Specific Heat Problems

Change in Energy = (mass) x (change in temperature) x (specific heat)

Change in Temperature = (final temperature) – (initial temperature)

$Q = (m) \times (T_f - T_i) \times c$

Units: Q = Joules or calories $T = {}^{o}C$ c = J/g ^{o}C or cal/g ^{o}C

1. Copper has a specific heat of 0.387 J/g ^{o}C. If you have a piece of copper with a mass of 75 g that is heated up by 15 ^{o}C, how much heat is required?

2. Marble has a specific heat of 0.858 J/g ^{o}C. If a piece of marble has a mass of 120 g and it starts at a temperature of 50 ^{o}C and goes to 88 ^{o}C, how much heat is required?

3. If you have a piece of metal that has a mass of 1275 g, its energy increases by 11,000 J, and its temperature rises by 12 ^{o}C, what is its specific heat?

4. If you increase the energy of a block of lead by 150,000 J and the temperature rises by 25 ^{o}C, what is the mass of the lead if the specific heat is 0.128 J/g ^{o}C ?

5. If you have a wood board that has a mass of 5000 g and a specific heat of 1.674 J/g ^{o}C, how much would the temperature of the board rise if it absorbed 325,000 J of energy?

6. If a 500 g piece of ice is at a temperature of -25 ^{o}C, and it given 5500 cal of energy, will the ice melt? If not, what is the final temperature of the ice? The specific heat for ice is 0.5 cal/g ^{o}C.

7. If 1750 g ocean water is heated up with 130,000 cal of energy and 1750 g of tap water is heated with the same amount of energy, which sample of water will end up at a higher temperature? Assume both samples of water start out at 21 ^{o}C. The specific heat of ocean water is 0.93 cal/g ^{o}C and the specific heat of tap water is 1.00 cal/g ^{o}C.

8. If the air in this room has a mass of 450,000 g and the specific heat of air is 0.25 cal/g ^{o}C, how much heat would it take to get the air temperature from 15 ^{o}C to 27 ^{o}C?

9. If 1,000,000 calories of heat was added to a room that contained 425,000 g of air and the final temperature of the room was 25 ^{o}C, what was the initial temperature of the air in the room? (assume that the specific heat of air is 0.25 cal/g ^{o}C)

10. What would be the specific heat of an object if its temperature dropped from 530 ^{o}C to 270 ^{o}C and it also lost 75000 cal of heat? Assume that the mass of the object is 625 g.