



Curtis Rising Star Science Challenge

Engineering Notebook

Level: Basic

This engineering journal belongs to:

Design a Scaffolding System

Goal: Design a scaffolding system.

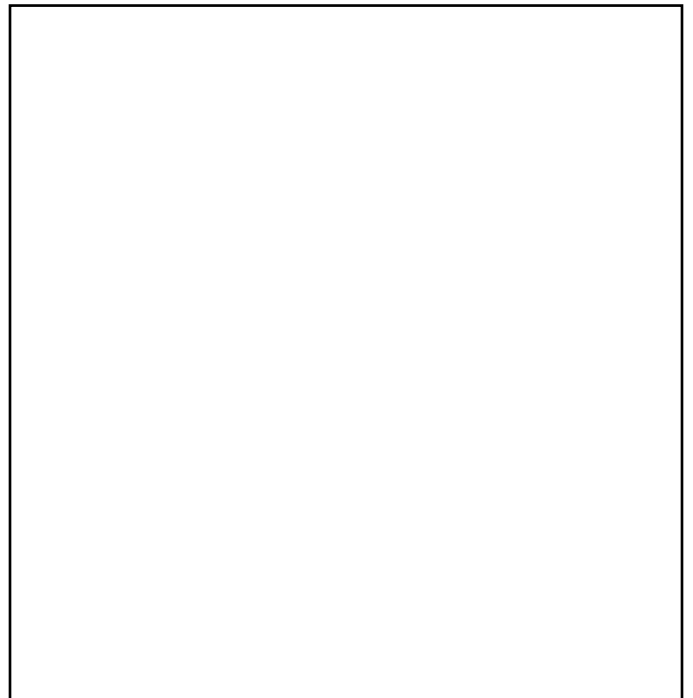


Height:

My scaffolding system must be **stable**. This means it can balance without me touching it.

Imagine


Imagine at least two solutions to the problem.



Plan

Work with your group to come up with a plan.

Draw the plan for your design below.

A large, empty rectangular box with a thin black border, intended for students to draw their design plan. The box occupies most of the page's width and height.

Create

Here are the steps we followed to create our design:

First, my team:

Next, my team:

Last, my team:

Test I

Check off the criteria your group met.

- Our design is tall enough.
Our design **height** is: _____ .
- Our design is **stable**.

Improve

My team will **improve** our design by:

Test 2

Check off the criteria your group met for your improved design.

- Our improved design is tall enough.
Our improved design height is: _____ .
- Our improved design is stable.

Reflect:

My design

| | |
|-----|---------|
| did | did not |
|-----|---------|

 improve. I know because:

If we had more time, my team would **improve** our design by:

Design a Roller Coaster

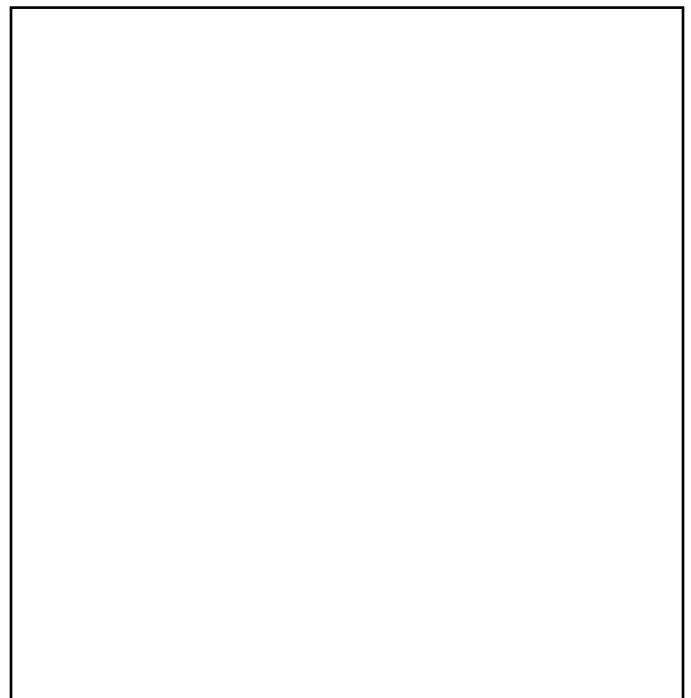
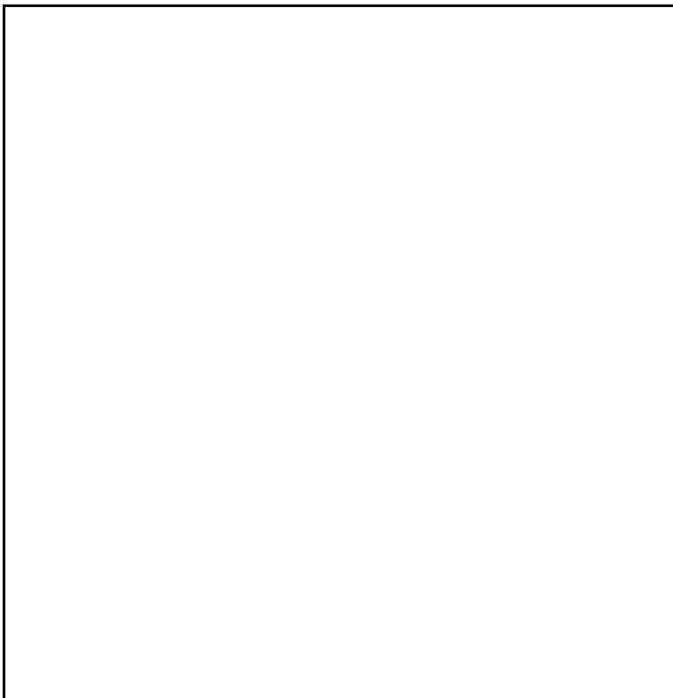
Goal: Design a roller coaster.

