Grades K-5
Mini-Lesson + Activity: “How do you become a great inventor?”

VIDEO TRANSCRIPT

MINI-LESSON VIDEO 1

Hi, it's Doug! When you think of new inventions, what kinds of things do you think of? Virtual reality headsets that let you explore anywhere in the world? Cars that can drive on water? Pet robots that can pick up your toys? Well, someone named Max has a question about the inventors who create all of these cool new inventions. Let's give Max a call now.

[Video Call]

- Hi, Doug!

- Hi, Max!

- I have a question for you. How do you become a great inventor?

- That's a great question.

It's so fun for me, as a grown-up, to look back on the things that seemed futuristic to me as a kid. I'd watch shows like "Star Trek" and see things like cool, futuristic doors that automatically opened whenever you got close to them. Hey, we've got that today, someone invented it. Or computers that respond to voice commands.

- Tell me the location of Commander Data.

What? When I was growing up, you couldn't talk to a computer, but look, we've got this now too.

- Okay Google, beam me up.

- Okay, energize.

Other things I saw in movies and shows are things that haven't been invented, at least not yet. Things like flying cars. What kinds of inventions do you think we might have once you've grown up?

MINI-LESSON VIDEO 2

You can probably come up with lots of ideas. Who knows what we'll have? Some amazing things are already being worked on: a robotic arm that does your dishes, cars that drive themselves, jet packs that allow you to fly from one place to another. Still, we don't have any of these things yet. Who will invent those and how? How do you become a great inventor? To figure that out, it's helpful to look at inventions and inventors of the past. Inventors like Katharina Paulus, the inventor of the modern parachute. Or Josephine Cochrane, the inventor of the dishwasher. Or all of the scientists and engineers at NASA who worked together to invent the Saturn Five Rocket—a rocket powerful enough to send people all the way to the Moon. First, any of these inventors have to come up with the idea. While that might seem easy, keep in mind that some of the greatest ideas are sometimes things that no one even thought was possible. Imagine what it was like to be Katharina Paulus. You're going to jump out of a plane or a hot air balloon and land on the ground with your feet? "Yes, we can do it," she thought. But it's one thing to come up with an idea, it's another thing to actually build something that works. How do inventors do that? If you've not thought much about this before, it can be tempting to think, "Well, people who invent things are just geniuses. They wake up one morning with a brilliant idea in their head and then they build the thing and presto, it works!” Now we have a new invention. Nothing could be further from the truth. The story of almost every invention is filled with what looks like trying and failing—again and again and again. The scientists and engineers who invented rockets weren't trying to get these rockets to blow up, but they knew that building

a huge rocket wasn't something that had ever been done before. And rocket fuel—it's really explosive. Figuring out how to control the amount of rocket fuel getting burned, that's something that NASA could only learn by trying. Each time one of these tests failed, they carefully figured out why and made improvements to their design. By being willing to try again and again, and each time carefully observing and learning from their mistakes, eventually, they figured it out. And we've got rockets that have taken people all the way to the Moon. The history of inventions is full of stories just like this. People coming up with new ideas for things and building something, trying and failing, but each time, learning from their mistakes so that they can get it right. Not every idea makes it to the finish line. The idea of rocket-powered ice skating might be a good example. Or this automatic ketchup dispenser. But one thing is for sure. If we're going to have new inventions in the future, it'll only be possible if there are inventors who dare to dream big and aren't afraid of trying again and again and again. Each time, learning from their mistakes. In fact, many of these inventions of the future will be made by one of you watching this. That's all for this week's question, thanks Max for asking it. Now, after this video's done playing, my friends and I here at Mystery Science have created a step by step activity where you'll invent a new kind of parachute. I hope you'll try it. Have fun and stay curious!

ACTIVITY INTRODUCTION VIDEO

In today's activity, you're going to see if you can create an invention to save Bobby. Bobby may just look like an ordinary bobby pin, but he makes a good model of an actual person, something you can experiment with without anyone getting hurt. What you want to do is figure out how to save Bobby from falling. For example, if he were going to jump out of an airplane, how could you make sure he reaches the ground safely? A classic parachute is one way to slow down

someone's fall, but is it the only way? See if you can invent a new kind of parachute. We can call it the Bobby Dropper—a device made of paper that will slow him down as he falls. Now, remember, almost no invention works on the first try. Not only is that okay—it's how you'll improve your idea. It'll be important to try something, make changes, and try again, each time learning from what doesn't work. I'll show you how to get started, step by step.

ACTIVITY STEP 1

Find a partner. Decide who will be Dropper and who will be Expert Eye. Don't worry, you'll trade jobs later. If you're working alone, that's okay too. When you're done with this step, click the arrow on the right.

ACTIVITY STEP 2

Get these supplies.

ACTIVITY STEP 3

First, try to make a Bobby Dropper that doesn't slow Bobby down as he falls. To do that, slide a bobby pin onto a piece of paper, like this. Then, carefully crumble the paper around the bobby pin, like this. You've now made what we can call a Fall Fast.

