



Skills Challenge: Matchstick Rangeland

(Adapted from Forest Service Fire Trunk Activities. You may choose to have each student create a rangeland or work in teams.)

Time: 30-45 minutes

Supplies: Supplies for 1 matchstick rangeland

- 30 wooden matches, toothpicks, or short pieces of wheat straw
- 1 craft Styrofoam block (about 6x6x1")
- 1 aluminum baking pan large enough to place foam block in bottom
- 1-2 water-filled spray bottle
- 1 watch/clock with a second hand
- Hot pads/oven mitts
- Newspaper and scissors
- Safety goggles or eye glasses
- Fire Extinguisher, large bucket of water, and/or access to a hose

**This can be done as a demonstration for younger audiences.
IT MUST BE SUPERVISED BY THE TEACHER**

Do:

- Review Safety Procedures
- Have each student/team build one of the following rangelands:
 - **Rangeland 1:** Build a matchstick rangeland on a flat slope
 - **Rangeland 2 and 3:** Build a matchstick rangeland on a 20 degree slope (ignition will vary)
 - **Rangeland 3:** Build a matchstick rangeland on a 40 degree slope

Detailed instruction for building a matchstick rangeland:

1. Place aluminum pans on a heat resistant surface (sidewalk, table, etc.)
2. Place the Styrofoam board in the aluminum pan to create a base for the rangeland (you can cover your Styrofoam board with aluminum foil if you plan to do this more than once)
3. Place the untreated ends of the unlit matches into the boards so the tips are about ½ inch apart. (You can also use toothpicks and/or straw for this step).

For round 1, the same amount of matches (density) should be used in each of the rangelands. Round 2 is described under the "optional" section below.
4. Establish the slope of the matchstick rangeland (to create the slope, find a rock, or piece of wood, etc. to put under one side of the Styrofoam board):
 - Rangeland 1 should be flat
 - Rangeland 2 and 3 should be elevated about 20 degrees (~3-4 inches)
 - Rangeland 4 should be elevated about 40 degrees (~6 inches)
5. Once all have been set-up, bring students together and discuss the next step.
6. Ask students to look at the set-up and predict how and why fire behavior will differ among them based on how they are ignited (write hypothesis in lab book or notebook). Remind them that any inaccurate predictions are celebrated because it shows participants are learning something new.

7. Ignition:
 - Rangeland 1: light the edge row of matches
 - Rangeland 2: light the matches at the bottom edge of the slope
 - Rangeland 3: light the matches at the top of the slope
 - Rangeland 4: light the matches at the bottom edge of the slope
8. Assign one student to be the timekeeper (they will say go when you are ready to ignite the matchstick rangeland) and will stop the timer when there is no longer fire.
9. Light one pan at a time so all students can observe what happens to each model. When the timekeeper says “go,” light one row of matches. All students should record the following observations about fire behavior:
 - Density (number) of the fuel (matches)
 - Topography (slope)
 - Point of ignition (i.e., bottom or top of the slope)
 - Time to burn
 - The density of unburned matches
 - Any other observations to explain fire behavior

Apply:

After all the rangelands have been set on fire, have the team members share their observations of different fire behavior.

Discussion Questions:

- How did the slope affect each fire’s spread?
- How well did fire burn downhill?

Optional: After you have completed the activity, have students create their own scenarios. For example, students could adjust how matchsticks are placed (perhaps there has been a fuels treatment that removed sagebrush (i.e., matchsticks) from a portion of the rangeland). Perhaps there are invasive annual grasses creating a continuous fuel load (e.g., this can be mimicked using shredded newspaper or dried plants). Students may want to adjust the ignition source (e.g., unsupervised campfire), or perhaps they will use grazing to create a fuel break. The possibilities are endless.