Length: My roller coaster must go from a chair to the floor.

My scaffolding system must be **safe**. This means the marble does not fall off the track.

Imagine


Imagine at least two solutions to the problem.



Plan

Work with your group to come up with a plan.

Draw the plan for your design below.

A large, empty rectangular box with a thin black border, intended for students to draw their design plan. The box occupies most of the page's width and height.

Create

Here are the steps we followed to create our design:

First, my team:

Next, my team:

Last, my team:

Test I

Check off the criteria your group met.

- Our design is long enough to go from the chair to the floor.
- Our design is **safe**.

Improve

My team will **improve** our design by:

Test 2

Check off the criteria your group met.

- Our design is long enough to go from the chair to the floor.
- Our design is **safe**.

Reflect:

My design

| | |
|-----|---------|
| did | did not |
|-----|---------|

improve. I know because:

If we had more time, my team would **improve** our design by:

Design Play Dough

Goal: Design high quality play dough.

| Play Dough Quality | | |
|--------------------|---------------------|------------------|
| High Quality 3 | Medium Quality 2 | Low Quality 1 |
| | | |

Imagine

What are the **properties** of our materials?

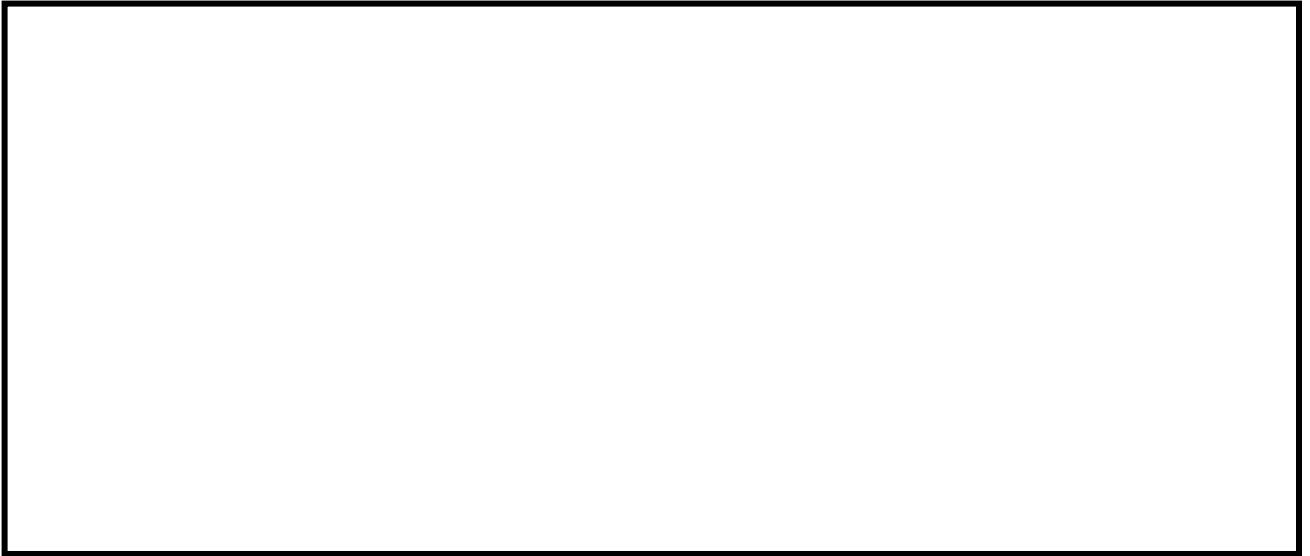
| Water | Flour | Salt |
|-------|-------|------|
| | | |

Plan

Work with your group to come up with a plan.

Glue your steps below. You do not need to fill in all steps.

