Teacher's Guide for:

Stethoscopes

Note: All activities in this document should be performed with adult supervision. Likewise, common sense and care are essential to the conduct of any and all activities, whether described in this document or otherwise. Parents or guardians should supervise children. Rock-it Science assumes no responsibility for any injuries or damages arising from any activities.

NOTE: *This is the transcript of a lesson that was videotaped during an actual Rock-it Science class with real students, not actors. The students' brainstorming comments are included on the video but are not transcribed here because they're not part of the lesson presentation.*

Contents:

Title Page of Video

Stethoscopes
A Rock-it Science Lesson
Filmed November, 2009

Rock-it Science
2110 Walsh Ave, Unit F
Santa Clara, CA 95050
www.rockitscience.org

Intro Quick Recap:

- How can you tell if someone is dead?
- In the old days, they held a cold mirror in front of their nose. If there was no fog on the mirror, they'd assume the person was dead because they weren't breathing.
- Later, they used the heartbeat to determine whether someone was dead. This method lasted hundreds of years.
- Then modern science discovered ways of keeping the heart beating even if there was no activity in the brain. If you hook electrodes to someone's brain and there's just a flat line, they say he's dead, even if the heart is still beating.
- In this class, we're going to use the old-fashioned method, with heartbeats.
- In the old days, the doctor would just put his ear against a person's chest to hear their heart. But they didn't like to do this because many people had fleas or body lice.
- So one doctor discovered you could roll up a sheet of paper into a tube *[demonstrate]* and listen to the heart through the tube, so he wouldn't be so close to the fleas and lice.
- Nowadays, doctors use stethoscopes. If you were to take the doctor's stethoscope apart, you'd discover that the sensor just contains a ring and a plastic disc. That's all. *[Demonstrate unscrewing and reassembling the sensor on a stethoscope.]*
- You can use a stethoscope to listen to your heart. The heart is in the middle of your chest, and it's tilted a little to the left. So there's a spot on the left side of the chest where the sound is more amplified. If you put the sensor there, you can hear your heart.

Disassembling the sensor on a stethoscope.

Experiment Quick Recap: *"Stethoscopes"*

Students listen to their own heartbeats.

- There are two versions of the stethoscope we're going to make. You can choose either the simpler one or the complicated one.
- You start with a rubber tube. But if you stick the end in your ear it has sharp edges that would hurt. So you put a soft squishy piece on the end.
- The first thing you'll do is listen to your fingerprints by putting one end of the tube in your ear and gently rubbing the other end with your fingertip.
- Pass out a tube and a soft endpiece to each student and have them put them together and try it out.
- For the complicated version, you need another piece of soft endpiece. Put it on, then stick one end in each ear and see if you can hear anything.
- Then cut each student's rubber tube in half and give them a T-connector to reattach the pieces.
- Set up a hot air gun so it stands up by itself, pointing upwards. Have students hold the tips of their tubing over the gun until they get warm. This will make it easier to insert the T-connector.
- Give each student a second rubber tube and have them attach it to the third branch of the T-connector.
- For the sensor, each student receives a souffle cup with a hole drilled in the bottom just large enough for the tube to pass through, along with a plastic lid.
- Students insert the tube through the hole and apply some hot glue to hold it in place.
- To help keep the earpieces in their ears, students place a rubber band around the two tubes that connect to the ear pieces, and secure it with duct tape.
- Students sit quietly and listen to their hearts with the stethoscope.
- Then students run around and yell for about 30 seconds to get their heart rate up. Then they listen again.
- Instructor brings out a model of a 2-chamber pump and a sensitive microphone attached to a speaker. The microphone is used to show the sounds made by the valves as the pump is pressed up and down, and by the water flowing through the tubes.
- If a person has a heart murmur, you can hear the blood squirting between the two chambers where it's not supposed to be going.
- Have students mark the clear plastic lid of their stethoscopes with permanent markers to identify them.

Equipment List: "Stethoscopes"

Items needed for Instructor:

- Stethoscope, standard medical
- Heart model, two-chamber
- Water to fill model
- Hot air gun
- Wire cutters
- Small microphone
- Speaker
- Cable between microphone and speaker
- Electrical outlets for hot air gun and speaker

Prep Work:

- Cut drip tubing to 2-foot lengths.
- Cut surgical tubing to 1/2" lengths
- Drill 1/4" hole in bottom of cup
- Assemble 2-chamber heart model (from "Heart Chambers" lesson)

Disassembling the stethoscope.

Items needed for Students:

Consumables (per student):

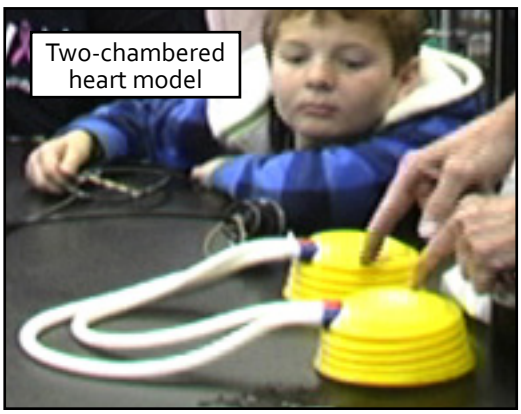
- Tubing, garden drip, 1/4" outer diameter, approx. 2-foot length (2 each)
- Tubing, surgical, 1/4" diameter, approx. 1/2" length (2 each)
- T-connector, garden drip, plastic
- Souffle cup, plastic, 2-oz
- Souffle lid, plastic, 2-oz.
- Rubber band, #16
- Duct tape, approx. 2" x 2" (2 each)

Cutting the tubing.

