

Engineering Challenge: Developing Perseverance (K-6)

Students will be challenged to persevere through an engineering design challenge as they strive to build the best possible Puff Mobile. The lesson is designed for grades K-6, but can be adapted for other age groups as needed. Complete each section by following the instructions below.

 Teacher Led	 Requires Computer OR Mobile Device	 Requires Spaces
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Learning Goals

1. Students will **learn** the importance of perseverance.
2. Students will **practice** perseverance through an engineering design challenge.
3. Students will **reflect** on their design challenge experience.

Materials

 Student Handouts	<ul style="list-style-type: none">• Handout [A] - Puff Mobile Design Challenge Instructions (Page 5)
 Technology Requirements	<ul style="list-style-type: none">• Internet• Mobile device, tablet, or laptop

 Video/Audio Clips	<ul style="list-style-type: none">● 1000 Mistakes Video● The Most Magnificent Thing book or video by Ashley Spires
 Additional Materials	<ul style="list-style-type: none">● Lifesavers● Paperclips● Sheets of paper● Tape● Scissors● Straws● Markers/Colored Pencils

Instructions

Setup

1. Gather all materials for the Puff Mobile Design Challenge and set them on a central table that all groups have access to.
 - Each group may use 4 straws, 4 lifesavers, 4 paper clips, 24 inches of tape, and a piece of paper to build their Puff Mobile. They may also use scissors if needed and markers if they would like to decorate the Puff Mobile.
2. Mark off a Puff Mobile Racetrack by taping a start and a finish line about 5 yards apart.

Before the Lesson

1. Invite students to gather around the carpet area.
2. Show the [1000 Mistakes Video](#)
3. Discuss with students how they feel when they fail or are not good at something right away.
 - Ask students what they do when they are not good at something or fail
 - Share a time that you failed and how you responded
4. Explain how overcoming failure requires perseverance
 - Write the word perseverance on the board and have students brainstorm what the word means to them
 - Perseverance: continuing to work towards achieving a goal despite failure or difficulties

Lesson Part 1 - Story Time

- Show students the cover of the book and ask:
 - *What do you think this book is about?*
 - *How do you think the girl will show perseverance?*
- Explain that you are going to read a story about a little girl who is determined to create something magnificent. The little girl fails quite a few times, but despite her failures, she never gives up.
- Read *The Most Magnificent Things* book or show the [video](#) of the book being read.
- Once finished, ask the following questions to the whole class:
 - *What did the girl do the first couple of times she was unhappy with what she created?*
 - *How did the girl feel when she kept failing to create the most magnificent thing?*
 - *What did the girl realize while on her walk?*
 - *How did the girl show perseverance in the story?*
- Explain to students that they will be creating the most magnificent Puff Mobile (aka a car that can travel on just a few puffs of air).

Lesson Part 2 - Puff Mobile Design Challenge

1. Pass out **Handout [A] Puff Mobile Design Challenge Instructions**.
2. Teacher will explain the purpose of the Puff Mobile Design Challenge and the materials that will be provided to each group.
 - Purpose: The goal is to design a Puff Mobile that can travel 5 yards with as few puffs of air as possible using the materials allotted. You must demonstrate perseverance by testing your Puff Mobile and then redesigning it to make it better.
 - Materials: Each group will receive: 4 straws, 4 lifesavers, 4 paper clips, 24 inches of tape, a piece of paper, scissors and markers to decorate.
3. Students will work with a partner to begin designing their Puff Mobile
4. Students can test their car and rebuild as many times as they want within 20 minutes (students may pick up new materials for each rebuild)



5. At the end of the 20 minutes, each group will bring their car to the start line and groups will take turns seeing which car can travel from start to finish with the fewest puffs

After the Lesson - Documenting in Spaces

Teacher Tip!

The instructions for this lesson involve adding to the Class or Individual Space in Spaces. You can adapt the instructions if you'd prefer to make this an Activity.

1. Students will document their learning in Spaces by following these guidelines:
 - Click **+ Create** > Choose **Camera** > Take a photo of each of the Puff Mobiles created > Post Photo
 - Add a **Title** > Click the Title box and add a title to the Post.
 - Post a Description > In the **Post Description** box, write a description of the Puff Mobile Design Challenge.
 - Click **✓ Next**
 - Choose the **Class Space** or **Individual Space**
 - Click **✓ Post**
 - Add **Reflection** > Write a reflection answering the following questions:
 - *How did you feel after testing the first model of your puff mobile?*
 - *What improvements did you make for your next model(s)?*
 - *What is a goal that you have for yourself?*
 - *What obstacles might you face while trying to reach that goal?*
 - *How can you show perseverance when you face those obstacles?*
 - Click the **send arrow** to post your reflection.

Handout [A] - *Puff Mobile Design Challenge*

Instructions

Purpose

Your goal is to design a Puff Mobile that can travel 5 yards with as few puffs of air as possible using the materials allotted. You must demonstrate perseverance by testing your Puff Mobile and then redesigning it to make it better.

Materials

- | | |
|---|--|
| <input type="checkbox"/> Lifesavers (4) | <input type="checkbox"/> Straws (4) |
| <input type="checkbox"/> Paperclips (4) | <input type="checkbox"/> Scissors (for cutting only) |
| <input type="checkbox"/> Sheet of paper (1) | <input type="checkbox"/> Markers/Colored Pencils (for decorating only) |
| <input type="checkbox"/> Tape (24 inches) | |

Procedure

- 1) Choose a partner to work with on your Puff Mobile.
- 2) Gather the allowed amount of each material for the first build of your Puff Mobile.
- 3) Come up with a plan and then build your Puff Mobile.
- 4) Test your Puff Mobile and then brainstorm ideas for how you can make it better.
- 5) Gather more materials and then build a new model of your Puff Mobile.
- 6) You may repeat steps 4-5 as many times as you would like until time is up.
- 7) Gather around the Puff Mobile Racetrack and show off your best Puff Mobile for the class!