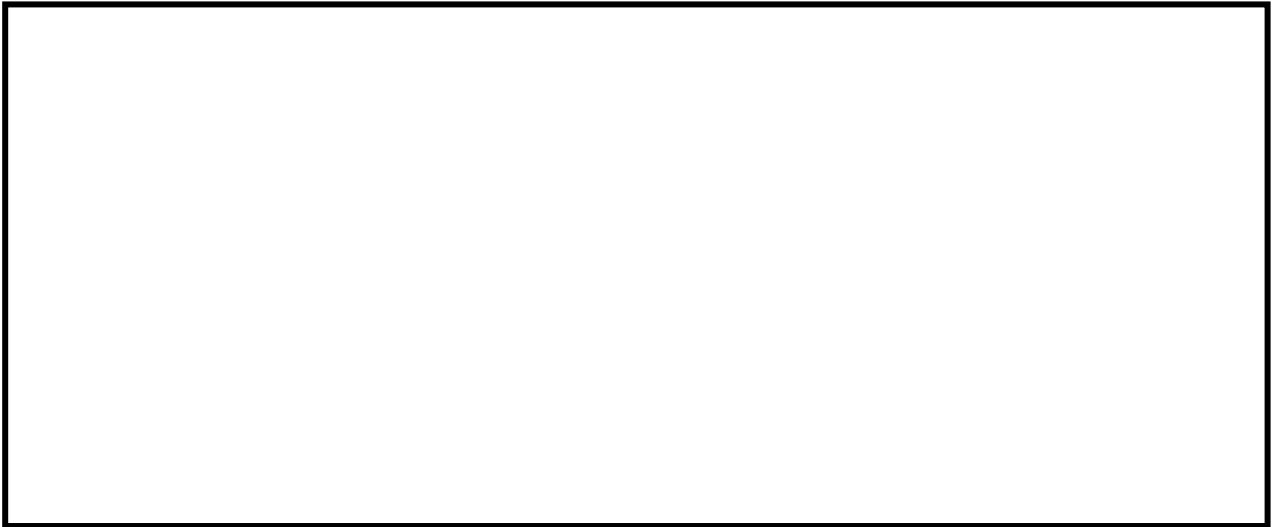
1.



2.



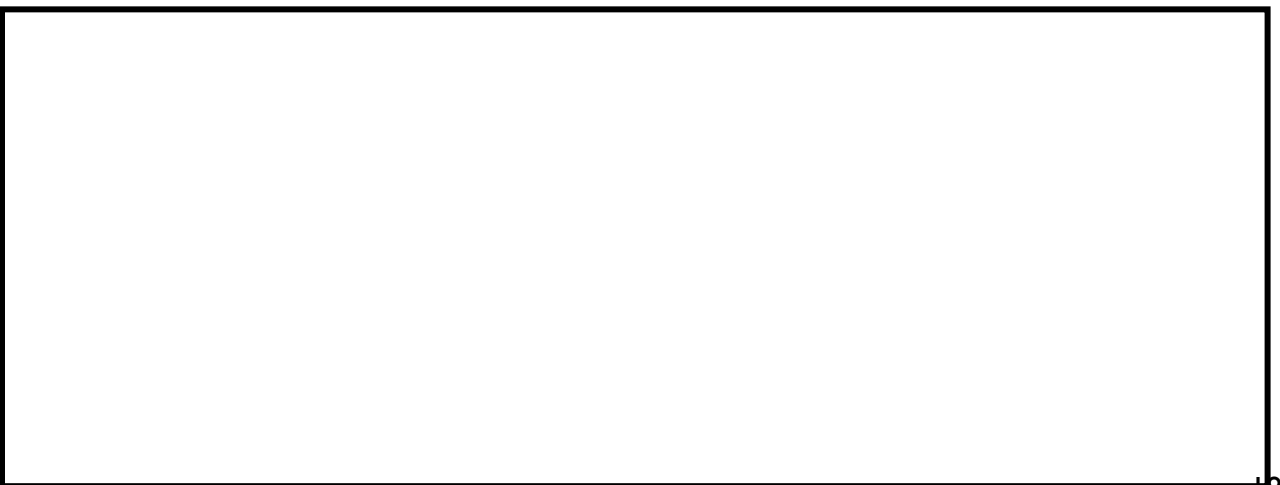
3.



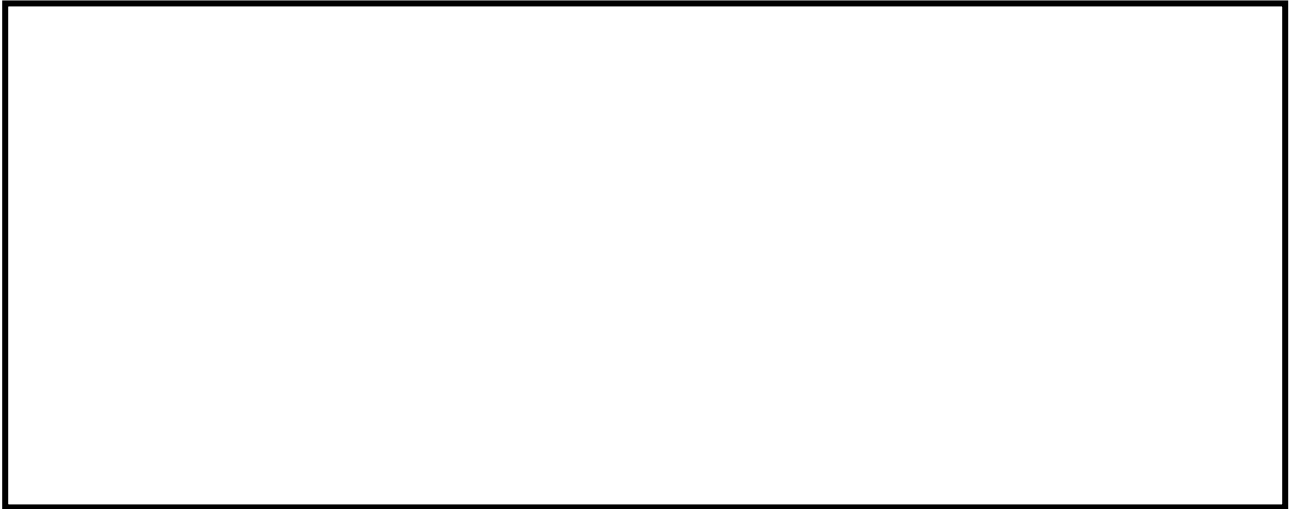
4.



