



Teacher's Guide for:
Mirror Mylar Masks

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.

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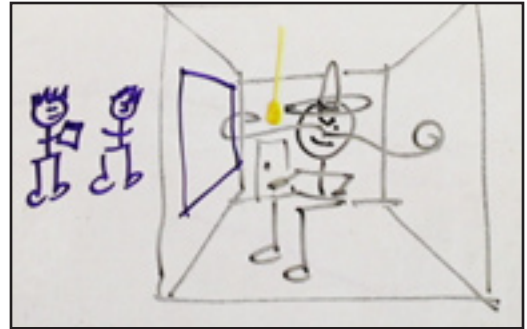
Mirror Mylar Masks
A Rock-it Science Lesson
Filmed October, 2009

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Intro Quick Recap:

- Suppose you have a clothing store. How could the mirrors in the store help you sell clothes to overweight people?
- Show students a large flexible mirror. Hold it in various positions and bend it both concavely and convexly to show how the reflection changes.
- In police interrogation rooms, there is a one-way window. How is that possible?



Police interrogation room with mirror.

Experiment Quick Recap: "Mirror Mylar Masks"

- Give students scraps of mirror mylar. Have students hold the pieces in various positions and bend them various ways to see how their reflection changes.
- Tell them to try to make their reflection appear upside down, or skinny or fat, or appear to have extra eyes. If they hold the mylar very close to their face, can they see through it?
- Give students a piece of defective mirror mylar that they can partially see through and let them repeat the process.
- Give students a slightly better piece of defective mylar that they can see through, large enough to use for a mask.



Looking at distorted reflection in mylar.



- Students can decorate their masks using glue guns and pom-poms, pipecleaners, and colored markers.
- The Teacher punches a hole in either side and the student can tie a long skinny balloon through the holes to hold the mask on.

Equipment List: "Mirror Mylar Masks"

Items needed for Instructor:

- Mirror, flexible plastic, about 24" x 48"
- Paper punch
- Balloon pump

Items needed for Students:

Consumables (per student):

- Mirror mylar scraps, some opaque and some that you can partially see through
- Mirror mylar, see-through, about 6" x 10"
- Pom-poms, assorted colors and sizes, 4 per student
- Pipe Cleaners, assorted colors and styles, 4 per student
- Balloon, skinny, 2" x 60" 1 per student

Other:

- Markers, permanent, colored
- Glue guns
- Scissors

Prep Work:

- Cut pieces of mylar to size for masks. Scraps can be used for first part of experiment.
- NOTE: The mirror mylar used in this experiment was a manufacturing reject. We found it at R.A.F.T. (Resource Area for Teaching) in San Jose, CA.



