

Elasti-Launcher: Mission to Mars

Team Members: _____

Mission Date: _____

Directions:

- A. Your teacher will give you a piece of clay with a specific mass. You will perform a total of 20 test launches and record the data from each launch. You must perform 10 launches with the mass added to your rocket, and 10 launches with no added mass.
- B. After completing the 20 test launches, your teacher will place "Mars" at a specified distance from your Elasti-Launcher. Write down this Distance to Mars in the Mission Data box.
- C. Your teacher will collect the first two pieces of clay give you a third piece of clay. Add this new clay to your rocket and write down the mass of this rocket.
- D. Analyze your test launch data and decide upon the Angle and Power for your Final Launch Settings.
- E. Explain your reasoning for selecting your Final Launch Settings.
- F. Launch your rocket at Mars using your Final Launch Settings and record the Impact Distance.

Test Launch Data

| | Mass (g) | Angle (°) | Power Setting | Distance |
|----|----------|-----------|---------------|----------|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |
| 16 | | | | |
| 17 | | | | |
| 18 | | | | |
| 19 | | | | |
| 20 | | | | |

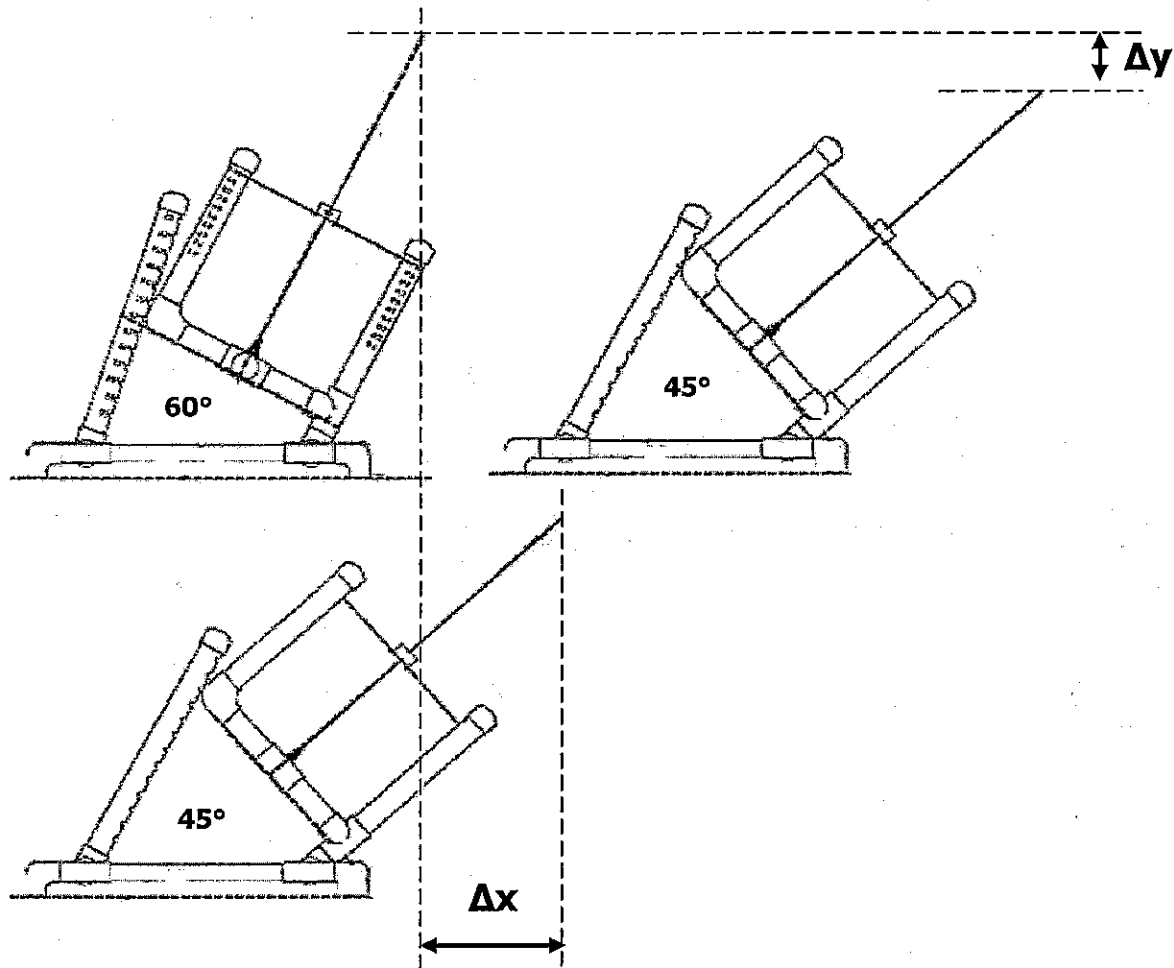
Mission Data

| | | | | |
|---|-------|--------|--------|------------------|
| Distance to Mars: | | | | |
| Final Launch Settings: | Mass: | Angle: | Power: | Impact Distance: |
| Explanation for Final Launch Settings: | | | | |

Perceived Error Source – True Launch Point

Students may notice some discrepancies in their results, especially if they test many different launch angles. They may have already learned that a launch angle of 45° should yield maximum range. Here, for low launch speeds, the longest range may appear to result from the 35° launch angle! This discrepancy is caused by the launcher design. Students can find the error source with careful observation.

Examine these diagrams of the launcher at two different angles.



Notice that when the launcher is adjusted from 60° to 45° , the launch point at the end of the rod moves down by a distance Δy and forward by distance Δx .