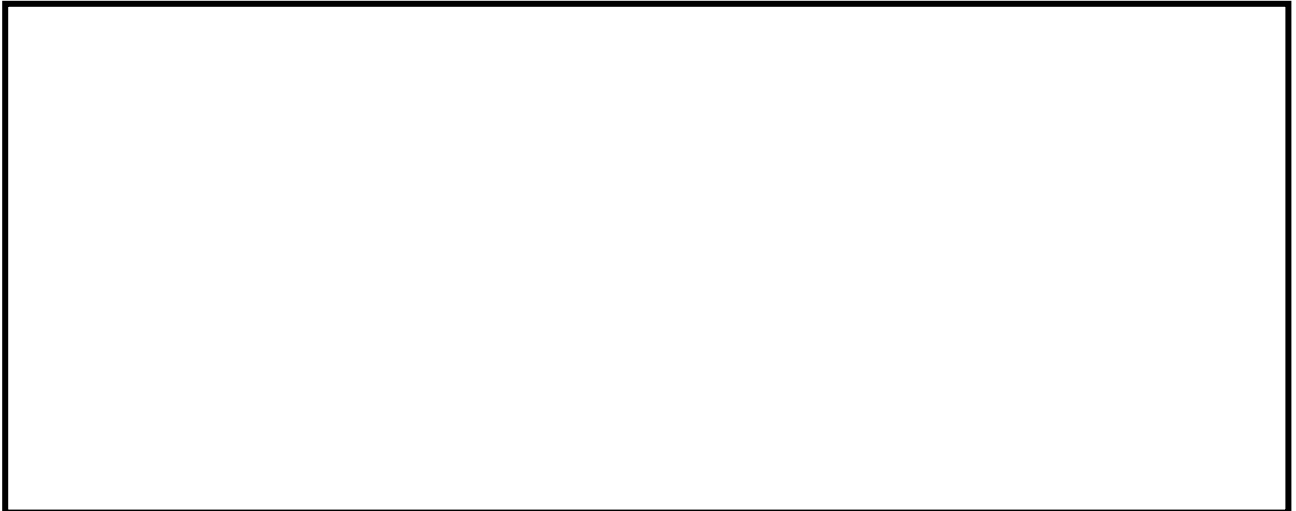
5.



6.



7.



8.



Test 1

Our play dough quality is (circle answer):

1

2

3

Improve

My team will **improve** our design by:

Test 2

Our play dough quality is (circle answer):

1

2

3

Reflect:

My design

| | |
|-----|---------|
| did | did not |
|-----|---------|

improve. I know because:

If we had more time, my team would **improve** our design by:

Water Runoff Reduction System

Goal: Design a system which will reduce water runoff into a lake from a nearby city.

Original lake level:



Centimeters (cm)

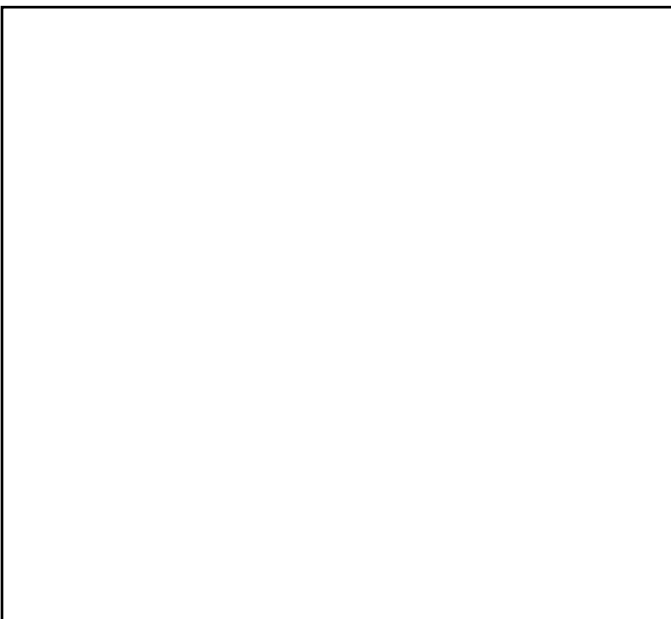
Create a system which will reduce water runoff in an urban landscape to less than:



cm

Imagine


Imagine at least two solutions to the problem.



Plan

Work with your group to come up with a plan.

Draw the plan for your design below.

A large, empty rectangular box with a thin black border, intended for students to draw their design plan. The box occupies most of the page below the instructions.

Create

Here are the steps we followed to create our design:

First, my team:

Next, my team:

Last, my team:

Test I

Water level after rain:

cm

Check off the criteria your group met.

- Our system reduced the water runoff.

Improve

My team will **improve** our design by:

Test 2

Water level after rain:

cm

Check off the criteria your group met.

- Our system reduced the water runoff.