Other:

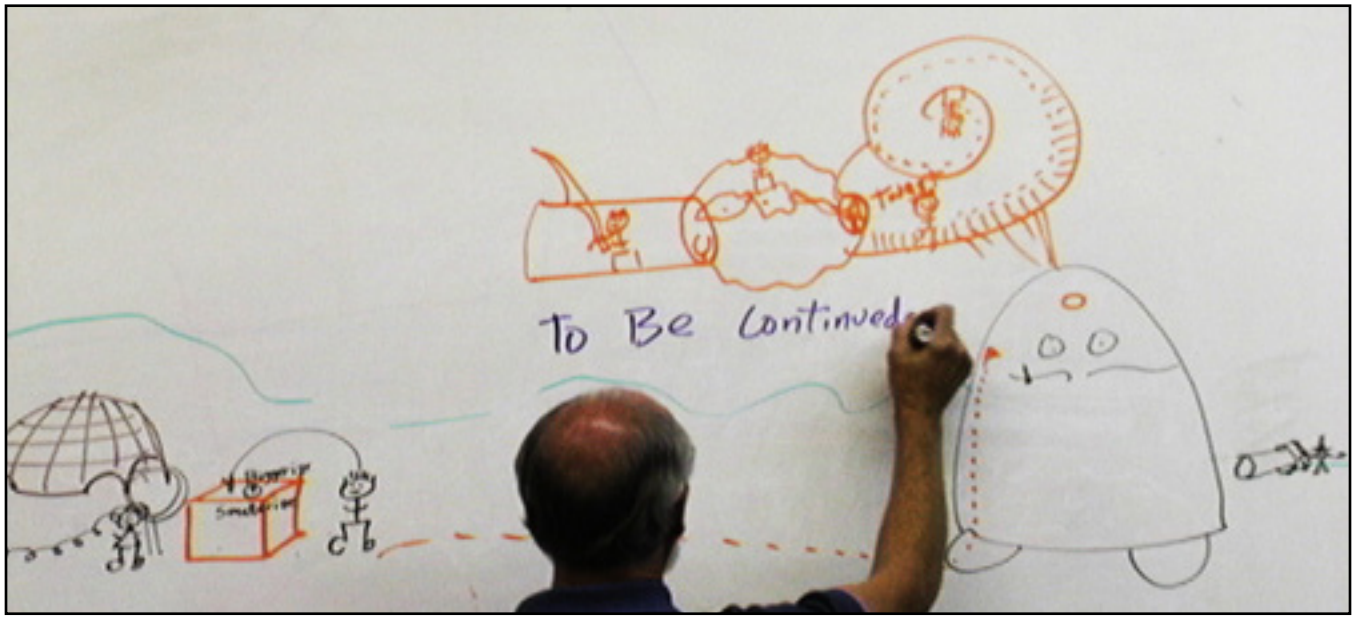
- Glue gun
- Glue stick
- Markers, permanent, colored

Plastic souffle cup with tube through hole in bottom.



T-connector.

Story Recap: "*Jack Inside the Giant Minion*"

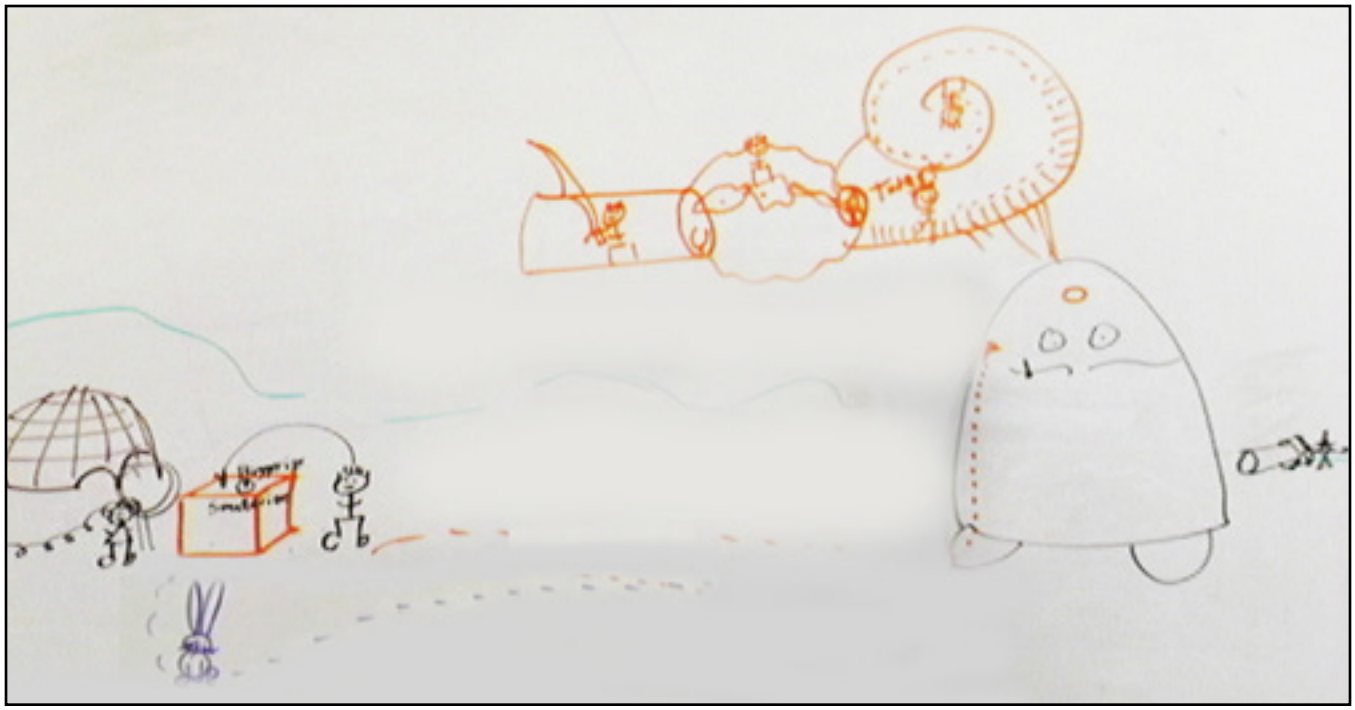


Part 1:

- Jack and Jill woke up one morning to find an empty cardboard box on their front lawn.
- It had a knob that said, "Biggerize" on the top and "Smallerize" on the bottom.
- Jack got in and spun the knob, and Jill poked the "Biggerize" button. Jack became enormous.
- Jack could no longer fit in the box, so Jill used the "Smallerize" button to shrink him down one part at a time.
- Then Jack got in again and punched the "Smallerize" button and disappeared.
- Jill ordered a magnifying glass from the Acme Store of Everything and found Jack in a corner of the box. She used the "Biggerize" button to make him normal size again.
- Evil Mister Fred had also found a similar box on his lawn that day and used it to make a giant minion. However, the minion accidentally knocked the castle over and crushed the box, so Evil Mister Fred couldn't make any more.
- Jack ran over to investigate, and he climbed up the minion and went into its ear. It was like a big cave with a sideways trampoline *[the eardrum]* at the end. Jack jumped against the trampoline and bounced off. This made the minion shake his head wildly. To Jack, it felt like an earthquake.
- Jack used his pocket knife to cut a hole in the trampoline so he could see what was behind it. He found three tiny little bones -- Hammer, Anvil, and Stirrup, and another squishy trampoline thing.
- Jack jumped up and down on the bones, which made the minion feel like someone was banging a bass drum inside his head.
- Jack cut through the second trampoline and entered the cochlea, which was shaped like a snail shell and was full of jello-like stuff. He could hear high-pitched tweet sounds.

Story Recap (cont.): "*Jack Inside the Giant Minion*"

- There's grass-like stuff on the floor *[little tiny hairs]*. When Jack walks through the grass, it makes sparks, like nerve impulses.
- Then he climbes up inside the cochlea to the very center, where he can hear very low sounds.
- The signals from the little hairs are going to the minion's brain, which is the size of a walnut.
- Jill is outside and doesn't know if Jack's alive or dead in there. She calls to him and he hears her but can't answer because he's in the jello. Jill thinks he's in trouble and wants to rescue him.



Ending:

- Jill called the Acme Store of Everything and ordered a rabbit with big ears. She climbed on top of the minion and put the rabbit with its ears against the minion's head.
- The rabbit could hear Jack faintly inside the minion, and they moved closer to one ear, and that turned out to be the one Jack was in.
- Jill told Jack to go to the minion's brain. Jack cut a hole in the cochlea and entered a big empty cavern with some lights and sparks in it, and saw the teeny little brain.
- Jill told Jack to squeeze the brain, and when he did, the minion yelled and raised one foot.
- When Jack squeezed the other side of the brain, the minion raised the other foot. By alternately squeezing each side of the brain, Jack could make the minion walk.
- The minion ended up walking back toward Evil Mister Fred's castle and stepped on it and on Evil Mister Fred.
- Jack and Jill kept the giant minion and used it to help them build cities and stuff.

Transcript: Intro

Today we're going to be talking a little bit about things that go thunk, and fleas and lice, and alive and dead. How can you tell if someone is dead? *[Student: They're not breathing.]* They're not breathing. Okay, that's a good sign. What else? If they're laying there with their tongue out. What else? Their heart isn't beating. What else? They have flies on them. They're not moving. They're not talking. If they're a skeleton.

In the old days, they first checked if a person was breathing. They put a cold mirror by their nose, and if there was no fog on the mirror they'd say, "Oh, the person is dead," because they're not breathing. But then they found some people who didn't appear to be breathing, nothing showed up on a mirror, and they weren't dead. So they said, "Oh, we need a better way to figure it out."

So then they went to the heartbeat thing. They said that if your heart is not beating, then you're dead. And that lasted for a long time. It lasted for hundreds of years. You can check it at your neck, there's a place there. There's a place just below your thumb where you can feel your heartbeat. And they figured as long as their heart was beating, they had to be alive.

Then modern science came along, and we found ways to keep people's heart beating, but they were just like *[looks dazed and unresponsive]*. So they came up with a new definition: You're dead if your brain doesn't work. They hook electrodes to you, and if it's a flat line then they say, "Yeah, he's dead." If there's stuff going on in the brain, then they say, "Oh, the person's alive."

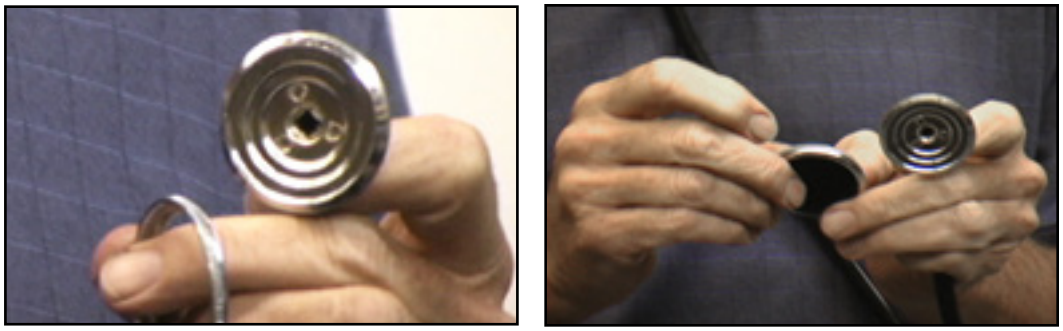
So we're going to go with the old-fashioned way. We're going to do some stuff with heartbeats today. Now, to do heartbeats, you have to somehow hear it or feel it. In the old days, doctors would just put their ear on your chest and listen. They'd say, "Oh, okay. It's beating. You're alive. Good for you."

