \frac{Q}{mc}$ $\frac{2514}{(500 \times 4.19)} = 1.2°C$

11. A material scientist is testing the properties of different wires. In one of his experiments, a 0.056 kg thin metallic wire was heated and its temperature increased by 48.5°C. In order to heat the wire, 1 032 J of energy was absorbed. The specific heat capacity of different metals are listed below. Which of the wires below was tested?

Specific heat capacity of different metal wires.

	Metal	Specific heat capacity (J/g °C)
(A)	W	0.38
B)	X	0.13
C)	Y	0.44
D)	Z	380.0

$C = \frac{Q}{m\Delta T}$ $\frac{1032}{(56 \times 48.5)}$

.385 J/g.°C