Reflect:

My design

| | |
|-----|---------|
| did | did not |
|-----|---------|

 improve. I know because:

If we had more time, my team would **improve** our design by:

Design a Zip Line

Goal: Design a container which can transport a company's products using a zip line to a town on the other side of a protected forest.

Distance:



The container must deliver the payload into the destination without dropping in on the ground.

Imagine

Imagine at least two solutions to the problem.

A large, empty rectangular box with a thin black border, intended for drawing a solution to the problem.A large, empty rectangular box with a thin black border, intended for drawing a second solution to the problem.

Plan

Work with your group to come up with a plan.

Draw the plan for your design below.



Check off the 5 materials your group will use. You may select an item multiple times.

| | |
|---|--|
| <input type="checkbox"/> Small paper cup | <input type="checkbox"/> Plastic cup |
| <input type="checkbox"/> Large paper cup | <input type="checkbox"/> Paper |
| <input type="checkbox"/> Index card | <input type="checkbox"/> Yarn, 12 in. |
| <input type="checkbox"/> Wax paper, 12 in. x 12 in. | <input type="checkbox"/> Aluminum foil 12 in. x 12 in. |
| <input type="checkbox"/> Paper clip | <input type="checkbox"/> Masking tape, 12 in. |

Create

Here are the steps we followed to create our design:

First, my team:

Next, my team:

Last, my team:

Test I

Check off the criteria your group met. Record test data on your graph.

- Our design is stable. The payload did not drop onto the ground.
- Our design traveled far enough.

The distance our container traveled is:

- Our design delivered the payload successfully to the destination.

Improve

My team will **improve** our design by:

Test 2

Check off the criteria your group met. Record test data on your graph.

- Our design is stable. The payload did not drop onto the ground.
- Our design traveled far enough.

The distance our container traveled is:

- Our design delivered the payload successfully to the destination.

Reflect:

My design

| | |
|-----|---------|
| did | did not |
|-----|---------|

improve. I know because:

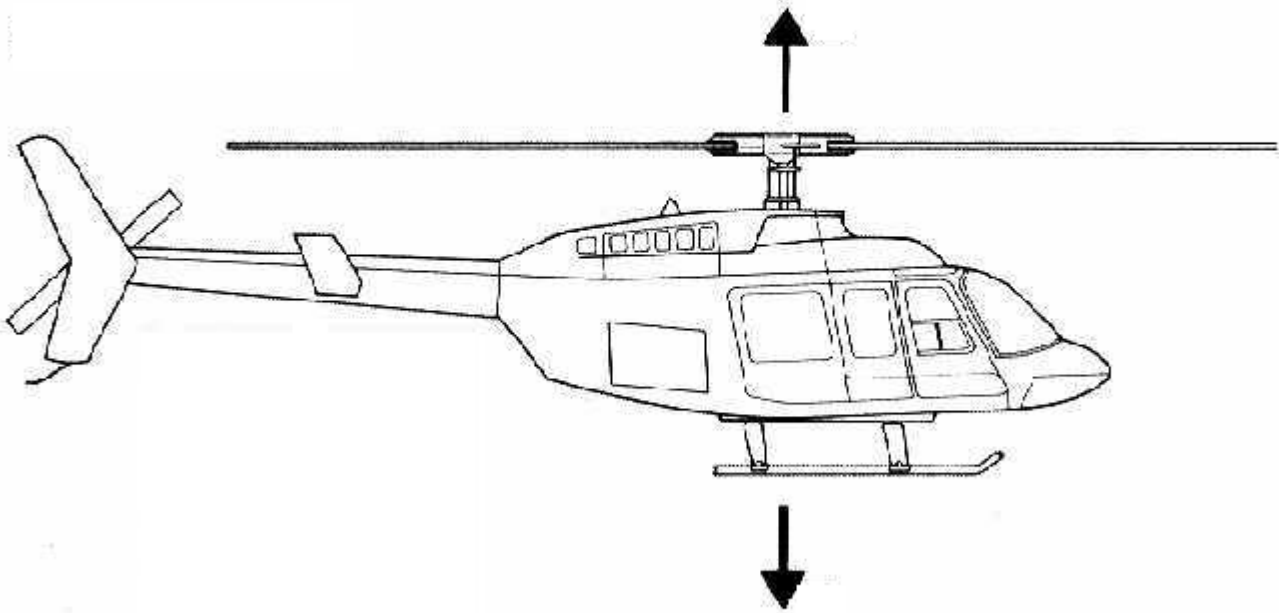
If we had more time, my team would **improve** our design by:

Design a Paper-copter

Goal: Design a paper-copter which can drop slowly.

The copter must drop _____ feet.

The blades cause drag.



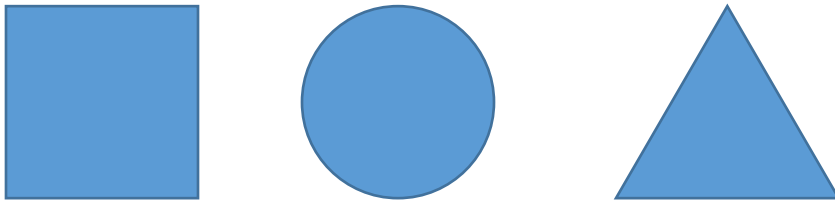
Gravity pulls down.