But there was a problem with that. In the really old days, people had body lice, little creatures that walk around on you and bite and leave itchy spots. And they had fleas. And doctors didn't like to put their head on somebody who had fleas and body lice, because it's like getting mosquito bites. You don't want to get those.

So one doctor said, "I have an idea." And he took an ordinary piece of paper. Here's a piece of paper. And he rolled it up. He says, "Now I'll just listen through this, and maybe I'll have enough time to get away before the fleas crawl up and get on my ear." And he could hear the sounds through the rolled-up piece of paper. And that worked pretty good. For quite awhile they used that.

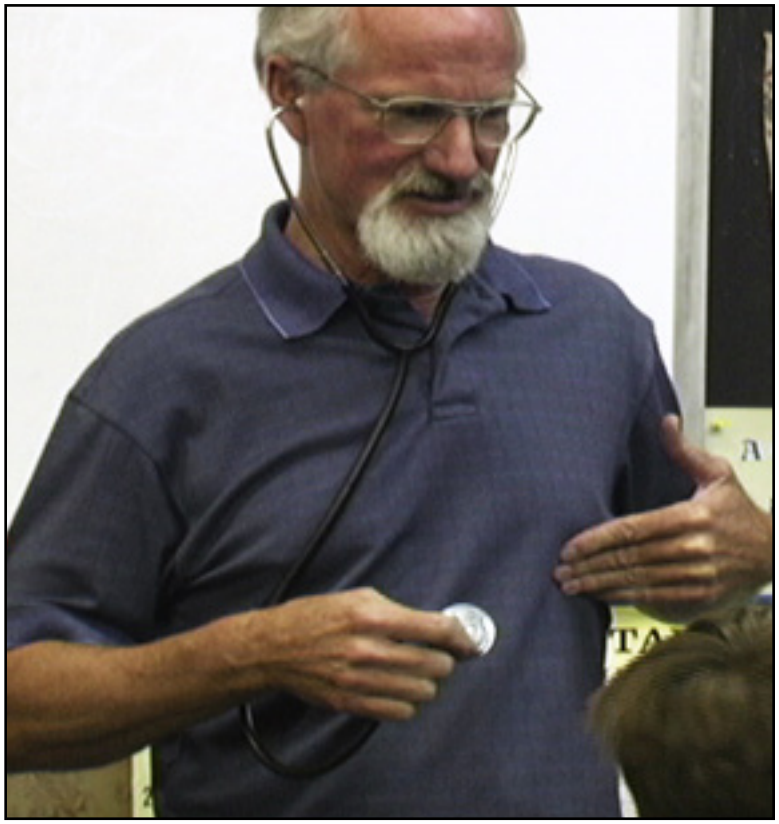
Listening through rolled-up paper.

And then, nowadays doctors have these things that you can keep in a refrigerator before they put it on you. *[Student: A stethoscope!]* A stethoscope, yeah. And a stethoscope has got these great ear thing-amajiggies and a spring in there so it stays on your head. And it's got that part. What do you suppose is inside of that part? *[Student: Something that detects vibration.]* Something that detects vibration.



Inside the stethoscope is a metal ring (left) and a thin plastic disk (right).

Well, next time the doctor goes to take your heartbeat, say, "Oh, let me look at your stethoscope. Oh, lookit over there, it's a flying elephant!" While he's looking, you unscrew the ring and take out the jobberdooie. Now it's just a little piece of metal with a hole in it. There's a ring and a thin piece of plastic. That's all there is. There's no batteries, there's no electronics, it's just a thin piece of plastic. And you didn't really break his stethoscope. You can always put it back together again. That's all there is.



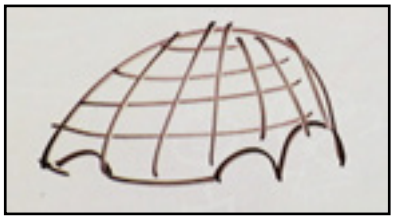
Finding your heart.

Now, you can test these to see if you can hear your heartbeat. You could try listening on your arm -- no, none there. You could listen on your stomach -- gurgle, gurgle, gurgle -- oh, there goes last night's pizza. You could try listening on your head -- nothing in there. And there's certain parts of your body where your heartbeat is more amplified. Your heart is almost exactly in the center. A little bit toward the left. But your heart is kind of tilted in there, so part of it is right by this rib. And if you put the stethoscope at that little spot . . . *[Student: Why do they put it on your back?]* Well, they listen to your lungs on your back . . . then you can hear your heartbeat. *[Student: You can feel it here.]* Yeah, you can feel it there. You can feel your heart. There's a spot right there where it goes in between your ribs and you can feel it. *[Student: Which side is it on.]* Well, it's on the side that goes thump-pa-thumpa. Just try the left side first.

