Balloon Rockets

Rockets use Newton's third Law of Motion to propel them. The balloon rocket is powered by escaping air using Newton's Third Law. It's motion is determined by Newton's First and Second Laws.

Hypothesis: Newton's Laws of Motion can be used to explain a rocket's motion because Newton's Laws explain all aspects of motion.

Materials:
Three (3) balloons of different sizes and shapes
Drinking straws
String
Tape
Meter stick
Stopwatch
Calculator

Procedure:

1. Following the teacher's directions, run a string across the classroom to make a rocket path. One person will need to tightly hold the other end of the string to make a rocket track.
2. Blow up the balloon but don't tie it closed. Carefully tape the straw lengthwise on the balloon.
3. Thread the loose end of the string through the straw with the open end of the balloon pointing toward the loose end of the string.
4. Line up the starting point with the front of your balloon.
5. The person holding the stopwatch says "Go" and starts the stopwatch as the person holding the end of the balloon lets go.
6. Stop the stopwatch when the balloon stops. Record the time to the nearest 100^{th} of a second in the appropriate data table.
7. Measure the distance the balloon traveled in centimeters (cm) and record the distance in the appropriate data table. (Measure from starting point to front of balloon stop)
8. Repeat steps 3 through 6 two more times with the same balloon.
9. Repeat steps 2 through 7 with your second balloon of a different size and shape.
10. Repeat steps 2 through 7 with your third balloon of a different size or shape than your first or second balloon.
11. Calculate the average speed for each trial and then the overall average speed for each of the three balloon rockets.

Data: <u>Don't forget to label your numbers with the correct units.</u>

First Balloon used: _____

First Balloon	Trial #1	Trial #2	Trial #3	Totals/Overall
Distance				
Time				
Average Speed				

1. Add together the three distances from your trials to obtain your total distance.
2. Add together your three times from your trials to get your total time.
3. Now use the formula: Average speed = Total distance) total time to calculate your overall speed.

Second Balloon used: _____

Second Balloon	Trial #1	Trial #2	Trial #3	Totals/Overall
Distance				
Time				
Average Speed				

Third Balloon used: _____

Third Balloon	Trial #1	Trial #2	Trial #3	Totals/Overall
Distance				
Time				
Average Speed				

Questions:

Answer the following questions on a separate piece of paper. You must answer the questions using complete sentences. Thorough explanations are required.

1. Compare and contrast the distances traveled by your balloon rockets. Which balloon rocket went the greatest distance? Which balloon rocket went the least distance?
2. Compare and contrast the average overall speed for each balloon rocket. Which balloon has the greatest average speed? Which balloon has the least average speed?
3. What aspects of these balloons rockets made them travel far and fast?
4. Using the information you know and have reviewed about forces, draw a diagram showing all the forces acting on the balloon rockets.
5. Use Newton's Three Laws of Motion to explain the motion of a balloon rocket from launch until it comes to a stop.

Conclusion: Write a conclusion for Part 1 of this experiment. (Remember: Your first sentence should correspond with your hypothesis. Your explanation should tell how you know that your first sentence is true.)