Imagine

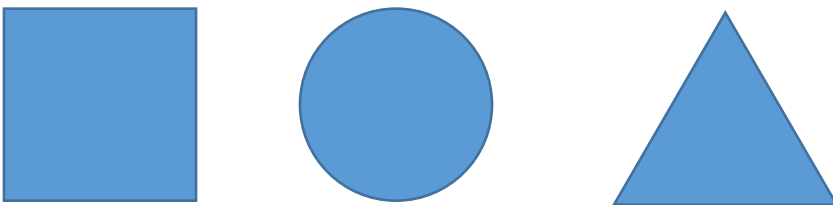
| | | | |
|-------------|--------|--------|----------|
| Blade Shape | Circle | Square | Triangle |
| Drop Time | | | |

Draw the shapes in order from slowest to fastest.

Circle the shape which was most successful:

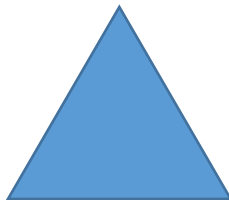


Circle the shape which was least successful:



Plan

Circle which shape you will use for your blades?



Which size will you use for your blades? 1 2 3 4 5

Draw your paper-copter:



Create

Here are the steps we followed to create our design:

First, my team:

Next, my team:

Last, my team:

Test 1

How long did your paper-copter take to drop?

_____ seconds

Improve

My team will **improve** our design by:

Test 2

How long did your paper-copter take to drop?

_____ seconds

Compare your designs. Create a bar graph.

Seconds

| | |
|--|--|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

Test 1 Test 2

Reflect:

My design did did not improve. I know because:

If we had more time, my team would **improve** our design by:

Design a Telephone

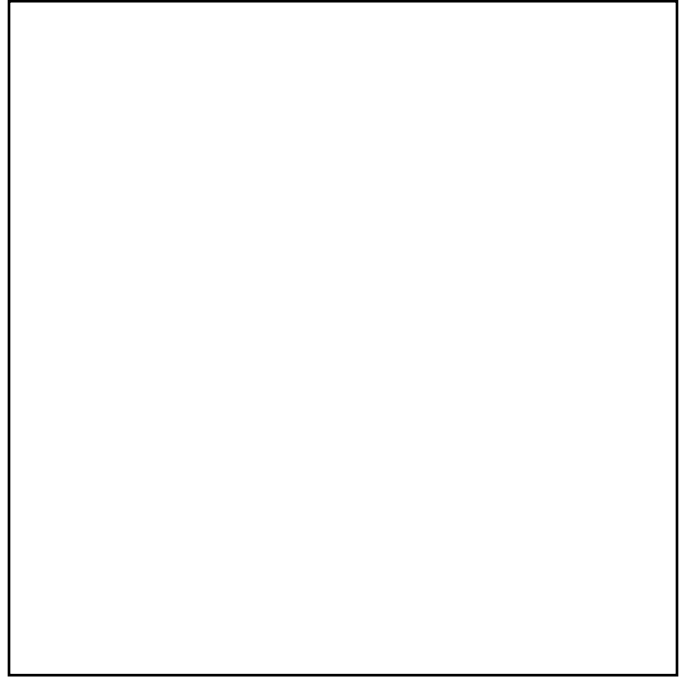
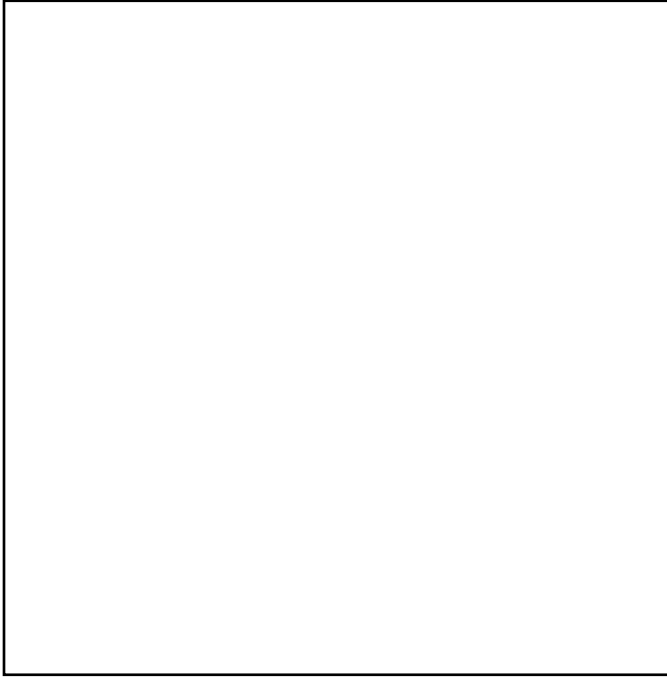
Goal: Design a telephone which transfer sound clearly.

The sound must travel  feet.

 words must be heard clearly.

Imagine

Draw at least two ideas.



Plan

Circle which size and material you will use for your cup to speak in:

Small

Plastic

Medium

Paper

Large

Styrofoam

Circle which size and material you will use for your cup to speak in:

Small

Plastic

Medium

Paper

Large

Styrofoam

Which material will you use to connect the cups?

