

Lesson 1 | SUPERHERO ENGINEERING DESIGN

Leverage students' excitement about superheroes to inspire a hands-on engineering design challenge.

OBJECTIVE

Students will design, build, and improve a superhero eye mask using the engineering design process.

STANDARDS

NGSS

Grades 1–2

ETS1-1. Define a problem

ETS1-2. Illustrate how an object's shape helps it solve a problem

Grade 3

ETS1-1. Define a problem

ETS1-2. Brainstorm multiple solutions

TIME

60 minutes

MATERIALS

- *Superhero Tools and Functions* nonfiction reading passage
- Make a Superhero Eye Mask activity sheet
- Art supplies for masks (e.g., construction paper, cardboard, chenille stems, yarn, etc.)



Remote Ready

1 News flash! Avengers Campus is calling all heroes to develop their superpowers! Tell students that they are being recruited to find their inner hero. Training begins now!

2 Ask them to think about reasons people wear all kinds of masks.

- Who wears masks and why? (For example: face masks to avoid spreading germs, ski masks to protect from the cold, eye masks to block out light, etc.)
- Why do superheroes often wear masks? (For example: to disguise their identity, to protect their faces, to give them better vision, etc.)

3 Explain that masks are made differently based on their function (what they will be used for). For example, a ski mask might be made of cozy wool because it is meant to keep people warm. Iron Man's mask is made of strong metal and covers his entire head because he uses it for protection.

4 Share the *Superhero Tools and Functions* nonfiction reading passage to show how a tool's shape (structure) connects to its function. Depending on students' needs, read the passage out loud as a class, or allow students to read independently.

5 Ask students how they can create an eye mask to showcase their inner hero. Distribute the Make a Superhero Eye Mask activity sheet to guide students

through imagining, designing, and building an inventive superhero mask using basic art supplies.

Remote tip: Encourage students to use materials available in their homes (dry-food boxes, cotton balls, etc.).

To increase the challenge: Add additional constraints. For example, a mask must be made from a single piece of material, or students cannot use tape or glue in their design and must determine an alternate means of attaching things (e.g., folding).

6 Engage students in testing and improving their masks. For example, they may need to check that they can see through the mask's eye holes, adjust the mask for a more comfortable fit, or make sure that any 3D elements stay fastened.

7 Congratulate students on completing the first step of the hero recruitment process! Hold a superhero eye mask parade in the schoolyard and have kids explain their masks.

Remote tips: Have students draw diagrams of their masks, add a short description, and send it back with completed schoolwork. Collate the drawings into a **We're Superheroes!** book to be photocopied for each student.

If internet is limited, have students email **photos of their superhero masks**. Collate the photos and share a PDF or Google Drive folder with the class.

Hold small-group or whole-class **video sessions** so students can share their work.

Name _____

MAKE A SUPERHERO EYE MASK

Super Heroes like Black Panther and Captain Marvel wear masks. It's part of their identity! What is your superhero identity? Follow the steps below to create your own superhero eye mask.



1 Ask and Think

- ★ What kind of superhero do you want to be?
- ★ What does your mask need to do? (Examples: hide your face OR make it easy for people who need help to find you)
- ★ List your ideas for how to meet this goal.

2 Make a Plan

Pick one of your ideas. Draw your plan for how to make your mask on separate paper. Add labels and measurements.

3 Build Your Mask

You can make changes as you build!

4 Test

- | | | | |
|---|------------------------------|----------------------------------|-----------------------------|
| Does your mask meet your goal from question #1? | <input type="checkbox"/> Yes | <input type="checkbox"/> Sort of | <input type="checkbox"/> No |
| Does it fit and stay on your head? | <input type="checkbox"/> Yes | <input type="checkbox"/> Sort of | <input type="checkbox"/> No |
| Can you see through it? | <input type="checkbox"/> Yes | <input type="checkbox"/> Sort of | <input type="checkbox"/> No |
| Is it comfortable? | <input type="checkbox"/> Yes | <input type="checkbox"/> Sort of | <input type="checkbox"/> No |
| Did anything fall off? | <input type="checkbox"/> Yes | <input type="checkbox"/> Sort of | <input type="checkbox"/> No |

5 Improve

- ★ What parts of your mask worked well?
- ★ What parts of your mask will you change?
- ★ Now improve your mask!

ENGINEERING HERO TIP

You can use string to measure the length of the curve around your head.

ENGINEERING HERO TIP

Heroes run into problems all the time! Then they do their best to fix them.

SUPERHERO TOOLS AND FUNCTIONS

Attention, heroes-in-training! It's time to explore your favorite superheroes' tools before you design your own.

Every tool—including a superhero's suit—has a **structure**. That means the tool's shape and its parts. How do you decide which parts a tool needs? That depends on the tool's **function**—what the tool will help you do. The way a tool is made needs to match what it is used for.

Did you know the suits below did not always look this way? Scientists test new superhero suits and make lots of changes until the suits work!

Captain Marvel's suit is made of **flexible leather** so she can move easily when she flies.



Ant-Man's helmet is made of **thick metal** to protect his head.



Black Panther wears **special sneakers** that absorb sound. That way, he can move silently.