Assorted pipe cleaners and pom-poms



Balloon pump

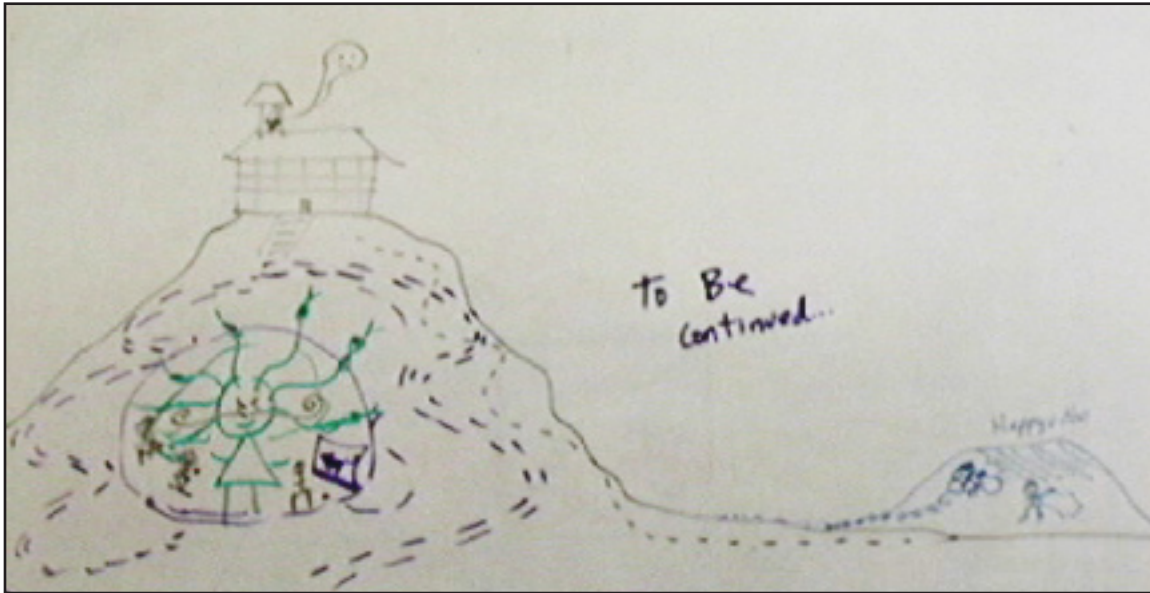


Skinny balloons



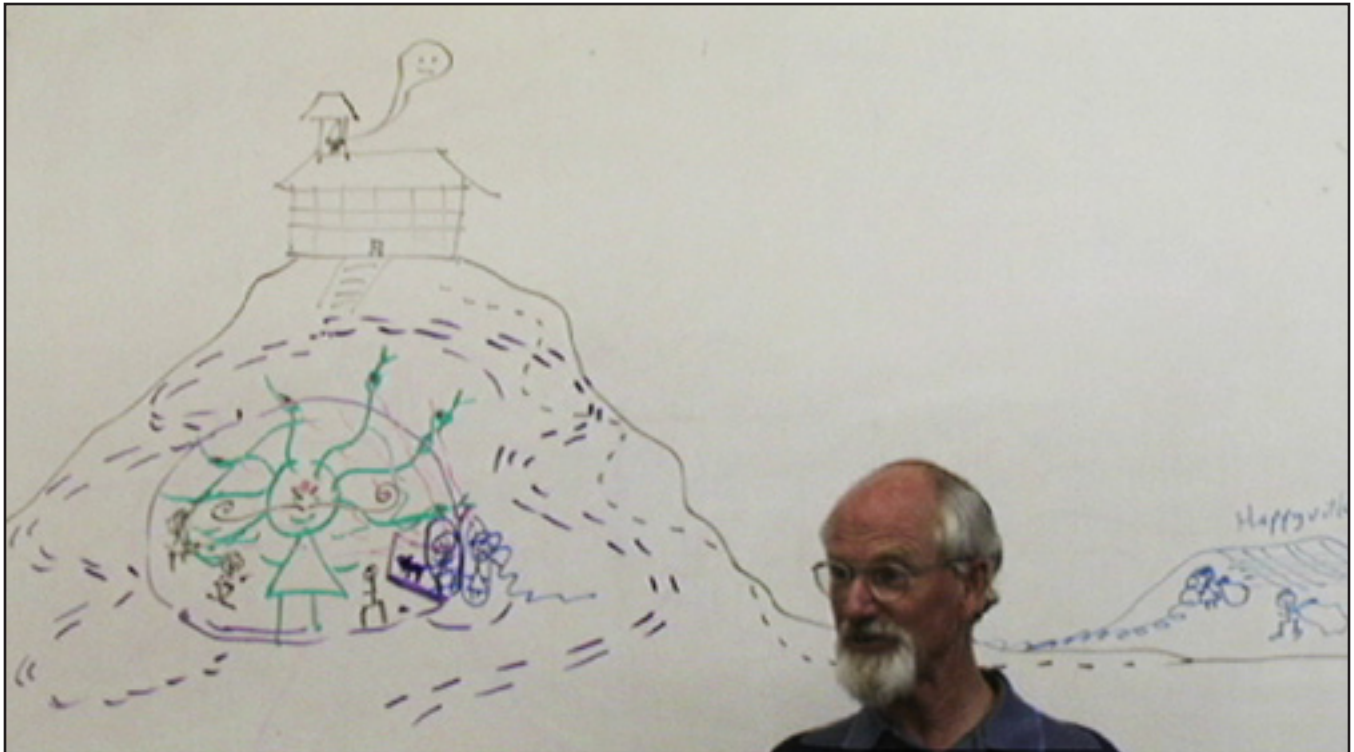
Paper punch

Story Recap: "Jack & Jill and the Medusa"