String

Yarn

Rubber band

Draw your plan for your telephone:



Create

Here are the steps we followed to create our design:

First, my team:

Next, my team:

Last, my team:

Test I

Write down the words you heard:

| | |
|---|---|
| <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> | <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> |
|---|---|

What is your score out of 5 words?

| | |
|-------------------|-------|
| <hr/> <hr/> <hr/> | words |
|-------------------|-------|

Improve

My team will **improve** our design by:

| |
|-------------------|
| <hr/> <hr/> <hr/> |
|-------------------|

Test 2

Write down the words you heard:

| | |
|---|---|
| <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> | <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> |
|---|---|

What is your score out of 5 words?

| | |
|-------|-------|
| <hr/> | |
| <hr/> | |
| <hr/> | words |

Reflect:

My design

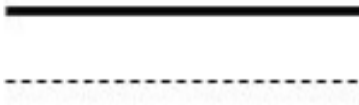
| | |
|-----|---------|
| did | did not |
|-----|---------|

improve. I know because:

If we had more time, my team would **improve** our design by:

Plant Hydrating System

Goal: Design a filter which will deliver the amount of water a plant needs in one day.



The plant needs _____ water each day.

Imagine

How much water did each material absorb?

| Sponge | Paper Towel | Diaper |
|------------|-------------|------------|
| - _____ | - _____ | - _____ |

Order the materials from least to most absorbent:

Plan

Work with your group to come up with a plan.

Draw the plan for your design below.

A large, empty rectangular box with a thin black border, intended for students to draw their design plan. The box is centered on the page and occupies most of the lower half of the document.

Create

Here are the steps we followed to create our design:

First, my team:

Next, my team:

Last, my team:

Test I

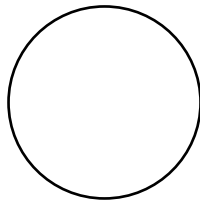
Check off the criteria your group met.

Did the design overflow? Yes No

Did any water pass through the filter? Yes No

Volume of water that passed through the filter: _____

Is the volume of water passed through greater than, equal to, or less than the optimal volume?



Improve

My team will **improve** our design by:

Test I

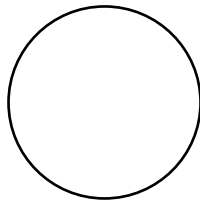
Check off the criteria your group met.

Did the design overflow? Yes No

Did any water pass through the filter? Yes No

Volume of water that passed through the filter: _____

Is the volume of water passed through greater than, equal to, or less than the optimal volume?



Reflect:

My design

| | |
|-----|---------|
| did | did not |
|-----|---------|

 improve. I know because:

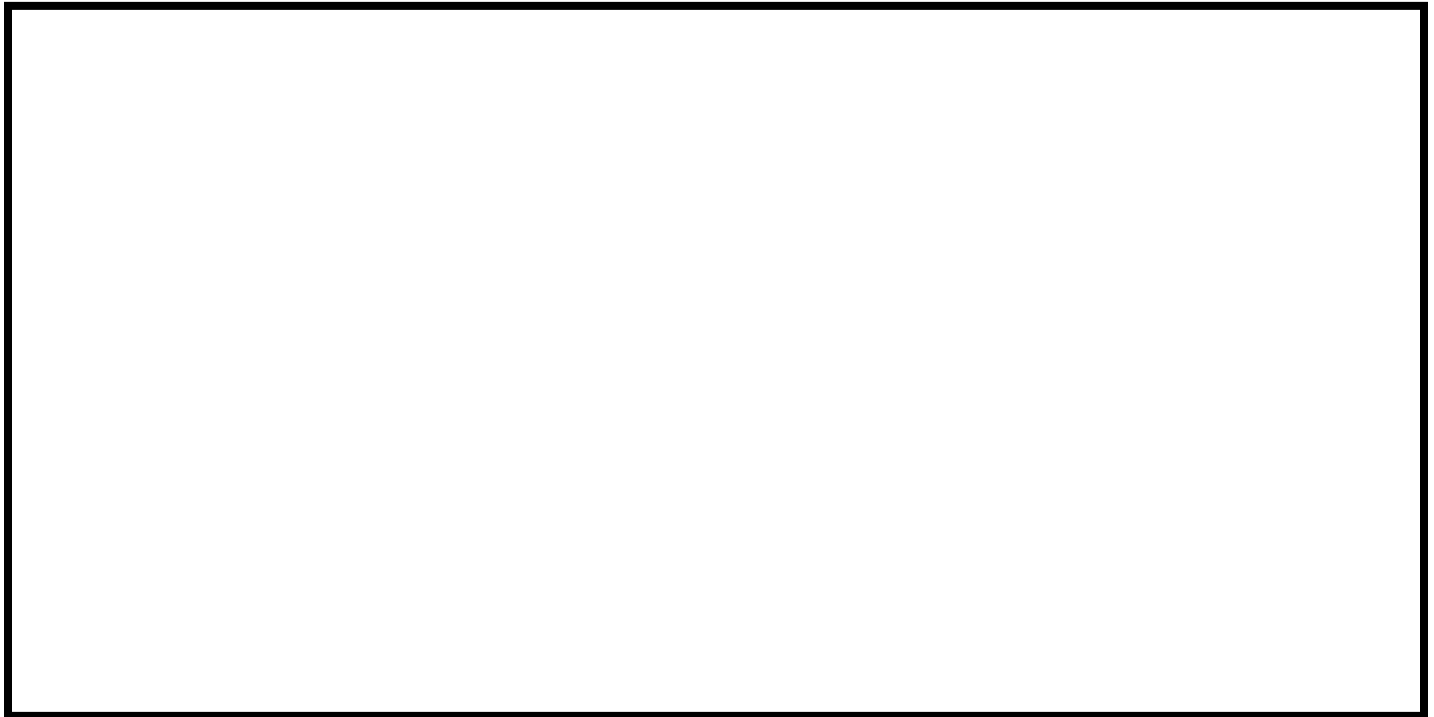
If we had more time, my team would **improve** our