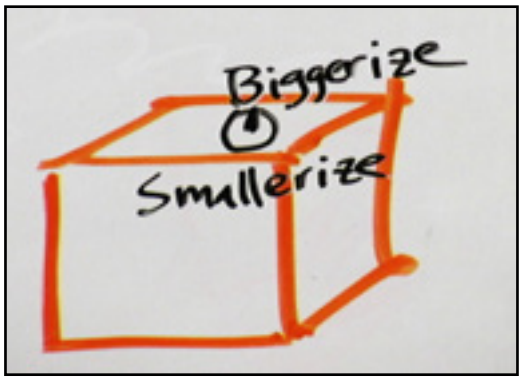
Well, today we're going to try to make our own stethoscope and see if it will actually work. But first, we need a crazy story.

Story: *"Jack Inside the Giant Minion"*

Let's see, once upon a time there was some ground. And Jack and Jill woke up early that morning. They'd been living in a turtle shell. There's lots of room in a turtle shell. They woke up, went outside, and they found on their front lawn a cardboard box. There. It wasn't there the night before. They looked down and said, "It's just an empty box."

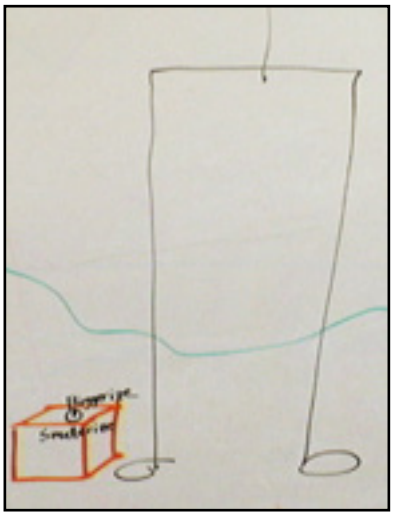


Jack and Jill's turtle shell.



The Biggerize and Smallerize button.

And Jack got inside. He looked all around inside and he said, "Hey, Jill! There's a knob in here with an arrow on it. And on the top it says "Biggerize," like that. And then underneath, it says "Smallerize." And Jill said, "It's a size machine." She said, "Jack, stay in there. Spin the knob." And Jack spun the knob. And Jill poked the button. Next thing you know, Jack grew to be huge, like that. Jack was tall. He's way up above the ground. And Jill's down here.



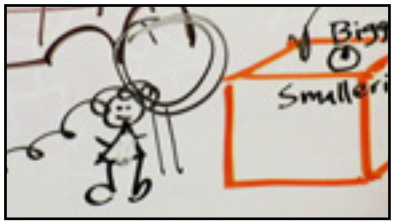
Tall Jack.

And Jack said *[in a deep voice],* "Whoooooaaaahhhh! This is greeaattt!" Because when you're big you get a really low voice. And he said, "Go stomp, stomp." Jill said, "Stop! You're going to kill somebody." And Jack said, "Okay, make me smaller." And Jill said, "All right. Well, you're too big to fit in the box."

Small Jill.

So she said, "Put your foot in there." So Jack stuck his foot in the box and Jill went Smallerize. And next thing you know, Jack's foot is really small. So they can put the other foot in there. And she had to work her way up a little at a time, and kept shrinking and shrinking and shrinking until Jack finally got to his normal size again.

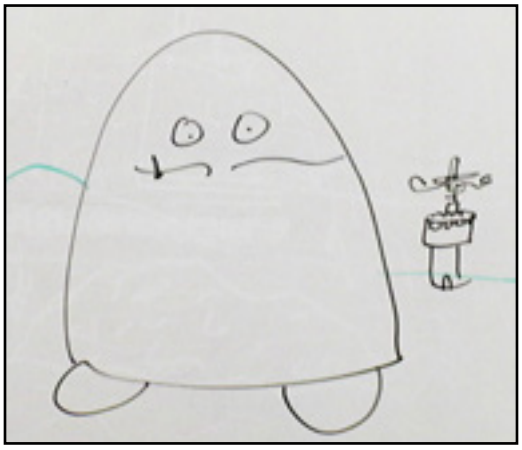
So now Jack is back to normal size. And Jack says, "Okay, your turn to get in." Jill says, "Not a chance. I'm not getting in that box." And Jack said, "But we've got to find out what's going to happen. Something cool's going to happen!" So Jill said, "Climb in." So Jack jumped. She spun it down to "Smallerize." Next thing you know, Jack disappeared.



Jill's magnifier.

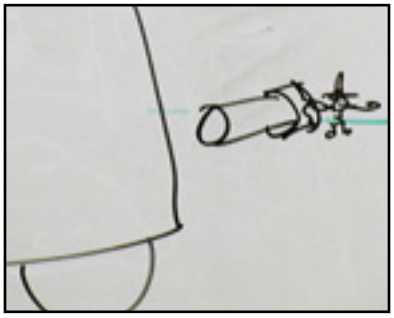
So Jill called the Acme Store of Everything and ordered a magnifying glass and started searching for Jack. As she's looking, she's going, "Jack! Jack! Where are you?" And she hears a tiny high-pitched voice coming out of the box. And she finally found him down there lost in a corner between some pieces of cardboard. There's Jack. And Jack said,

"We've got to do something. I don't like this size." So Jill put it back to Biggerize and poked the button, and Jack popped back out regular size.


Giant minion and Evil Mister Fred.

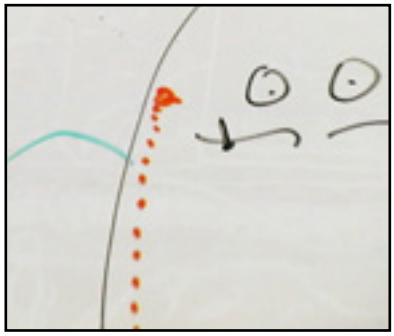
She says, "Wow! This is really neat. Just think of the things we can do with this." And Jack said, "Yeah, when I get this big I could just destroy everything." And Jill said, "Uh-oh. That's bad. What if there's another one of these?" And then they looked a little bit that way, and what did they see? A giant minion. There's the castle. *[Student: Where'd his baseball bat go?]* The baseball bat didn't biggerize. It's only that big.

