STUDENT HANDOUT

Student Name: _____

1 What changes did you notice before and after the tire was pumped up?

2 How do you think these changes are related to the particles inside the tire?

3 If you noticed a change in temperature, what do you think caused this?

4 Make Predictions:
What will happen when we compress the air inside the apparatus? Will the result be different if we compress slowly vs. quickly? Will the amount of cotton affect the success of ignition?

5 What do you think was the starting temperature of the air in the tube?

6 How hot do you think it would have to get to ignite the cotton?

7 Why doesn't slow compression of the piston cause the cotton to ignite?

8 Summarize what you have learned, then revisit your predictions in **4** about the fire syringe. If you were not correct write a revision at the end of your lab report.

What is a Fire Syringe?

1. A fire syringe is a piston-and-cylinder device with a thick-walled transparent cylinder fitted with a metal piston which can travel within a short distance of the bottom of the cylinder. It is used to demonstrate compression ignition.

2. Compression ignition is demonstrated by placing a small piece of cotton at the bottom of the fire syringe and then plunging the piston forcefully into the cylinder. The cotton will burst into flame due to the rapid rise in temperature which accompanies the sudden reduction in volume (and increase in pressure) of the air beneath the piston.

3. The energy provided by the arm muscles working to compress the air is transferred into the much reduced volume of the air during compression and manifests itself as heat energy sufficient to ignite the tinder.

4. Compression ignition is the principle underlying the operation of a Diesel engine.

Fire Syringe Operating Instructions

1. Pull out the syringe and place a small piece of cotton at the bottom of the tube, approx 5mm.

2. Gently re-insert syringe so it just enters the mouth of the piston chamber

3. Place unit base on flat, stable 3. surface and push syringe straight down with force and speed. You will see a flash of fire which will last as long as there is oxygen present in the tube.

ATTENTION: The downward 4. force required along with the pressure built inside the tube can cause damage to the handle or tube if the syringe is not pushed straight down.