Board Game Challenge

Goal: Design a board game that is both fun and engaging. To be fun, the game board needs to have 30 spaces measured in inches and allow for four players to participate. To be engaging, players must use simple addition to move throughout the board.

Imagine:

Draw the game board you would design yourself:

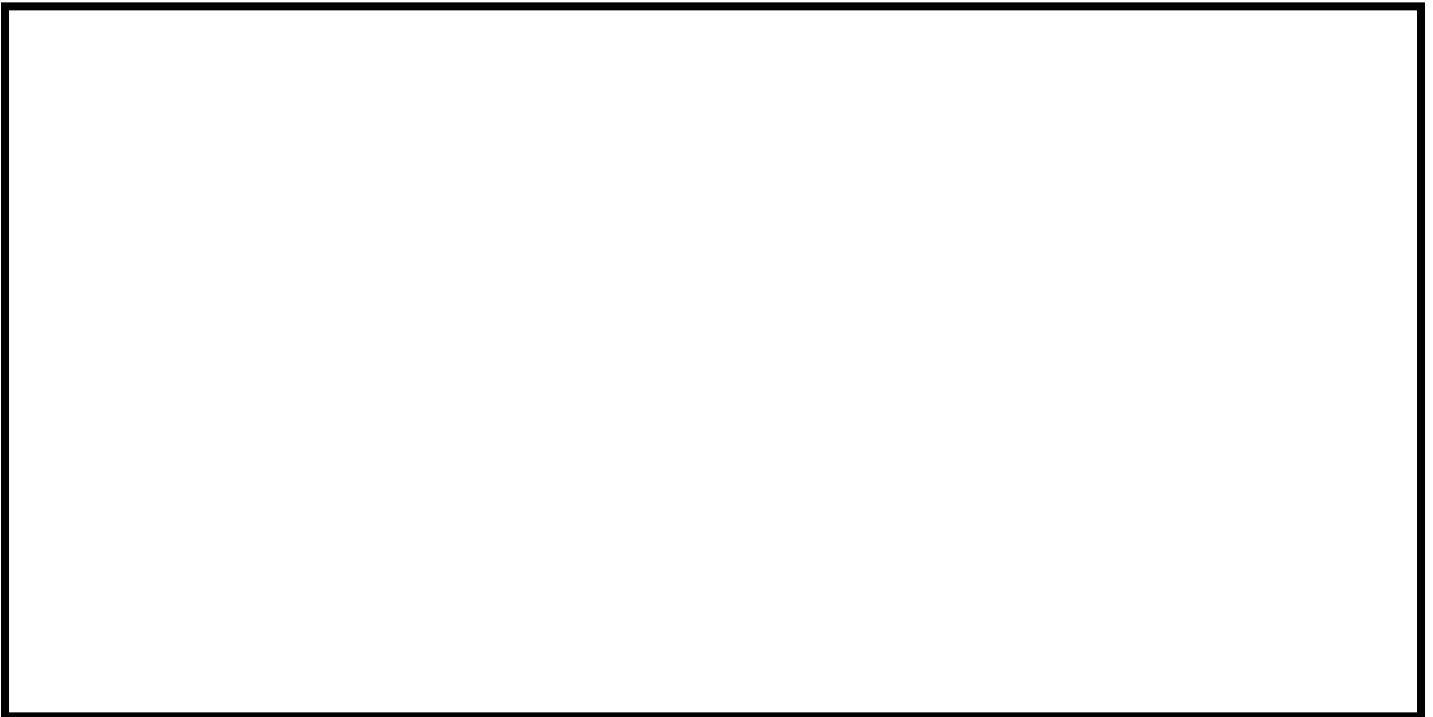


Here are some math equations I would include:

Plan:

Work with your group to come up with a design.

Draw your group's game board design here.



Here are some math equations we will include:

Create

Here are the steps we followed to create our design:

First, my team:

Next, my team:

Last, my team:

Test I

Check off the criteria your group met based on the feedback from the other group.

Does the game board have 30 spaces or more? Yes No

Can four players participate? Yes No

Write down three addition equations included in the game below:

Improve:

My team will **improve** our design by:

Test 2

Check off the criteria your group met based on the feedback from the other group.

Does the game board have 30 spaces or more? Yes No

Can four players participate? Yes No

Write down three addition equations included in the game below:

Reflect:

My design

did did not

improve. I know because:

If we had more time, my team would **improve** our
