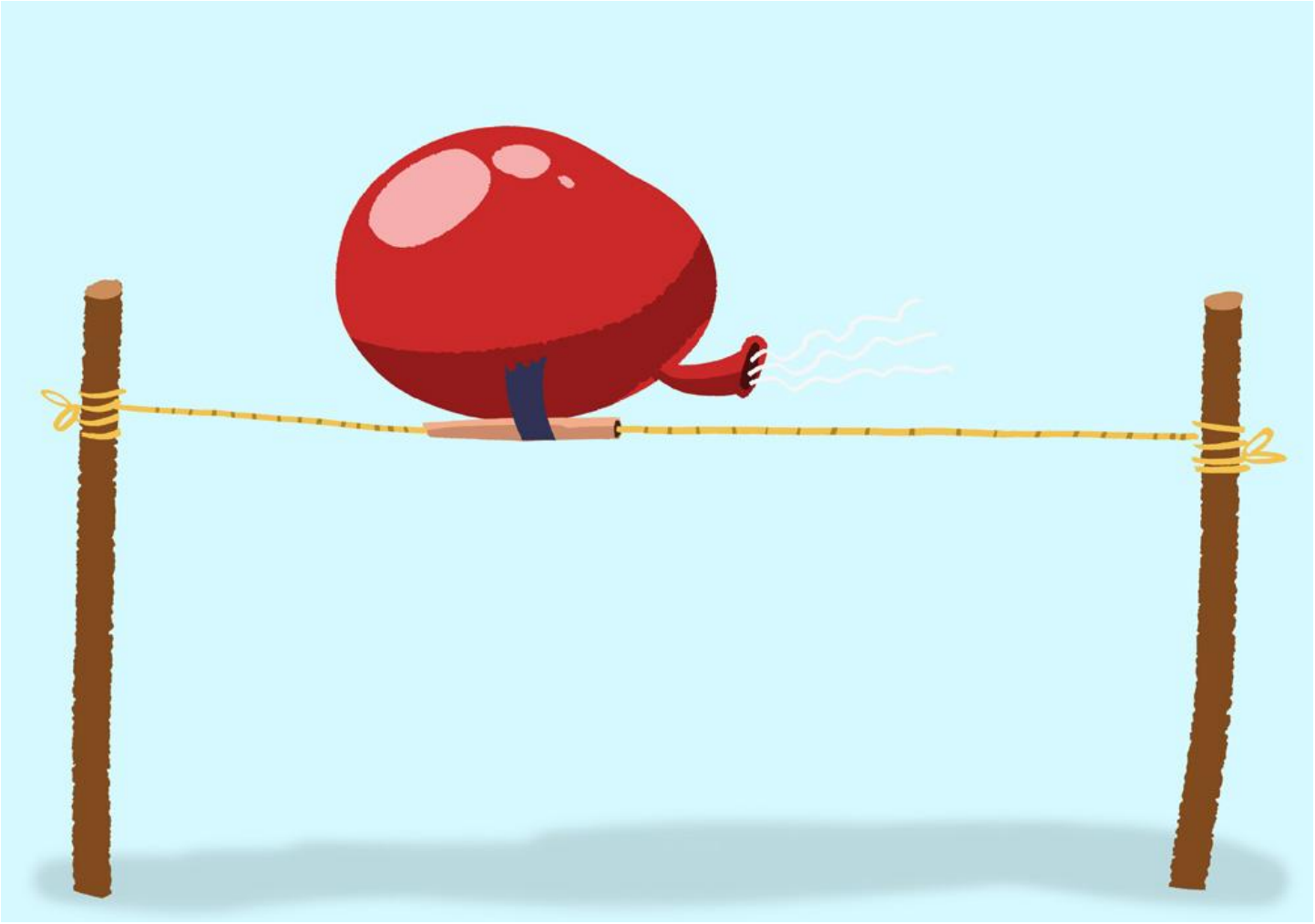

Balloon Rocket Lab Activity

Name:

Date: **Pd:**

Other team members:

Balloon Rocket Lab

Objective:

- How can we use a balloon to design and build a rocket that moves from one side of the room to another along a filament wire?
- To identify and observe Newton's three laws
- To observe how mass affects both speed and distance travelled.
- To gain experience in calculating speed of an object.