Part 1:

- Evil Mister Fred was surfing the internet and met Medusa. She was sad because whenever she went on a date, the men would always turn to stone.
- Medusa has long thick hair made of snakes with red eyes. As long as the snakes are all looking in different directions, there's no problem, and she can walk down the street. But if something grabs the snakes' attention and they all turn and focus on one person at the same time, that person turns into stone.
- Evil mister Fred invited Medusa to a Halloween party at his house. He bought a big haunted house from the Acme Store of Everything and dug a basement underneath it with lots of tunnels leading to Medusa's room. If anyone goes through the door leading to the basement, the door slams shut behind them.
- In Medusa's room, there's a big screen tv that the snakes like to watch. Evil Mister Fred has a remote control that he can use to turn the tv on and off. When he wants to visit Medusa, he turns it on so the snakes won't look at him.
- On Halloween night, Evil Mister Fred invited all the kids in Happyville to come to his haunted house. He wants to turn them into statues and then sell them.
- Thousands of children come, along with Jack and Jill. The children enter the house and are lured into the basement. They run through the tunnels and end up in Medusa's room, where they get turned to stone.
- Jack and Jill approach Medusa's room and realize what she is, just in time to close their eyes so they don't look directly at the snakes.



Ending:

- Jack and Jill called the Acme Store of Everything and ordered some reflective shields.
- They jumped out and made noise so the snakes would look at them and Medusa would see her own reflection and turn into stone.
- When the snakes looked into the mirrors with all their intensity, the mirrors got really hot. Just before Jack and Jill had to let go of the shields, the energy from the snakes' eyes hit Medusa right in the middle of the forehead.
- All the life energy from the children she had turned to stone came out of her and started to move around the room. And it was angry at her.
- It grabbed Medusa and threw her up into the air. She made a hole in the ceiling and went crashing right up through the haunted house above, where Evil Mister Fred was sitting. And she crashed right through Evil Mister Fred.

Transcript: Intro

[Teacher holds a large plastic mirror so students can see their reflection in it.]

Suppose you have a clothing store, and you're selling clothes to rich people. And suppose the rich people are kind of overweight, but you want them to buy lots of clothes. So you get yourself a plastic mirror. What could you do with a plastic mirror to help you sell clothes to rich overweight people? *[Student: You make them look smaller.]* You make them look smaller. Would you want to make them look shorter or thinner? *[Students: Thinner.]* Thinner. How could you make them look thinner? *[Student: Turn it sideways.]* Turn it sideways, okay. *[Turns mirror sideways and bends it so it's slightly convex.]* There. Are they thinner now? *[Student: They're fatter.]* Are they fatter now? I'll bring it around and you can tell me if you look thinner or fatter. *[Walks around with mirror so each student can see their reflection. They all see themselves as fatter.]*

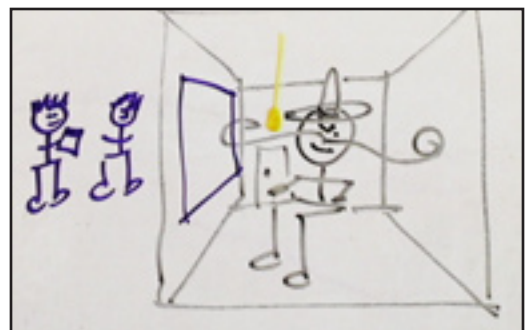


Students see their distorted reflection in the flexible mirror.

Well, that's not going to work. They probably won't spend as much money if they look fatter in your fancy clothes. Now, you notice I bent the mirror slightly. Can you tell which way I bent it? *[Student: Inward.]* Inward. Okay, let's try bending it outward. There. Are you thinner now? *[Student: Yes.]* Can you see it from where you are? *[Student: Yeah, I'm much thinner now.]* You're much thinner now. So, if you've got to put mirrors on your walls, you can make them bent as much as you want *[bends mirror deeply]*.