Well, there's Evil Mister Fred, and he found a box in his front yard, too. And now he's got this enormous minion. And Evil Mister Fred said, "Now I can take over the world. I'll just keep throwing minions in there and biggerizing them until I have an army of giant minions." And the really huge minion said, "Wow, this is great, look at me! *[Dancing around.]* Awwww." And the minion stepped on the cardboard box and wrecked it. And he accidentally knocked down Evil Mister Fred's castle.


Castle knocked down.

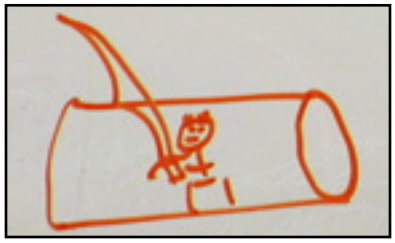
And Evil Mister Fred's not happy. And he's only got one giant minion. And he said, "Well, at least I have one minion, the invincible minion. With minion power, yeah, we can do anything."

And Jack and Jill said, "We've got to do something about him." And Jack said, "I've got an idea. I'm going to go over and see what I can find out about that minion." And Jill said, "No, Jack. He'll step on you."

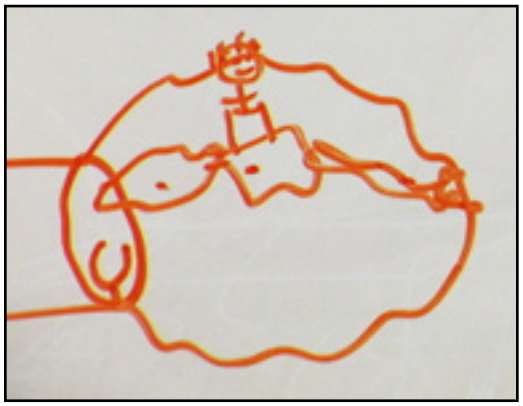

Jack ran into the minion's ear.

So Jack ran over there. There's Jack on the minion's shoe. And then Jack ran up the minion and found the minion's ear. And Jack ran into the minion's ear. And he found a cave there. Let's make a big hole here. There's the hole. Jack's inside. And he's in the minion's ear. And at the end of this big cave, there was like a trampoline on its side. And Jack said, "Fun!" And he ran towards it, leaped into the air, and bounced off of the trampoline. *[Student: The eardrum.]* Yeah, it's the eardrum.

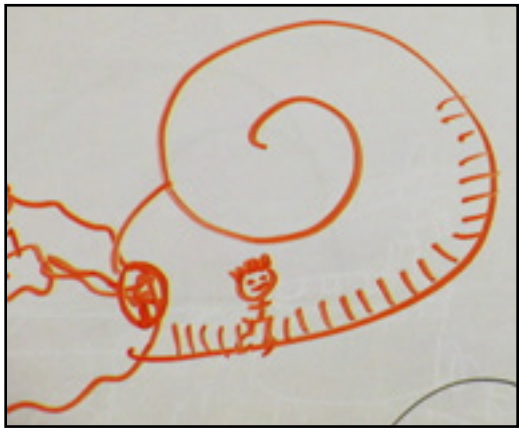
And the minion went, "Whoooaaaaahhhh!" *[shakes head wildly],* like that. And Jack felt this earthquake and almost got shaken out of the ear.


Jack in minion's ear with knife.

And Jack said, "Well, I wonder what's behind that trampoline." So Jack took out his pocket knife and said, "I've got to find out what's on the other side of this trampoline." And he cut a hole in it. And the minion went "Aaaaaahhhhh!" And he screamed, earthquakes on the ground, jumping up and down, Jack has to hang on for dear life.



Eardrum and inner ear bones, with Jack.



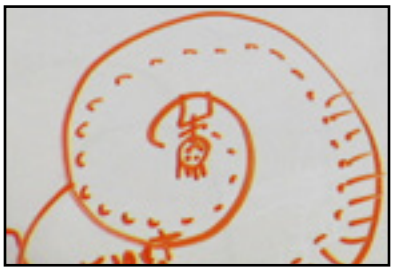
Jack inside the cochlea.

So Jack climbed into this room, and he found it was all dark in there. And there were three things up in the air. These were little tiny bones. One's called a Hammer, one's an Anvil, and one's a Stirrup. So hammer, anvil, stirrup. And Jack said, "Oh, cool!" And he climbed up on top of the bones. And they'd wiggle. So he jumped up and down on those. And of course, to the minion this sounds like somebody's banging a bass drum in his head -- bong, bong, bong! And he's shaking all around.

And Jack noticed that the last bone had another squishy trampoline thing there. And he was pushing on this squishy trampoline thing. And he said, "Yeah! Listen what's in there!" And he took his knife out and he cut a hole in that, and this, like, clear jello started to ooze out. He says, "Oh, boy, jello!" He took a big breath and dove into the jello.

And so now here's Jack inside of the jello stuff, holding his breath. And there's like grass on the floor. To Jack it looked like grass. It's really little tiny hairs. And this snail shell-looking thing is called a cochlea.

And Jack is in the minion's ear sensor thingamajiggy. And at the opening there -- it's like a nice big opening of a cave -- he hears birds tweeting. He hears all these high frequency tweet-tweet-tweet sounds, like that. And as he's walking along kicking the hairy stuff, it's making sparks. These are like nerve impulses. And he climbs in upside down, comes through the very center of the thing here, and there's Jack. And now, when he's way inside, he hears this really lowwww sound, because the low sounds can travel further along. And when he's moving around in there, the minion hears like somebody's making low-sounding notes, but he can't tell where they're coming from.



