**S’Mores Challenge - Mission 7:**

# **In a team of 2 people find the specific heat capacity for a smore.**

**Step 1:** Get a marshmallow, two graham crackers and a piece of chocolate from the front. Weigh your marshmallow and record it’s weight.

**Step 2:** Have one partner **CAREFULLY** wash a thermometer and insert it into a marshmallow. You should try your best to insert it so the end of the thermometer is in about the middle of the marshmallow. Record the marshmallow’s starting temperature in the table.

**Step 3:** Have the other partner place a piece of chocolate onto the graham cracker square.

**Step 4:** While one partner **CAREFULLY** rotates the thermometer have the second partner use the hair dryer to heat both the marshmallow and chocolate. See diagram below.



Hair Dryer



Marshmallow

Graham Cracker & Chocolate

**Step 5:** Get your marshmallow hot! Ms. Lauder recommends 40°C or 50°C for optimal marshmallow gooiness! Once it’s hot record the final temperature and carefully remove it to make your s’more!

 **Step 6:** Repeat for Trial 2. Then proceed to Step 7.

|  |  |  |  |
| --- | --- | --- | --- |
| **Marshmallow Data:** | **Trial 1:** | **Trial 2:** | **Average****(Trial 1+ Trial 2) / 2** |
| Weight (g) |  |  |  |
| Initial Temperature T(i) °C |  |  |  |
| T(i) in Kelvin |  |  |  |
| Final Temperature T(f) °C |  |  |  |
| T(f) in Kelvin |  |  |  |

**Step 6:** The pieces of chocolate were 0.008 kg, and changed temperature by about 25°C. The energy put out by the hair dryer was 1875 J.

We are looking for the specific heat capacity or c of the chocolate.

We know Q = mc∆T. So, we rearrange to get c. So $c=\frac{Q}{m∆T}$

Q = 1875 J

m = 0.008 kg

∆T = 25°C or 298.15 K

$$c=\frac{Q}{m∆T}$$

Find c for the chocolate pieces.

**Step 7:** Take the average weights of marshmallows and convert them into kg.

1 g = 0.001 kg so to go from g to kg divide by 1000.

Average weight in g =

Average weight in kg =

**Step 8:** Same as you did for the chocolate pieces, find the average specific heat capacity of a marshmallow.

$c=\frac{Q}{m∆T}$ Q= 1875 J m = kg ∆T = T(i) – T(f)

 T(i) = °C or K

 T(f) = °C or K

 ∆T =

C = J / kg • K

**Step 9:** Hand in to Ms. Lauder and start on the learning menu!