Hot Air Balloon math calculation rubric

Name_____ Period_____ Date_____

The purpose of this rubric (worksheet) is to help you develop your math skills so that you can apply those skills in discovering the lift potential of your balloon.

Introduction: At the moment, your balloon is flat and looks like a rectangle with a tail. The balloon will change shape when it is filled with hot air. The new shape will be similar to a rounded pillow with a tail. To calculate the total volume of your balloon, you will use the formula for finding the volume of a cylinder ($v = \pi * r^2 * h$). To do this correctly, you must understand some of the symbols and terms used in this math formula.

Terms and symbol / letter definitions:
Circumference = the total distance around a circle.
Diameter = the measured distance of a straight line from one outer edge of a circle, passing through the center, and ending at the opposite outer edge of the circle.
h = height.
r = the radius of a circle. The radius is the distance from the center of the circle to the outer edge.
π = pi, with the math value of 3.14.
^ = this symbol means raised to and is followed by a number. For this rubric, the number will be 2. When you see ^2, it means squared, as in pi r squared using the little 2 above the r.
* between numbers means multiply.

Directions: To obtain all the required information for the formula, follow each step below and fill in the required data. Use an Ainch@ ruler for all measurements. ***List all measurements in inches.***

1. Determine the **height** of your balloon by measuring the distance from the bottom body corner (either one, or not the tail), to the top corner (on the same side as the bottom corner you started with).
Enter this data here: _____. List the answer in inches.

2. Determine the **circumference** of your balloon:
   A: **Measure** the **width** of your balloon from left side to right side. Place that measurement here: _____. List the answer in inches.

   B: **Multiply** the width of your balloon **by 2**. This is the circumference of your balloon. Enter this data here: _____. List the answer in inches.

3. Determine the **diameter** of your balloon. **Divide** the circumference **by 3.14** (pi/π).
Enter this data here: _____. List the answer in inches.

4. Determine the **radius** of your balloon. **Divide** the diameter by 2.
Enter this data here: _____. List the answer in inches.

5. Determine the **volume** of your balloon by using the following formula.
$V = \pi * r^2 * h$
Enter your data/formula setup here:
_____.
*A sample using fake balloon measurements: V = 3.14*11^2*30*
*V = 3.14*121*30*
V =11398.2

Enter your answer here: _____cubic inches
Show your math calculations below.

6. **Convert** your total cubic inch volume to **cubic feet volume**:
Divide your answer from #5 **by 1728.** (1728 is the number of cubic inches in a cubic foot)

Sample: 11398.2 ÷ 1728 = 6.596

Enter your data here: _____cubic feet.

7. Determine the **weight** of your balloon. Weigh your balloon using the metric gram scale provided. Enter this data here: _____.

8. Convert the gram weight of your balloon to ounces. **Multiply** the answer from #7 **by .0353**. *Sample: 57 * .0353 = 2.0121 oz.*
Enter this data here: _____oz.
You can now determine the lift potential of your balloon. 1 cubic foot of air, heated to 127 degrees Fahrenheit, can lift approximately 1/4 (.25) of an ounce.

9. Determine the **lift potential** of your balloon. **Multiply** the volume (number of cubic feet in step #6) **by .25.**
*Sample: 6.596 * .25 = 1.649 ounces of lift potential.*
Enter your data here: _____.

10. Compare the weight of your balloon to the lift potential. **Subtract** the weight of your balloon from the lift potential to see if your balloon will possibly fly. The weight of your balloon should be LESS than the lift potential.
Enter your data here: _____.

NOTE! **Your grade does not depend upon your balloon being able to fly.**