FLINN SCIENTIFIC

Name____

Experiment 1: Balanced and Unbalanced Forces Worksheet

Data Table

Distance between starting line and finish line: _________________

Mass of Hall's carriage: ________________

Hanging mass: ________________

Inclined Plane Angle	Time			
	Trial 1	Trial 2	Trial 3	Average
0°				
15°				
30°				
45°				
60°				

Post-Lab Questions *(Use a separate sheet of paper to answer the following questions.)*

1. Calculate the average time for each trial. Record this information in the Data Table.
2. Calculate the average carriage speed for each inclined plane angle.
3. What forces acted on the carriage? *(Optional)* Draw a free-body diagram depicting the forces acting on the carriage.
4. During the timing measurements, did the carriage move with the same speed throughout the entire length of the inclined plane?
5. If the speed of the carriage changed, what does this say about the forces acting on the carriage?
6. What happened when the inclined plane angle was at 45°? What does this say about the forces acting on the carriage?
7. What happened when the inclined plane angle was at 60°? Explain why this occurred.
8. When the forces acting on an object are balanced, can the object be moving? Explain.

Name____

Experiment 2: Friction Blocks Worksheet

Data Table A

Object	Tested Block Surface	Tested Surface	Static Frictional Force (N)	Sliding Frictional Force (N)
Wood Block	Flat	Tabletop		
Wood Block	Edge	Tabletop		

Data Table B

Weight added to Wood Block	Static Frictional Force (N)	Sliding Frictional Force (N)
0 Newtons (initial)		

Post-Lab Questions *(Answer on a separate sheet of paper.)*

Part A: Frictional forces versus surface area

1. Does it take more force to start an object sliding over a surface or to keep it sliding at a constant speed?
2. How do the frictional forces between the two different experiments compare? What influence does the surface area have on the frictional force? Why?

Part B: Frictional forces versus Normal force

3. Draw a graph of static frictional force versus Normal force, using the information in Data Table B. Draw a "best fit" line through the data points.
4. Does the data produce a straight "best fit" line? If yes, what does the slope of the line represent?
5. On the same sheet of graph paper, draw a graph of the sliding frictional force versus Normal force, using the information in Data Table B. Draw a second "best fit" line through this data. Use a different color pen or pencil to distinguish between the two sets of data.
6. Does this data produce a straight "best fit" line? If yes, what does the slope of this line represent?
7. Determine the coefficients of static friction and sliding friction between the wood block and the tabletop from the corresponding graphs. Refer to Equation 1.

Name____

Experiment 3: Bungee Jump Worksheet

Data Table

Unstretched elastic band length (*UL*)	
Mass (m_u)	
Stretched elastic band length (x_u)	
Calculated spring constant of elastic band (k)	
Mass of egg and basket (m_e)	
Egg basket length (*BL*)	
Platform height (*PH*)	
Separation distance (d)	
Total height of the jump (h)	
Calculated stretch distance of elastic band (X)	
String length (*SL*)	

Calculations

Observations

Did the egg survive? Was it an “exhilerating” jump?

Sources of error.

Name____

Experiment 4: Ring and Discs Worksheet

Data Table

Object	Mass	Time			
		Trial 1	**Trial 2**	**Trial 3**	**Average**
Disc, 3.5					
Ring, 3.5					
Disc, 5					

Prediction:

Post-Lab Questions

1. How did the motion of the 5   diameter disc compare to your prediction?

2. Which round object(s) rolled down the inclined plane the fastest?

3. Was mass an important factor for the speed of the rolling objects down the inclined plane? Explain.

4. What physical property made the speed of the rolling objects different?

Name________________________________

Experiment 5: Collisions in One Dimension Worksheet

Data Table

Stationary Ball Bearings	Colliding Ball Bearings	Colliding Speed	Observations
3	1	Slow	
3	1	Fast	
3	2	Slow	
3	2	Fast	

Post-Lab Questions *(Answer on a separate sheet of paper.)*

1. What type of collision did the ball bearings experience—elastic or inelastic? Explain.
2. What happened to the colliding ball bearing(s) after the collision?
3. How did the number of stationary ball bearings affect the collision results?
4. How did the speed of the colliding ball affect the speed and number of ball bearings knocked away?
5. How did the number of colliding ball bearings affect the number of ball bearings knocked away?
6. *(Optional)* If the colliding ball bearings had more mass than the individual stationary ball bearings, how would this affect the results of the collisions? *(Would more ball bearings be knocked away? Fewer? Would the colliding ball bearing stop after the collision? How would the speed of the balls that are knocked away be affected?)*