Materials:

Stopwatch	*Ziploc bag*	*Clothes pin/clip*	*"Weight A"*
Meter stick	*Balloon*	*Drinking straw*	*"Weight B"*
Clip board	*Tape*	*String*	*Calculator*

Mass of Balloon Rocket = 14grams Weight A = 10 paper clips (10grams) Weight B = 30 beans (20grams)
$g = 9.8\ m/s^2$ Height =1.5m Speed in this case is = velocity

Formulas: **v= distance/time** **K.E. = ½ mv^2** **P.E. = mgh**

Procedure:

1. Thread the straw through the string then run the string between two points in the room to make a path for your balloon rocket. (Between two chairs or two sinks). Should be a few meters in length. *Be considerate—there are several other groups in the class.*
2. Tape the Ziploc bag to the straw – *make sure you can still open it.*
3. Blow up the balloon but don't tie it closed – hold it closed or clip it with a clothespin.
4. Carefully tape the straw lengthwise on the balloon.
5. Line up the starting point with the front of your balloon.
6. To run a trial:
    a. The person holding the stopwatch says "Go" and starts the stopwatch as the person holding the end of the balloon lets go.
    b. Stop the stopwatch when the balloon stops. Record the time in your data table.
    c. Measure the distance the balloon traveled in centimeters (cm) and record the distance in the appropriate data table. (Measure from starting point to where front of balloon stops)
    d. Re-inflate balloon for next trial
7. Repeat steps a – c four more times with the same balloon – be sure to inflate your balloon to the same size each time.
8. Add "weight A" to the Ziploc bag. Then repeat a-c. Record data in second data table.
9. Add "Weight B" (both weights will be in the bag) and repeat steps a-c
10. Calculate the average speed for each trial and then the overall average speed for each of the six balloon rockets.
11. Using the values in your data table, calculate the kinetic energy, and potential energy. (Determine the average when finished.)

Results: Balloon Rocket Lab Data Tables

1st Balloon

v= distance/time K.E. = ½ mv^2 P.E. = mgh

Trials	Time (sec)	Distance (cm)		Speed (cm/s)	Kinetic Energy (J)	Potential Energy
Trial #1						
Trial #2						
Trial #3						
Trial #4						
Trial #5						
Average						

1st Balloon with "Weight A"

v= distance/time K.E. = ½ mv^2 P.E. = mgh

Trials	Time (sec)	Distance (cm)		Speed (cm/s)	Kinetic Energy (J)	Potential Energy
Trial #6						
Trial #7						
Trial #8						
Trial #9						
Trial #10						
Average						

1st Balloon with "Weight A" and "Weight B"

v= distance/time K.E. = ½ mv^2 P.E. = mgh

Trials	Time (sec)	Distance (cm)		Speed (cm/s)	Kinetic Energy (J)	Potential Energy
Trial #11						
Trial #12						
Trial #13						
Trial #14						
Trial #15						
Average						

Conclusion

Answer the following questions about your Balloon Rocket. You must answer the questions using complete sentences. Thorough explanations are required.

1. Explain how you were able to get the balloon to move across the room.
   a. Pushed it b. Air pressure c. It exploded

2. Which balloon rocket went the greatest distance?
   a. Balloon 1 b. Balloon 1 w/weight a c. Balloon 1 w/weight a & b

3. Which balloon rocket went the least distance?
   a. Balloon 1 b. Balloon 1 w/weight a c. Balloon 1 w/weight a & b

4. Which balloon has the greatest average speed?
   a. Balloon 1 b. Balloon 1 w/weight a c. Balloon 1 w/weight a & b

5. Which balloon has the least average speed?
   a. Balloon 1 b. Balloon 1 w/weight a c. Balloon 1 w/weight a & b

6. Identify which factor has the greatest affected on the speed of each rocket
   a. Number of pumps b. Weight a c. Weight a & b

7. Identify Newton's first law?
   a. For every action there is an equal but opposite reaction
   b. Force is equal to mass of the object TIMES acceleration
   c. Object at rest remains at rest; an object in motion will remain in motion unless acted upon by an outside force.

8. Identify Newton's second law?
   a. For every action there is an equal but opposite reaction
   b. Force is equal to mass of the object TIMES acceleration
   c. Object at rest remains at rest; an object in motion will remain in motion unless acted upon by an outside force.

9. Identify Newton's third law?
   a. For every action there is an equal but opposite reaction
   b. Force is equal to mass of the object TIMES acceleration
   c. Object at rest remains at rest; an object in motion will remain in motion unless acted upon by an outside force.

Results: Balloon Rocket Lab Data Tables

2nd Balloon

Trials	Time (sec)	Distance (cm)	Speed (cm/s)	Kinetic Energy (J)	Potential Energy
Trial #16					
Trial #17					
Trial #18					
Trial #19					
Trial #20					
Average					

2nd Balloon with "Weight A"

Trials	Time (sec)	Distance (cm)	Speed (cm/s)	Kinetic Energy (J)	Potential Energy
Trial #21					
Trial #22					
Trial #23					
Trial #24					
Trial #25					
Average					

2nd Balloon with "Weight A" and "Weight B"

Trials	Time (sec)	Distance (cm)	Speed (cm/s)	Kinetic Energy (J)	Potential Energy
Trial #26					
Trial #27					
Trial #28					
Trial #29					
Trial #30					
Average					

Conclusion

Answer the following questions about your Balloon Rocket. You must answer the questions using complete sentences. Thorough explanations are required.

10. How can you increase the Kinetic Energy of the balloon rocket?

11. What happens to the potential energy from the point of release to when it stops?

12. How did your rocket compare to other groups?

13. Was it faster, slower, more kinetic energy?