Jack all the way inside cochlea.

And all these signals from these little hairs are going into the minion's brain, which is the size of a walnut. It's a really tiny brain.

And now Jill's outside. She's saying, "Jack! What are you doing?" And Jack happens to be at the part of the ear where he can hear voices. And he says, "Mmmphhh!" Well, he's surrounded by jello. He can't talk. And Jill doesn't know if Jack's alive or dead inside the minion.

Well, Jill wants to rescue Jack, and she thinks he's in trouble inside this big minion. If you were Jill, what would you do?

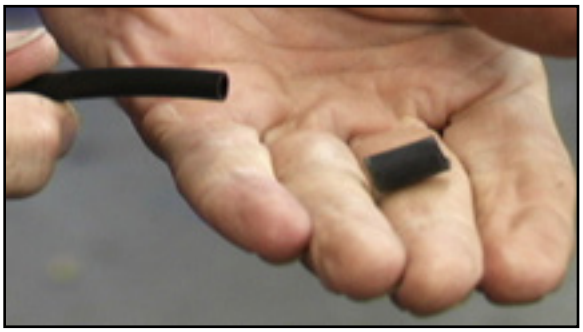
Imagination and Brainstorming Time

[Students make suggestions] (THERE ARE NO WRONG ANSWERS! Whatever they say, you should reply: "That's a good idea," "They might do that," etc. After brainstorming, proceed with the experiments, then finish the story.)

We'll leave this "To be Continued . . ."

Experiment: "*Stethoscopes*"

There are two versions of what you're going to make. Version one is, you start off with a tube. And if you stick this end in your ear, it's got sharp edges and you'd hurt your ear and say, "Ooh, that hurts!" So we're going to put something soft on the end. The soft thing is a piece of soft rubber tubing that we can squish right onto it -- squishy, squishy, squishy. You've go to wiggle and squish and push, and you talk to it, and it goes on. There. Now you've got a soft thing on there so it won't hurt your ear.



Drip tubing with end piece of softer surgical tubing.

First thing you're going to do is listen to your fingerprints. You stick this end in here *[puts one end of tube in ear]* and you take your finger and you gently rub it on the end, and you can hear the ridges of your fingerprints go by. *[Student: Don't blow in it.]* You could blow into it, but it will hurt your ear. Blow softly if you're going to blow in it. After we do that, I'll tell you the rest of the instructions. So first you're just going to make this. See if you can hear your fingerprints, and see how much it amplifies the sound. So you each get a tube *[passes out one tube to each student]*. Okay, everybody's got a tube. Now you need a soft thing *[passes out soft end pieces, one per student]*. And listen to that and see if you can hear your fingerprints.

Listening to fingerprints.

Would you guys want to make the more complicated version or the simpler version? *[Students: Complicated!]* The complicated version looks like this *[holds up a stethoscope with two earpieces]*. The simple version looks like this *[holds up a stethoscope with one earpiece]*. *[Students: Complicated!]* Okay, for the complicated version, you need another soft rubber thingy. And you put this on the other end of your tube. If you get it on there, stick one end in each ear and see if you hear anything. You can hear -- the left side of your brain can hear the right side of your brain.

Tube in both ears.

Now I bring along my super-duper cutters and just go chomp! *[cuts tubing in half]*. After we chomp them, you're going to put them back together with this impossible-to-put-on "T." The T has a top and a straight-downy thing. You take the top part and you put it in one tube. It doesn't have to go in all the way. And you put it on the other tube, like that. Then you twist the two so they look like horns, like that. Okay?


Cut the tubing in half.

So I'm going to give you the T's first, and then we'll come by and cut them *[passes out T's, then comes around and cuts each tube. Students attempt to fit the ends of the tubing onto the T.]* Okay, everybody's got cut horns.


T-connector

Now, you get a chance to burn your fingers. We always like a chance to burn our fingers *[Sets up a hot air gun with the nozzle facing upward]*. You take the two tubes and you bring them over here to this hot air gun, and then you stick just the ends in until they get warm. When the plastic is warm, then the T will slide right in. You can do two people at once on one hot air gun. *[Students take turns warming the ends of their tubes, then assemble the T's.]*


Warming the tips over the hot air gun.

When you're done, come and get another piece of tubing and stick it on the end of the T. *[When all students have finished warming their tubing, Instructor turns off hot air gun.]*

Now you need the sensor part. The sensor is a plastic thing just like the doctor had *[holds up the clear plastic lid from a 2-oz. souffle cup]*. Set the plastic thing on the table, put the cup on the plastic thing, smush it down til it clicks, and this goes onto your tube like that *[sticks third end of tubing into a hole in bottom of souffle cup]*. And it stays with just a little bit of glue *[uses a hot glue gun to apply some glue around the edges of the hole]*. Then you hold it until you get to be about twenty-five years old. Don't move a muscle. You want to make it so it doesn't fall off, okay? *[Instructor passes out souffle cups and lids, and students glue the tubes into the holes.] [Student: How far in should I put the tube?]* As long as it doesn't hit the plastic, it's good.


Apply hot glue around the edge of the hole.

Now, if yours is already glued, then we need the ear-holder-onner-rubber-band-things. Here is an ear-holder-onner-rubber-band. You just put it over the two earpieces, and you can either tie it on or tape it on. Now it will stay on your head wherever you put it. Better tape it on. *[Gives each student a rubber band and two pieces of duct tape to anchor it to the tubing.]*

If you have yours together, try to make it so that the ear things stay in your ears. You can just hold them in your ears if you want. You only really need one of them. Just hold one of them in your ear, because you really only need one, and listen *[places sensor over heart]. [Students try listening to their hearts.]*

Rubber band keeps tension on the tubing while student listens to his heartbeat.

