Using the heat formula and the table of specific heat values, solve the following heat problems.

1. A 0.5-kilogram piece of aluminum increases its temperature 7°C when heat energy is added. How much heat energy produced this change in temperature?

2. A volume of water has a mass of 0.5 kilogram. If the temperature of this amount of water was raised by 7°C, how much heat energy is produced?

3. How much heat energy is required to raise the temperature of 1 kilogram of steel by 10°C?

4. How much heat energy is needed to raise the temperature of 100-liters of water from 10°C to 25°C? Note: One liter of water has a mass of one kilogram.

5. When 1,500 joules of energy is lost from a 0.12-kilogram object, the temperature decreases from 45°C to 40°C. What is the specific heat of this object? Of what material is the object made?

6. What is the specific heat of a material that gains 600 joules of energy when a 0.25-kilogram object increases in temperature by 3°C? What is this material?

7. A liquid with a specific heat of 1,900 J/kg·°C has 4,750 joules of heat energy is added to it. If the temperature increases from 20°C to 30°C, what is the mass of the liquid?

8. What is the mass of a block of concrete that gains 52,800 joules of energy when its temperature is increased by 5°C?

9. A scientist wants to raise the temperature of a 0.10-kilogram sample of glass from –45°C to 15°C. How much heat energy is required to produce this change in temperature?

10. A person wishes to heat pot of fresh water from 20°C to 100°C in order to boil water for pasta. They calculate that their pot holds 2 kilograms of water and that they would need to apply 669,440 joules of heat energy to produce the desired temperature change. Are the person’s calculations correct? Defend your answer and demonstrate all relevant calculations.

11. A 0.25-kilogram sample of aluminum is provided with 5,000 joules of heat energy. What will be the change in temperature of this sample of aluminum?

12. What is the change in temperature for a 2-kilogram mass of water that loses 8,500 joules of energy?

13. Which of the substances listed in the table on the first page would heat up more quickly if an equal amount of heat energy were applied to all of the substances at the same time? Explain your answer.

14. Which of the substances listed in the table on the first page would you choose as the best insulator (substance that requires a lot of heat energy to experience a change in temperature)? Explain your answer.

15. Which substance—wood or steel—is the better conductor? A conductor is a material that requires very little heat energy to experience a change in temperature. Explain your answer.