

# DAY 1: Burn Baby Burn

*\*Adapted from [algebralab.org](http://algebralab.org)*

## **Materials**

*Copies:* 1.1 Burn Baby Burn  
Ticket Out the Door Day 1

*Supplies:* Rulers that measures height in centimeters (1 per group of 3)  
2.5 inch birthday candle (1 per group of 3)  
matches (for teacher ONLY)  
candle holder (a paper plate with small piece of play-doh to keep the candle in place) (1 per group of 3)  
stopwatch (1 per group of 3)  
pitcher of water (for a safety measure)

## **Objective:**

Students will conceptually understand slope,  $x$  and  $y$  intercepts, domain & range by relating the terms to real world data collected & analyzed by measuring the height of a burning candle over time.

## **Student Talk Strategy**

Report to a Partner for 1.1  
Think-Write-Group-Share for 1.1  
Inside-Outside Line for 1.1

## **Academic Language Use**

trend line - Straight or curved line that indicates the general pattern or direction of data

$y$ -intercept- The coordinate point where the graph of the line passes through the  $y$ -axis. In the context of patterns, the  $y$ -intercept is the “starting point” or “step zero” meaning the value of  $y$ , when  $x = 0$ .

$x$ -intercept- The coordinate point where the graph of the line passes through the  $x$ -axis. The  $x$ -intercept is the value of  $x$ , when  $y = 0$ .

Domain- Set of all  $x$  input values that “make sense” or will “work” for the function.

Range- Set of all possible resulting  $y$  values after substituting in the  $x$  values of the domain.

## **Burn Baby Burn**

### **Part 1- Measure, Record, & Graph Data (25 minutes):**

Put the students into groups of three. Pass out activity sheet 1.1 to each student. Then, to each group of three pass out a ruler, candle, paper plate with a small piece of play-doh, and a stopwatch. While materials are being passed out, instruct students determine each person’s role in group by choosing one of the following jobs: 1) recorder (records the data in the t-table), 2) ruler holder & timekeeper (holds the ruler up parallel to the candle and keeps time, and 3) candle watcher/measurer (dictates to the recorder the height of the candle at each 30 second interval).

As a whole group, show the students how to place the candle into the play-doh so the candle is standing upright. Then have each group measure the height (in *cm*) of the candle excluding the length of the wick. There will be some decimals. Write the height of the candle before lighting in the t-table as a coordinate point (0,\_\_\_). Light the demonstration birthday candle and show students how to carefully hold the ruler next to the candle, measuring its' height in centimeters every 30 seconds for 5 minutes. For each height measurement (including starting height), exclude the wick when measuring. The recorder will record the data in the table provided on 1.1. Explain to students that they need to be consistent in the way they determine the height at each interval. For example, at times while the candle is burning, there will appear to be "puddle" of melted wax while the candle burns. The candle watcher/measurer needs to always take the measurement at the top or bottom of the puddle.

Question students to be sure they understand the directions. Ask, "Does everyone know their job?", "How often do we measure the candle?", "Where do we put the data?" etc. Warn students that the 30 seconds comes and goes quickly so everyone needs to be paying close attentions once the candle is lit. Once students are ready go, around to each group and light each group's candles. After 5 minutes, the measuring will stop and the candle needs to be blown out.

Once all groups have finished measuring, bring the class together to get started on graphing the data points by asking a group recorder to share their first couple data points in their table. Model for students on the document camera how to correctly plot the points. The data will vary among groups. Time permitting, ask students to turn report to a partner their thoughts on why the data between groups may be different; then share out. Then have students continue to plot their remaining points on their own page, working with their group.

### **Analyzing the Data (30 minutes):**

#### **Part 2 – Writing an Equation:**

Guide students to select two points on their line. It is easiest (but not necessary) to pick points that use whole numbers). Model how to make a slope triangle (warning – be sure to show students how the graph is scaled in order to find the slope accurately when drawing the slope triangle. Be explicit about what the slope means (i.e.- most likely the

equation will roughly be  $y = -\frac{1}{2}x + 6$  or for every 2 minutes the candle burned 1 *cm*

burned or  $y = -.5x + 6$  for every 1 minute the candle burned .5 *cm* burned ). Use a think-write-group-share for question 1b. Set the timer for 30 seconds allowing students to think quietly to themselves and then write down their answer. When the 30 seconds are up, allow the students to talk with their group about their responses. Continue to do the same for 1c and 1d. Before starting on 2a and 2b (making predictions), guide students through drawing a trend line through their points (be sure to have the line extend into additional quadrants). Discuss the term trend line and add it to the word wall. The big idea here is to review what they have already focused on in the Linear A & B units (slope & *y*-intercept) as well as make some connections & predictions about the *x*-intercept (a focus in this Linear C unit). As you progress through Part 2, put up the word wall pages for the *x* and *y* intercepts.

### Part 3 – Domain & Range:

Continue to use think-write-group-share to answer the remaining questions. The big idea here is to tie domain and range to the activity so that students can attach meaning to these concepts. For letter d) Describe the **domain** of a function in your own words – stop and explain that domain describes the possible values for  $x$ . Put the word “domain” on the word wall. For letter g) Describe the **range** of a function in your own words - stop and explain that range describes the possible values for  $y$ . Put the word “range” on the word wall. Time permitting, use these two questions (d & g) for inside-outside line. Number off students by 1’s and 2’s. All the 1’s line up to face the 2’s. The 1’s will describe to the 2’s the meaning of the word domain, the 2’s will describe to the 1’s the meaning of the word range. After about 1 minute, one line will then rotate so that each person has a new partner. Continue this for 3-4 rotations.

### **Ticket out the Door (5 minutes):**

Pass out the Ticket out the Door and have the students raise their hands when finished (so that you can check it and then dismiss them).