Now I'm going to bend it farther this way. I'm going to start back here *[moves further away from students]*. Can you see yourself? Are you right side up or upside down? *[Moves back and forth so students can see their reflection change.]* Sometimes if I turn the mirror like this, you'll see your whole self rotate *[moves mirror in a wave motion]*. Are you rotating the same amount that the mirror's rotating, or more? *[Student: More.]*

So we can distort you with a mirror as light bounces around you. They have in movies and things -- they'll have a room where they have the bad guy sitting on a chair. And he's sitting in this room. There's a door in back. Does he look like he's in a room? And they put a lightbulb hanging from the ceiling right in front of him. They turn it on full power so he's sweating. And they ask him all kinds of questions. Where were you



Police interrogation room with mirror.

on Thursday night at eleven-thirty in the evening? They're grilling him to find out if he did some dastardly deed.

On the wall there's a big mirror. And on the other side of the wall there are psychologists and detectives and people watching him. How could they be watching him? [*Student: They see him?*] How could they see him? [*Student: It's transparent.*] It's transparent. [*Student: On one side.*] On one side. How could you have a transparent mirror? Well, we're going to experiment with that a little bit today to see what we can do with mirrors. And in the end we're going to have something that you might use if you want free candy. Because at the end of this week it's free candy day.

Story: "Jack & Jill and the Medusa"

Well, we need a crazy story. Then we'll do some experiments. Let's see. Let's suppose Evil Mister Fred was surfing on the internet and he met a lady named Medusa. And Medusa said she's always having a bad hair day. She tries to comb her hair, and the hair keeps moving all around, and she's got real thick hair, too. And Evil Mister Fred said, "Are you sure this is a problem?" And she said, "Yeah, yeah, yeah, my boyfriends, they're nice and friendly on the first date. And then after that, they don't say anything or do anything." And Evil Mister Fred said, "Hey, I'd like to meet you!"

So here's Medusa. And she's got this long thick hair. And she tries to comb it and the hair hisses. What kind of snakes should we have on it? [*Student: Cobra.*] Cobras. Okay, if they're cobras they have fat necks, like that. So she's got all these cobras on her head, lots of them. And the problem is, the snakes have red eyes. So if the snakes look at you, they'll turn you into stone. And it's not just a quick glance. You have to have a bunch of snakes all look at the same time at the same place, and pffttt! -- they can turn somebody into stone. So she's just walking around the streets of New York, and the snakes are looking in every different direction, and people aren't turning into stone everywhere. But if the snakes all get distracted, and they see one person who's shouting, then whoosh! -- turns them into stone.

And Evil Mister Fred wants to make friends with Medusa. And she's got a mustache. So he sends her an email and says, "Hey, Medusa! We're having a Halloween party over at my place. Why don't you come along? We'll have some fun." And Medusa says, "All right!" So Evil Mister Fred rented some land, a big hill. And he called the Acme Store of Everything and he ordered a haunted house, complete with those steps.

And haunted houses should have lots of rooms in them, with

several floors. It should have a bell tower. These haunted houses usually have a bell tower with a ghost coming out, like that, with a bell inside.

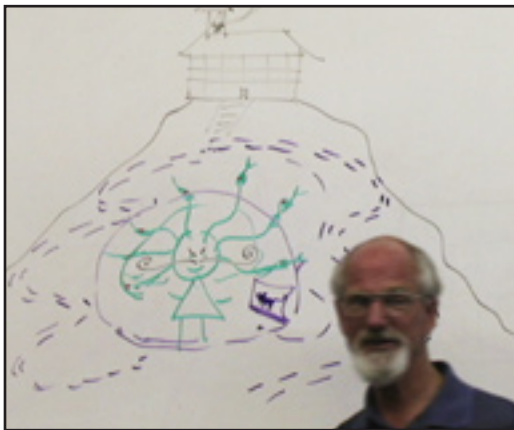
Underneath the house, there are tunnels under the house. Tunnels go all over the place. So if you happen to go into the house and go down into the basement, there are doors all over in the basement. You open a door and you go inside, and wham! -- the door slams closed behind you. And you find yourself in this dirt tunnel. And these tunnels go everywhere.



Medusa and red-eyed snakes.



Haunted house with bell tower and ghost.



Medusa's basement with tunnels and tv.

