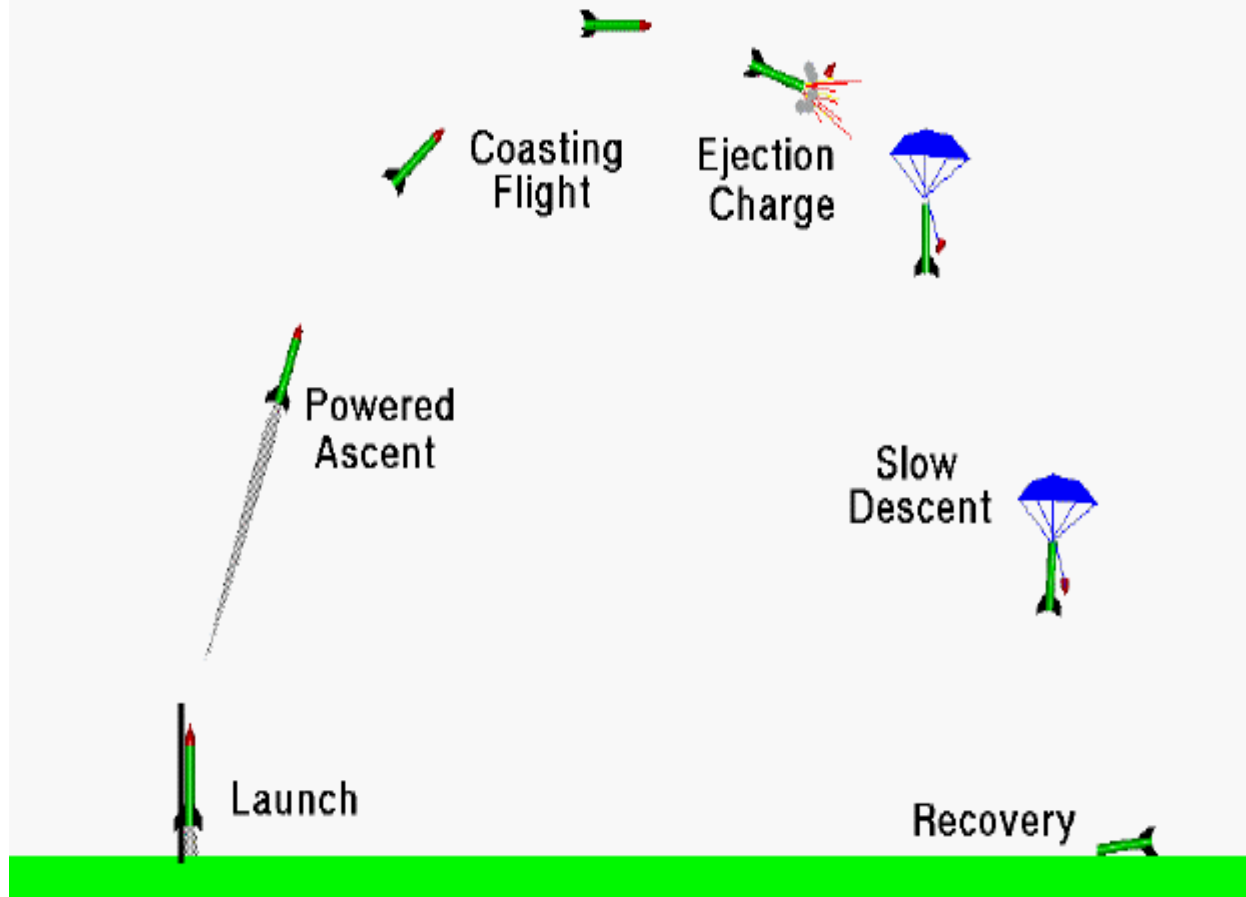


BOTTLE ROCKET LAUNCH LAB REPORT



Flight of a Model Rocket

Glenn
Research
Center



PART 3
Post-Launch Day Lab
Report Sheet

BOTTLE ROCKET LAUNCH LAB REPORT

Bottle Rocket Launch LAB Report

ROCKET / TEAM NAME:			
Name:	TOTAL POINTS:	/100	Date
			Class Pd

Objective: *How do you design a model space bottle rocket?*

ROCKET: Bottle (+5) Fins (+10) Nose cone (+5) Chute (+5) TOTAL score:5 /25
(circle EACH selection student has)

Success: Rocket goes straight up and returns straight down with chute deployed
 = rocket goes end over end on lift off; **Wounded Duck**=return entry is out of control

Data/Observations Bottle Rocket Lab Report +5 points (must complete WS all to get credit)

GO
NO GO
For equipment

Mass of Rocket: <small>Record 2 mass sizes</small>	(in grams) and then	(in Kilograms)
Volume of Rocket: 2000mL		Mass of Propellant (water mass): 500g
		Volume of ROCKET Propellant (WATER): 500mL

rocket mass+ water mass = Total Mass (in grams) + 500g =	PSI (# of pumps used)
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Y-axis number =	X-axis number =
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Total TIME: SECONDS: <small>(from launch to impact)</small>	Distance: METERS: <small>(from launch to impact)</small> THIS IS YOUR BASE
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MISSION GOAL *Evaluate the success of your launch based on the following guidelines (circle one):*

- +20 pts A = Successful mission:**
All worked successfully: 4seconds flight time; Rocket launch, Powered Ascent, Coasting, Chute deployment, Slow Decent, Recovered
- +15 pts B = Successful mission: ONLY Chute failed (did not open)**
All working successfully Except 4seconds flight time; Chute deployment, Slow Decent
- +10 pts C = Successful mission Football Wounded Duck Chute failed OR NO chute included**
All working successfully Except: 4seconds flight time; Powered Ascent, Chute deployment, Slow Decent
 - If no chute is present this is the highest score you can receive
- +5 pts D = failed mission Football Wounded Duck Chute failed Equipment broke**
All working successfully Except: 4seconds flight time; Rocket launch, Powered Ascent, Coasting, Chute deployment, Slow Decent,
- +0 pts F = failed mission: NO Rocket launch**