ACTIVITY STEP 4

Stand up and hold your Fall Fast up as high as you can. Then, drop the Fall Fast on the floor. If you've crumpled it well, it will do exactly what its name says, it falls fast. This is just about the

worst Bobby Dropper there is. It falls fast, straight to the ground, and lands with a crash. Go to the next step to start thinking of a better one.

ACTIVITY STEP 5

Here are some ideas of things that float, or fall slowly. Discuss with your partner. What do you notice about these things?

ACTIVITY STEP 6

Younger students: you can skip this step. Older students: on your worksheet, draw at least two of your ideas for your Bobby Dropper. You can draw more if you want. Your drawings don't have to be fancy. They can be quick doodles. If it's helpful, I'll set a timer for two minutes. Okay, time's up. When you're ready, go to the next step.

ACTIVITY STEP 7

All students: take a new piece of paper and make your first Bobby Dropper. It doesn't have to be perfect. Inventors often do quick versions to test out an idea. Older students: use your drawings while you're working. Younger students: if you're stuck, discuss with your partner. You can cut, fold, tear, whatever you do just remember to slide on a bobby pin or a paperclip when you're done. I'll set a timer for three minutes in case that's helpful. Okay, time's up. When you're ready, go to the next step to find out how to test your Bobby Dropper.

ACTIVITY STEP 8

It's time to test your first invention. Dropper: stand up with your Bobby Dropper in one hand and your Fall Fast in the other. Make sure the pins are at the top, like this, pointing up. You'll drop

them in the next step. Expert Eye: your job is to compare how the Fall Fast and the Bobby Dropper fall. I'll tell you more in the next step.

ACTIVITY STEP 9

Okay, don't do anything yet. When your teacher says go, the Dropper will drop both at the same time. Expert eye: you'll pay attention to how it drops. Does it drop straight down? Side to side? Loops and flips? Something else? After the Dropper drops, trade jobs. Okay, teacher, when you're ready, say, "Ready, set, go!"

ACTIVITY STEP 10

I'm guessing the fall fasts probably dropped straight down. But what did the Bobby Droppers do? Expert eyes: discuss how your partner's Bobby Dropper fell. Droppers: circle the path yours took on your worksheet. If your Bobby Dropper fell slower than the Fall Fast, you're already on your way to saving Bobby.

ACTIVITY STEP 11

Now you're going to test again. Figure out a way to hold your Bobby Dropper so the pin is not pointing up. It can be in any direction except up. Test your Bobby Dropper holding it the new way because it might do something different. Take turns. Then circle the path on your worksheet.

ACTIVITY STEP 12

Did you have a failure? When we did this, we sure did. In a minute, you'll make a new and hopefully improved Bobby Dropper. But before you do that, discuss as a class. Who noticed something that failed? What did you learn from it?

ACTIVITY STEP 13

Make and test another Bobby Dropper with a new piece of paper. Use your worksheet to keep track of your experiments. Your new Bobby Dropper can be a brand new design or you can make a new version of your first Bobby Dropper. To see if the new version is an improvement, test your original one and your new one to compare them. So don't change your first Bobby Dropper. It's okay if your new one doesn't work as well. That's a great thing to learn. Here at Mystery Science, we had a great time inventing Bobby Droppers. If you want to see some of our experiments, and our failures, go to the next slide to watch an extension. Have fun, stay curious, and don't be afraid to learn from failures!

EXTENSION

Inventing can look a lot like you're just messing around with stuff. You try something, it doesn't work, so you try something else. Here at Mystery Science, we tried a lot of things when we were inventing Bobby Droppers. We thought this one was a failure. When Isabelle dropped it with the pin pointing down, it fell even faster than the Fall Fast. We'll call that Version One, an epic failure. But failure gives us a chance to try again. Pointing the bobby pin down didn't work, so we decided to point it sideways. We'll call this Version Two. We looked at Version One and Version Two at the same time. Version Two moved from side to side as it fell and it fell

slower—nice! We wondered what we could do to make it even better. There are a lot of possibilities and there's no one right answer. We decided to try turning the paper's sideways movement into more of a swoop like the swoop of a paper airplane. Version Three, our Jet Plane Dropper, didn't fall down straight like Version One. We couldn't tell if it was flying or just fluttering like in Version Two. We talked with each other about what other changes we could try to make that might make it fly better. Isabelle noticed that a floating feather has lots of thin strips or fringes that could move separately. So she made Version Four, which has thin strips like a feather at the back. Wow, the fringed version really moved! But it also really crashed. Not what we had in mind. So far, it's looking like Version Two is probably the best one for Bobby. But we're still experimenting. Once we start inventing, we have a hard time stopping. We like to see what happens, especially when we get a failure. Have fun, stay curious, and always try to learn from your failures!