Name _____ Date _____ Period_____

Engineering a Hot Air Balloon

Design Challenge

Purpose –Create a **working, smaller scale** hot air balloon.

Materials

1 - Small Garbage bag	1 meter String	Meter Stick	Hot Glue
4 - Straws	Tin foil	Tape	2 - Candles

Build a Model Hot Air Balloon

Procedure:

1. Use a meter stick to measure the length of the top of an open garbage bag in cm.

2. Creating a working hot air balloon is all about physics and ratios, so you need to be very careful with your calculations. To find the length the straws need to be, simply multiply the length of the top of the bag (cm) and multiply it by 0.7. Be careful, if the straws are too long or too short, your ratio will be incorrect and the hot air balloon will not work.

Top of Bag Length (opening) (cm)	Length of Straws
---------- X 0.7	= ----------

**The straws are part of the base for the hot air balloon and will keep the garbage bag open, therefore, after calculating the length of the straws, create 2 straw lengths that match exactly.

3. Connect the 2 straw lengths by crossing them to form a large "+" then use a piece of tape to keep them in place. Be careful adding too much tape will add weight and the hot air balloon will not fly.

4. In the center of the straws, "+", place a small piece of tinfoil and attach to the straw base using 2 small pieces of tape.

5. Take 2 birthday candles and cut them evenly in half, make sure on the new piece to uncover some of the wick (piece of string).

6. Put a dot of hot glue onto the tinfoil and place a candle on it. Do this for all 4 candles. When placing a hot glue dot, use the spaces between the straws otherwise it will melt. Place just enough for the candles to stick, add too much the balloon will not fly.

7. If the base is too heavy, the hot air balloon will not rise. To help reduce the weight of the base, try trimming off as much tinfoil and tape as possible.

8. Use 4 pieces of tape to connect the straw base to the garbage bag. **Make sure the candles are facing inside the garbage bag, just as the heat source does in a real hot air balloon.**

9. Tie a piece of string at the end of one of the straw ends (away from the candles) to hold the hot air balloon.

Test Model

Hot Air Balloon models will be tested outside. We will go out as a class to test.

Evaluate Model

Answer the following questions using complete sentences

10. What challenges did you have as a group?

11. Did the model work the first time? Explain Why

12. Why do you think it is important to have exact and careful measurements to make the hot air balloon prototype?

13. What happened to the garbage bag when the candles were burning? Explain why

14. What happened to the garbage bag when the candles were not burning? Explain why

15. How is energy being transferred between the gas molecules inside the garbage bag?

16. Explain why a hot air balloon can rise in the Earth's atmosphere.