All the tunnels happen to lead to the same place, however. That's where Medusa is. And Evil Mister Fred has invited her down and created a big chamber for her and set up a big screen tv. But he's made it so he can turn the tv off. The big screen tv is showing programs about mice. Why would he show programs about mice? That's because the snakes will be watching tv, and if Evil Mister Fred goes in to say hello to Medusa, the snakes won't look at him and turn him into stone.

So now Evil Mister Fred's got this trap all set up. He wants people to go in there, and he can turn off the tv. Someone walks in and the snakes all go [*swings head around to stare in one direction*] and look at the person, and pffft! -- turn them into stone. And he's going to sell them as statues and make a lot of money. Pretty good business.



Jack and Jill in Happyville.

And nearby we need a small town. Should it be Goodville or Happyville? [*Students: Happyville.*] Okay, so here's Happyville up on the hill. And all the children are out going door to door collecting candy. And Jack and Jill are out there. They're collecting candy for the poor. They're not going to eat it themselves. At least, that's what Jill said. Jack said, "Huh! Right." And Jack is stuffing his face as he's walking along. And all the kids in town said, "Hey, did you hear about

it? They're having a big party at the haunted house on top of the hill. Somebody spent a lot of money. We've got to go up there and see what's going on." Jack and Jill said, "All right! Let's go!"

So they were all running up the hill, going up the road. And Jack said, "You know, there's a lot of kids going up there. It's a pretty big house, but it seems like it should be full by now." And Jill said, "Yeah. I wonder where they're all going." And they followed the kids up, and they saw the entire house was empty. And they said, "Uh-oh. This is bad."

And they explored from room to room, and there were no kids in there. All these arrows and footprints painted on the floor said, "Walk this way." So Jack and Jill started following the arrows and the footprints. And they went down staircase after staircase, down into the lowest part of the basement. And there was all the doors. And Jack and Jill went through the doors, and they heard kids running and yelling and screaming as they're going through all these tunnels. And then, after awhile, it was quiet. Jack and Jill said, "Uh-oh." So they went further and further down, and they were sneaking around. And they came around the corner and they looked into the room, and here were kid statues everywhere, thousands of them in various poses. All these children turned into stone.



Statues of children.

And Jack and Jill said, "Oh, no!" And they saw the green lady there with all the snakes. And they said, "I don't believe it! It's true! That's a Medusa!" And the snakes heard a voice, so they all turned around, and Jill went [*closes eyes*] and closed her eyes and moved out of the way.

Now, if you were Jack and Jill, and you wanted to rescue all those kids, and you didn't want to get turned into stone yourself, 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: "Mirror Mylar Masks"

[Teacher sets up a table cover and glue guns.] They may take about five minutes to warm up. So while they're warming up, we can do other experiments. You're going to pick out some mirror mylar, any shape or size you want. You take some mirror mylar and look at yourself in it, and see what happens to yourself as you bend it. Also try holding it really close to your face to see if anything happens that way. You can try rolling it up and looking inside like that. Whatever experiments occur to you, you can try them out. *[Students pick out pieces of mylar.]* *[Student: Are we going to make our own mirror?]* Well, first you're going to experiment with them and see what you see. Try to make yourself upside down or right side up. Try to make yourself skinny or fat. Try to give yourself some extra eyes if you want. If you put it really close to your face, can you see through it or not see through it? *[Students experiment with the mylar for a few minutes.]*



Looking at reflection in mylar scraps.

Now I'm going to give you a different piece. When they make mirror mylar, it goes through a machine into a tank, and it gets coated on one side with aluminum. When the tank doesn't work right, it looks all spotted. And when it gets spotted like this, they don't bother to leave it in a long time, so we'll see what happens here. I'll just randomly cut off some pieces *[passes out a piece to each student.]* Don't be gluing things yet; you're going to be gluing things in a minute. I want you to see these to see how these are different from what you have. And check to see if you see any colors in there.

