Popcorn and heat

Name:

Partner:

Objective:
Examining the relationship between the time it requires to pop a kernel with the distance away from the flame (heat).

Safety issues:
- The safety concerns associated with this activity are no different than those at a wiener roast.
- We are dealing with Bunsen burners, which means flammable gas, and open flames.
- We should also remind our students of the nature of conductors, specifically heat conductors such as the metals used in the manufacture of the ring stands, iron rings, and wire gauze.
- Because we are heating up either popcorn or match heads to the point where they will either pop or combust, it is necessary that students observe proper lab safety protocol, and always wear their goggles (my general rule is that a student is asked to leave the lab if they don't wear their goggles after one warning).

Materials**:**

Bunsen burner	Iron ring	Pop corn cornels or match heads	Tinfoil
Sparker	Ring stand	Goggles	Beaker
Wire Gauze	Stop watch	Water	Ruler	Gloves

Procedure:

1. Put safety goggles on
2. Build a Bunsen burner setup
3. We will be testing the heat of the flame with respect to the height above the flame.
   Try to have a steady flame with the proper colour and measure 5 different heights above the flame.
4. Start with your first height (ex. 3 cm) by aligning your ring and wire gauze 3 cm above the flame. The ring should be away from the flame when measuring.
5. Create an aluminum foil "boat", where you can place your kernel on top of the wire gauze.
6. Place 1 kernel inside the boat and place the boat on top of the flame and start your timer
7. Record the time required for the kernel to pop. After the kernel has popped, quickly dip your ring and wire gauze in a room temperature water bath to 'reset' the temperature.
8. Repeat 5 runs for EACH height. You should have 25 readings in total.
9. If there is time remaining, test the effects of the blue flame vs yellow flame at the same height.

Data**:**

Table 1: Data collected

Height	Time Trial 1	Time Trial 2	Time Trial 3	Time Trial 4	Time Trial 5	Average Time
Height 1 ( )						
Height 2 ( )						
Height 3 ( )						
Height 4 ( )						
Height 5 ( )						

Draw a properly labeled graph showing the relationship between the average time requires to pop a kernel to height.

Discussion:

1. Describe the (mathematical) relationship between time it requires to pop a kernel and distance from the Bunsen burner as observed in your investigation:

2. Based on the flame you used for your inquiry, estimate the time it requires to pop a kernel 30 cm away from a lit Bunsen burner.

3. Why is heat needed to pop a kernel? Explain the process in how a kernel pops with heat chemically.

4. Would the results of the inquiry be any different if you had displaced the cornels horizontally from the flame instead of vertically? Explain your answer.

5. List and explain any potential sources of error that could attribute to erroneous results in your experiment?

6. If you could change the experiment and the procedure to make the experiment more precise, what would it be?