M	T	W	R	F
textbook reading	calculations	Bunsen Burner Lab		Quiz 3
in the computer room -- review	Test 3			

Purpose:

How do we handle units in this equation?

$$Q = m \times C \times \Delta T$$

WARMUP:

Glue the tiny sheet into your notebook

Warmup question for Tuesday, March 2014
Mr. Genest Chemistry

don't solve! 1. Calculate ΔT = Tfinal - Tinitial
2. Use Page 296 to fill in the "C" 3. You're done.

Story problem	**calculate** $\Delta T = T_{final} - T_{initial}$	**Use Page 296 to fill in the "C" (incl Units)**
How much heat will raise a pot of 800 g of water from 20 °C to 90 °C?	$\Delta T = 90 - 20$ $\Delta T = +70°C$	$C = 1 \frac{cal}{g \cdot °C}$
Some chloroform is created in a laboratory. Experiments show that it climbs from 23.2 °C up to 56.8 °C when 3750 J of energy are added to the sample.	$\Delta T = 56.8 - 23.2$ $\Delta T = 33.6°C$	$C = 0.96 \frac{J}{g°C}$
A blacksmith shapes a sword of iron while it is heated to 1000 °C. When finished, the hot sword is plunged into a barrel containing 500 kg of water at 30 °C and warms the water to 30.4°C. How much mass does the sword have?	$\Delta T_{sword} = 30.4 - 1000$ $\Delta T = -959.6°C$ $\Delta T_{water} = 30.4 - 30.0$ $\Delta T = +0.4°C$	$C = 0.11 \frac{cal}{g°C}$
Aluminum metal is used as a structural material in many aerospace applications. What is the specific heat of aluminum if it takes 89.7 J to raise the temperature of a 33.0g block by 5.20°C?	$\Delta T = 5.20°C$	$C = 0.21 \frac{cal}{g°C}$

1. Definitions

heat	temperature
cannot be detected. Because heat is the flow of energy we only detect the changes it causes to other substances	can be measured with a thermometer

2. Isolate X in each of the following examples

$\frac{Bx}{B} = \frac{15}{5}$

$X = \frac{15}{5}$

$X = 3$

$\frac{y}{x} = 12$

$\frac{x}{y} = \frac{1}{12}$

$\frac{x}{x} = \frac{y}{12}$

$x = \frac{y}{12}$

$\frac{Q}{yz} = \frac{xyz}{yz}$

$\frac{Q}{yz} = x$

3. Zeroeth Law of Thermodynamics

Heat will flow from a high temperature object to a low temperature object until Both objects are the same temperature.

4. Two specific heats:

$C = 1 \frac{cal}{g \cdot °C}$ for water

$C = \frac{4.184\ J}{g\ °C}$ for water

5. GUESS

G – underline the GIVENS
U – circle the UNKNOWN
E – Find a relevant EQUATION
* S – solve by ISOLATING the unknown
S – substitute the givens into the equation

6. Examples of problem solving

a. How much heat will raise a pot of 800 g of water from 20 °C to 90 °C? We know $C = 1 \frac{\text{calorie}}{\text{gram} \cdot ^\circ C}$

EQUATION: $Q = (m)(C)(\Delta T)$

$\Delta T = T_{final} - T_{initial}$
$\Delta T = 90 - 20 = 70^\circ C$

$Q = (800)(1)(70^\circ)$
$Q = 56000$ calories

b. What is the specific heat of silicon if it takes 192J to raise the temperature of 45.0g of Si by 6.0°C?

C ← joules (Q)
m
T

$\frac{Q}{mT} = \frac{(m)(c)(T)}{(m)(T)}$

$\frac{Q}{m\Delta T} = C$

$\frac{(192J)}{(45.0g)(6.0^\circ C)} = C$

$C = 0.71 \frac{J}{g \cdot ^\circ C}$

5. Examples of problem solving

a. How much heat will raise a pot of 800 g of water from 20 °C to 90 °C?

first find T

$C = 4.184 \frac{J}{g^\circ C}$

$Q = (m)(c)(\Delta T)$

$\Delta T = 90 - 20$
$\Delta T = 70^\circ C$

$Q = (800)(4.184)(70^\circ)$
$Q = 234304\ J \approx 200000\ J$