BOTTLE Rocket Calculation STARTS HERE must show all work:

1... Height of rocket using Altimeter = (BASE is distance from launch to landing) (y / x) +4

2... $density = \frac{mass(grams)}{volume(mL)} =$ +3

3... $Mass _ Fraction = \frac{mass _ of _ propellant}{total _ mass} =$ +3

BOTTLE ROCKET LAUNCH LAB REPORT

BOTTLE Rocket Calculation

COMPLETE ALL blanks including units, for YOUR BEST rocket based on DISTANCE

4... Height Time up (seconds) = Total time divided by 2

$$\frac{\text{Height Total Time}}{2} = \text{Time up (initial Velocity)} \quad \boxed{+3}$$

5... Initial Velocity (Vi) = g t_{up}

$$(9.8\text{m/s}^2) (\text{Time up}) = \text{Initial Velocity (height)} \quad \boxed{+3}$$

6... Vertical Velocity (V_y) = (v_i)(Sin 60°)

$$(\text{Sin } 60^\circ) (\text{Initial Velocity}) = \text{Vertical Velocity} \quad \boxed{+3}$$

7... Horizontal Velocity (V_x) = (v_i)(Cos 60°)

$$(\text{Cos } 60^\circ) (\text{Initial Velocity}) = \text{Horizontal Velocity} \quad \boxed{+3}$$

8... Total Air time = (V_y) / g

$$\frac{\text{Vertical Velocity}}{(9.8\text{m/s}^2) \text{ gravity}} = \text{Total Air Time} \quad \boxed{+3}$$

9... Total distance = (V_x) (Total air time)

$$(\text{horizontal Velocity}) (\text{Total Air Time}) = \text{Total distance} \quad \boxed{+3}$$

DISTANCE INFO starts here

$$10 \quad \text{Final Velocity}(v_f)_{\text{meters/second}} = \frac{\text{longest_dis tan ce(meters)}}{\text{total_dis tan ce_time(seconds)}} \quad \boxed{+3}$$

11... Convert to MPH = (V_f)(2.23)

$$(2.23 \text{ m/s}^2) (\text{Final Velocity}) = \text{Final Velocity (mph)} \quad \boxed{+3}$$

$$\boxed{+8} \quad \text{acceleration} \left(\frac{\text{meters}}{\text{second}^2} \right) = \frac{\Delta \text{velocity} (\text{meters/second})}{\Delta \text{time} (\text{seconds})} = \frac{(v_{\text{final_distance}} - v_{\text{initial_height}})}{(t_{\text{distance time}} - t_{\text{time up height}})} = \text{Acceleration}$$

$$(13.) \text{Force}_{\text{Newtons}} = (\text{mass}_{\text{kilograms}}) (a_{\text{meters/second}^2}) \quad \boxed{+4}$$

$$(14.) \text{Momentum}(p) = (\text{Total mass}_{\text{kilograms}}) (v_f_{\text{meters/second}}) \quad \boxed{+4}$$

BOTTLE ROCKET LAUNCH LAB REPORT

Bottle Rocket RUBRIC

This is the sheet that the Instructor will grade

NAME: _____

DATE _____

Pd: _____

ROCKET: Bottle (+10) Fins (+8) Nose cone (+2) Chute (+5) TOTAL score:
(circle EACH selection student has)

(+2)Mass of Rocket: _____ grams _____ Kilograms

Volume of Rocket: 2000mL; Mass of Propellant: 500grams; Volume of Propellant 500mL

(+1)Distance from Launch point to Rocket landing (this is BASE): _____ meters

(+1)Total Time: _____ **(+1) Rocket mass+ Water mass=Total Mass**
(from launch to landing) Propellant
_____ + 500g = Total mass is _____ g
=Total Mass is _____ Kg

Y-axis is =

X-axis is =

LAUNCH: (circle BEST selection BELOW from the 2nd page)

+20 pts A =Successful mission:

Rocket launch, On Target, and Return entry all worked successfully including equipment

+15 pts B = Successful mission: ONLY Chute failed (or no chute)

Rocket launch, On target, and Return entry. SOME equipment failed (chute failed to work)

+10 pts C = Successful mission Football Wounded Duck Chute failed

Rocket launch, On target, and Return entry but don't worked successfully

+5 pts D = failed mission Football Wounded Duck Chute failed Equipment broke

Rocket launch but don't worked successfully

+0 pts F = failed mission: NO Rocket launch

(+50)REPORT SHEET: (record your answer on the line for EACH section. Include Correct UNITS)

01) Height of rocket: (+4) _____

08) Total Air Time: (+3) _____

02) Density: (+3) _____

09) Total Distance: (+3)

03) Mass Friction: (+3) _____

10) Velocity (Final): (+3) _____

04) Time Up: (+3) _____

11) Velocity (Final) MPH: (+3) _____

05) Velocity (initial): (+3) _____

12) Acceleration): (+8) _____

06) Velocity (vertical): (+3) _____

13) Force: (+4) _____

07) Velocity (Horizontal): (+3) _____

14) Momentum: (+4) _____

19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

← Y

1 - Sight rocket along top edge of altimeter.
 2 - When rocket is at peak altitude, pinch the plumb line against the graph paper.
 3 - look along the plumb line for a convenient intersection.
 4 - Determine X and Y from this intersection.

Height = Base * (Y / X)

Glue this sheet onto a backing of cardboard.

Punch hole for string here

- Rocket Altimeter -