What we're going to do is make your heartbeat louder. First, listen to your heart while you're sitting quietly in your chair. Don't run around yet. And search around til you find it. If you're sitting quietly, you should be able to hear your heart. *[Students listen for a minute or so.]* Search around until you find the spot. If you want, you can search around with your fingers first until you find the thump-thump. Now, when you find the spot where it seems best, remember that spot, set your stethoscope on the table, and remember where it was. For thirty seconds, we're going to run around, scream and yell, and be obnoxious and cause problems. Ready, get set, go! *[Students run around yelling and jumping.]* Stop!! Now go listen to your heart. *[Students listen again.]*

[Instructor brings out a two-part pump, each part having a pair of one-way valves, and connected by two hoses.] This is a model of your heart. This is as if you has a two-chambered heart instead of a four-chambered heart. This is a sensitive microphone *[small microphone is connected to speakers]. [Instructor places one hand on each pump.]* This has valves in it, so when I push one side or the other side, the water goes from one place to another. If I go like this *[alternately presses down on the pumps]* you can hear the water gushing around. I'm going to put the stethoscope on here *[holds microphone close to one of the valves, which makes a clicking sound under amplification]. [Student: Sounds like a horse running.]* That's the valve. Now, these valves, when they hit, they bounce, so it goes da-dit, da-dit, da-dit. Now here's the other one.

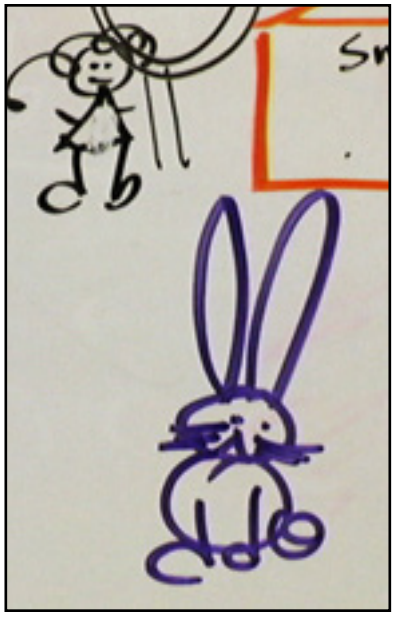
Two-chambered heart model.

Now, if you put it right against the tube and you listen carefully, you can hear the blood flow. That's the blood flow. It's actually water. So you hear the valve and the flow of the blood. But if somebody has a heart murmur, you can hear blood flowing with your stethoscope on their heart. *[Student: What's a murmur?]* A murmur is when there's a little hole between the two chambers, and blood is squirting between the two where it's not supposed to be going. And you hear this whishhhh after the thump -- whishhhh, thump, whishhhh, thump, like that. *[Puts away pump.]*

Put some sort of mark on the clear part of your stethoscope so you know which one is yours *[passes out permanent markers]*.

End of Story

**** DO NOT * present this part of the lesson until after the experiments!***



Jill ordered a rabbit with big ears.

Jill is trying to find where Jack is on the minion-zilla. So she called the Acme Store of Everything and ordered a rabbit. A rabbit with big ears. And she said, "All right, rabbit, we need your ears. Come along with me." So Jill grabbed the rabbit, ran over to the minion, and climbed on top of his head. And she put the rabbit's ears against the minion's head. And she said *[loudly],* "Jack, are you in there?" And Jack could barely hear her. He said, *[in a faint voice]* "Yeahhh! I'm here!"

And the rabbit said, "I hear him. He's in the ear." And Jill said, "In your ear?" The rabbit said, "No, silly, in the minion's ear!" And Jill said, "Okay, which one, rabbit?" He said, "I don't know. Let's try one." So the rabbit moved over this way with Jill, and Jill yelled again, and sure enough, Jack was inside that ear of the minion.

And the minion was looking around like this saying, "What's going on up there?" He didn't know what was going on. And Jill said, "Jack! Can you find the brain? Go to the brain!" And Jack said, "Okay!" And Jack took out his pocket knife, cut a hole through the cochlea, and found a huge empty space inside. Big cavern, he could hear echoes -- Hello! Hello! Hello! And then he saw some lights and sparks and things, and he went over there, and there was this teeny little brain. And Jack said, "I think I found it." And Jill said, "Well, grab it and see what happens."

So Jack grabbed the brain and the minion went, "Aaaaaahhhh!!!" and lifted up one foot. And Jill said, "Cool! Now grab it somewhere else." Jack said, "Okay." And the minion went, "Aaaaahhhh!!" and he lifted up the other foot. And Jill said, "Perfect! Now you know how to make him walk. Make him walk. Let's see where he goes."

So Jack was going *[grabbing the brain on alternate sides],* and the minion's going, "Ahh, ahh, ahh!" *[walks awkwardly],* like that. And Jack wasn't being really perfect about where he was putting his hands, and the minion started to turn around. And it came back toward Evil Mister Fred's castle. And Jill says, "You're doing good! Just keep going."

And it stepped on Evil Mister Fred's castle. And Evil Mister Fred. And Jack and Jill said, "Hey, we can use this. He's a handy thing. We can use it to build stuff. You've got control of this minion." And they used the minion to build all kinds of cities and stuff. And everyone lived happily ever after, except Evil Mister Fred.

End of Lesson

If you have questions about this lesson, please ask them through the online Teacher Support Forum on our web site.