Have you guys ever looked at bubbles and seen colors in bubbles? How do the colors get there? Does somebody leave some paint in the bubble mix? No? Must get there somehow. *[Teacher passes out another piece of mylar to each student.]*

Now, what you're going to be making is a type of mask. Ideally, you'd like to be able to see through your mask. If you have a piece of mylar that you can't see through and you put it on as a mask and go wandering around, you'll bump into stuff and fall off things and get run over by cars and trucks and things like that. So we're going to give you some choices of what you make the mask out of. When you decide what you make it out of, we're going to poke holes in each side. Balloons are good. You can either use the balloon as a rubber band and tie it onto holes in each side of the plastic. We're going to punch holes in both sides. You could tie it on here and on there, and then when you put it on your head,

it'll stay. Of course, you could also blow the balloon up and make a circle around your head and tape this onto that to create a mask-type thing.



Decorated masks with balloons tied on.

We have some better quality plastic that you can see through. This material -- you get a choice. You can either have a small piece that has the same amount of mirroring over the whole surface, or a bigger piece that doesn't have high-quality mirroring over the whole surface. So when I come by, you say either "small" or "big." *[Teacher passes out new mylar pieces.]*

Now you can glue stuff to it. You're supposed to make it into like a monster mask or whatever kind of mask you like. You get a choice. You can use up to four pom-poms, up to four pipe cleaners, and you can use as much ink as you want if you want to draw on them. *[Student: What about scissors?]* Yes, you can have scissors. *[Students select their decorations, return to their seats, and start gluing and drawing on their masks. When they're ready, the Teacher punches holes in either side of the mask so they can attach the balloon. When the time is up, the Teacher and students clean up the supplies before continuing the story.]*

End of Story

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

So Jack and Jill were down there. They saw Medusa there, they saw all their friends had been turned into stone. They said, "Oh, no! This is horrible! What a catastrophe! A disaster! All of our buddies are turned into rocks." And Medusa could hear their voices, and she said, "Mwa-ha-ha! Two more. I'm going to go get them."

So Medusa started searching for Jack and Jill. Jack and Jill said, "We've got to do something fast." So they called the Acme Store of Everything and they ordered some shields.

So let's put Jack in there. Jack is hiding behind this mouse. And he bought himself a shiny new shield, like that, and Jill bought herself a shield that they could hide behind. And they were mirrored, like yours is. And Jack said, "This should work good. All we have to do is jump out there, make a lot of noise, the snakes will look at us, and their own reflection will bounce back and maybe Medusa will turn into stone." And Jill said, "Yeah, or all the energies she sucked out of those kids could explode and blow us and this entire hillside to smithereens." And Jack said, "Huh. What are the odds of that?" And Jill said, "Oh, about a hundred and eighty-six million, three hundred and forty-two thousand to one." And Jack said, "I like those odds! Let's do it!"



Jack and Jill with reflective shields.

So Jack and Jill jumped out right in front of Medusa and said, *[makes silly noises]* "You can't see us!" And all the snakes went vroom! -- and stared right at Jack and right at Jill, half of them at Jill, half of them at Jack. And all of their eyes were trying to burrow through those mirrors, and Jack or Jill would say, "You can't get us. Ha, ha, ha!"



Red energy hits Medusa in the forehead.

And the snakes got really mad, and they gave it all they had. They poured tremendous amounts of energy into the shields. When they did, that energy started to heat up the shields. The shields turned red hot. And Jack and Jill said, "Uh, oh. We didn't plan on this. These things are cooking!" But the light was bouncing all over the room. And just when Jack and Jill thought they'd have to let go of the shields, the energy hit right in the middle of Medusa's forehead. And now, all the life energy of all those thousands of children came out of her and started to go around the room, saying "Fi, fi, fo, fum!" And it saw Medusa, and it said, "You're the one!" And it grabbed

Medusa and threw her up into the air. And she made a hole in the ceiling, a Medusa-shaped hole. *[Student: What about Evil Mister Fred?]* He's in the haunted house up above.



Medusa crashes through the ceiling.

So now Medusa's traveling through the earth at about a thousand miles an hour. And she hit Evil Mister Fred's haunted house. What should Evil Mister Fred be doing in there? I think he should be sitting here laughing because of all the problems he's created. So he's saying, "Mwa-ha-ha!" And Medusa bursts through the floor and goes right through Evil Mister Fred. *[And they all 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.