Part 1:

Forces Simulation

- **Make it “Public on the Web”**
- **Do Not Share this document with Ms. D link it to your Unit 2 website.**

Part 1: Tug of War

Procedures:

1. Click Here to go to the Motion and Forces Simulation Webpage
2. Click on the “Run Now” button
3. Click the “Open with Java Web Start” button
4. You are now ready to begin
5. Spend 2-3 minutes playing with the simulation to learn how it works.
6. Click on the “Sum of Forces” and “Values” boxes.
7. Create 3 Situations:
    a. Balanced Forces
    b. Unbalanced Forces to the left
    c. Unbalanced Forces to the right
8. Using the Snipping Tool, take a screenshot of each situation and insert the picture below.

Results/Screenshots:

Insert screenshot of Balanced Forces
Insert screenshot of Unbalanced Forces to the left
Insert screenshot of Unbalanced Forces to the right

Part 2: Friction

Procedures:

1. Click Here to go to the Motion and Forces Simulation Webpage

2. Click on the “Run Now” button
3. Click the “Open with Java Web Start” button
4. When the program has started, click the “Charts” button
5. You are now ready to begin
6. Click on the “Friction tab”
7. Spend 2-3 minutes playing with the simulation to learn how it works.
8. When you are done playing, press the “Reset” button
9. Click on the “Sum of Forces”, “Values”, and “Masses” boxes locate at the top right of the screen
10. Place 100kg worth of object(s) on the ground.
11. Using the Sliding Applied Force, find the minimum force to move the object(s) (Sum of forces =1N)
12. Record the amount of force here: __260ish_____
13. Press the “Reset” button
14. Click on the “Sum of Forces”, “Values”, and “Masses” boxes locate at the top right of the screen
15. Now, come up with 2 different situations so that the robot will use **LESS** force to move the object(s).
16. Record what changes you made and the amount of force it took to move the object(s)
17. Now, Repeat Steps 8-11, but this time come up with 2 different situations so that the robot will use **MORE** force to move the object(s).

Data Table 1

The change you made to use LESS Force	Amount of Force to move the object (N)
Describe change #1 here	
Describe change #2 here	

Data Table 2

The change you made to use MORE Force	Amount of Force to move the object (N)
Describe change #1 here	
Describe change #2 here	

Part 3: Friction (Maximum Speed)

1. Click Here to go to the Motion and Forces Simulation Webpage
2. Click on the “Run Now” button
3. Click the “Open with Java Web Start” button
4. When the program has started, click the “Charts” button

5. You are now ready to begin
6. Click on the “Sum of Forces”, “Values”, “Masses”, and “Speed” boxes locate at the top right of the screen
7. Place the 80kg man on the ground.
8. Type 500 Newtons into the Force Box
9. Press the Play button
10. Observe how long it takes to reach maximum speed. If you have a stopwatch, time how long it takes to reach maximum speed. Record the time here: _____
11. Now, come up with 2 different situations so that it takes **MORE** time to reach maximum speed. **In each situation the applied force MUST be 500 Newtons**
12. Record what changes you made in the data table below and if you timed it, record the time it took to reach maximum speed
13. Now, come up with 2 different situations so that it takes **LESS** time to reach maximum speed that you observed in step 5 . **In each situation the applied force MUST be 500 Newtons**
14. Record what changes you made in the data table below and if you timed it, record the time it took to reach maximum speed

Data Table 1

The change you made to reach Maximum Speed Slower	Time to reach Maximum Speed (sec)
Describe change #1 here	
Describe change #2 here	

Data Table 2

The change you made to reach Maximum Speed Faster	Time to reach Maximum Speed (sec)
Describe change #1 here	
Describe change #2 here	

Conclusion

Using the results from the simulator, apply this knowledge to the car project. Complete these two sentences:

- To build the FASTEST balloon powered car, I need to ……..

- To build the LONGEST DISTANCE balloon powered car, I need to …....

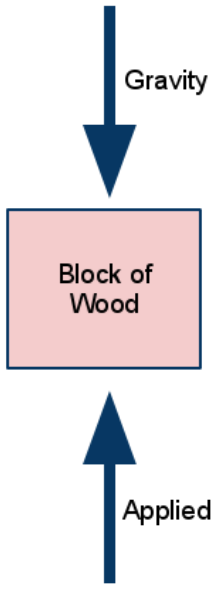
Part 2: Force Arrow Diagrams

Experiment Objectives:

- Identify the types of forces affecting the objectives
- Identify what happens to the motion of the objects
- Be able to draw force arrow diagrams

Procedures:

1. Using the different objects inside your white bucket, create different situations that include the forces that affect your objects
2. You must create situations where each type of force is used at least twice. You can create more but **YOU MUST CREATE EACH TYPE OF FORCE TWICE.**
3. You may use more than one force in each experiment. The more forces you create in one experiment, the better.

Experiment	**Type of Force(s) in your experiment**	**For each force, identify which object is pushing or pulling the other object**	**Force Arrow Diagram** (Be careful to draw your arrows the correct length)
Wooden block sitting on the table	• Applied Force • Gravity	**Applied**: The table is pushing up on the wooden block **Gravity:** The Earth is pulling down on the wooden block	

Add more rows if you need it			

Remember to delete all teacher instructions in red when you are finished.