# WESTLAKE ROCKET DESIGN TEAM

Group	name:
Group	members:

Rocket name:\_\_\_\_\_

## **MISSION TO MARS: ROCKET DESIGN CHALLENGE**

When engineers try to solve a problem, their initial ideas rarely work out perfectly. They try different ideas, learn from mistakes, and then try again. It will be no different as you and your team work together on your rocket!

#### Step 1: What is your goal/problem?

Before you begin solving the problem, you must know what the problem is! Make sure to clearly define your problem. In this section, be sure to answer the following question: What *exactly* are you trying to do? (This includes writing down all the distance, mass, height requirements, etc.)

#### Step 2: Brainstorming

This section is where you will plan how you're going to solve the problem listed above. How will you reach your goal? Make a list of everything you can possibly think of that you may need in your rocket design to have your launch be a success. Try to write down anything that comes to mind, BIG or small. Things to consider: How will you make it light/heavy enough? How will you get it to go straight? How will you protect the egg? These are just a few ideas, but there are many more questions that could help you reach your goal.

#### Step 3: Designing/Redesigning

After brainstorming, your group should come to a consensus about which ideas are most likely to meet the challenge. Come up with a design that will solve your problems. Consider the following additional questions: Does this design meet the requirements highlighted in the section where you defined your problem? Can we really build this given the time/tools/materials provided? What PHYSICS principles might support your design? How will you know if you're successful? What are some potential problems you might face?

Detailed design sketch (Label each feature)

Explanation of design (Why did you include each feature?

A rocket has to be able reach its target destination, but it also needs to be able safely transport whatever it is carrying, whether that's cargo, rovers, or people. You will need to consider two objectives when designing your rocket: its ability to hit the target, and its ability to keep its cargo, in this case an egg, safe. In order to be cleared for launch, you need to run multiple tests to ensure your rocket meets the goals you outlined. You also need to consider how you will measure the success of each test.

<u>Target group</u>: This group will be in charge of making sure your rocket hits the target. Many things affect the flight of your rocket such as:

- Mass, mass distribution, mass location....
- Fins, fin shape, fin size,...
- Nose cone?
- Etc.

This list is not comprehensive and includes many, many other things. You will be in charge of testing 3-4 different variables that reflect your design goals. For each variable you will need to at least three different variations to see which variation helps your rocket meets the goals you want to accomplish.

Variables to test:

1.	
2.	
3.	
4.	

Egg Survivability group: This group will be in charge of making sure your Egg survives. No one wants a squished astronaut. Consider the following topics when designing your egg-safe rocket:

- Momentum
- Impulse
- Force vectors
- Etc....

This list is not comprehensive and includes many, many other things. You will be in charge of testing 3-4 different variables that reflect your design goals. For each variable you will need to at least three different variations to see which variation helps your rocket meets the goals you want to accomplish.

Variables to test:

### Combining variables

Just because your rocket design meets two of your goals separately does not mean it meets them at the same time. Combine your variables and have at least two successful trials before having your rocket cleared for final launch.

Success 1: \_\_\_\_\_

Success 2: \_\_\_\_\_

[Be sure to attach all documentation of your tests]