



Teacher's Guide for: **Grow Snow**

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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Title Page of Video

Grow Snow
A Rock-it Science Lesson
Filmed July, 2009

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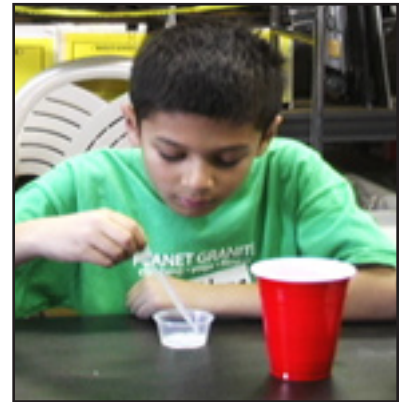
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Intro Quick Recap:

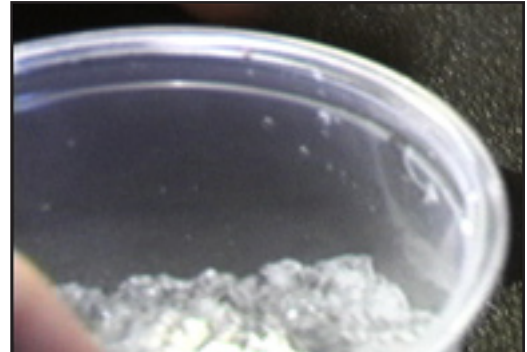
- Sponges are made of cellulose.
- Humans can't digest cellulose, but cows can.
- A chemist tried mixing cellulose with other chemicals and came up with something really great, but we're not going to tell you what it is until later.

Experiment Quick Recap: "Grow Snow"

- Each student gets a 2-oz plastic souffle cup and a plastic pipette.
- Every two students get a cup of water.
- Instructor puts a 1/4 teaspoon of large-crystal Polyacrylamide Copolymer (SoilMoist) in each cup (slow-growing crystals).
- Students use the pipette to add water to the SoilMoist and see what happens.
- When the cup is about half full, students can stir it with their finger to see how it feels.
- Pass out new cups to students.
- Instructor puts a 1/4 teaspoon of small-crystal Polyacrylamide Copolymer in each cup (fast-growing crystals).
- Students add water a few drops at a time, stopping to observe each time.
- When finished, students put their cups and contents into a ziplock bag and seal it.
- Students wash hands, then write their names on the ziplock bag.



Add Water to Crystals.



Expanded Crystals.

Equipment List: "Grow Snow"

Items needed for Instructor:

- None

Items needed for Students:

Consumables:

- Souffle cups, plastic, 2-oz (2 per student)
- Pipette, plastic (1 per student)
- Cup, plastic, 16-oz (1 per 2 students)
- Water (about 8 oz per 2 students)
- Polyacrylamide Copolymer (SoilMoist, large grains for slow-growing crystals), 1/4 tsp per student.
- Polyacrylamide Copolymer (Grow Snow, fine grains for fast-growing crystals), 1/4 tsp per student.
- ZipLock bag, 1-qt size (1 per student)

Other:

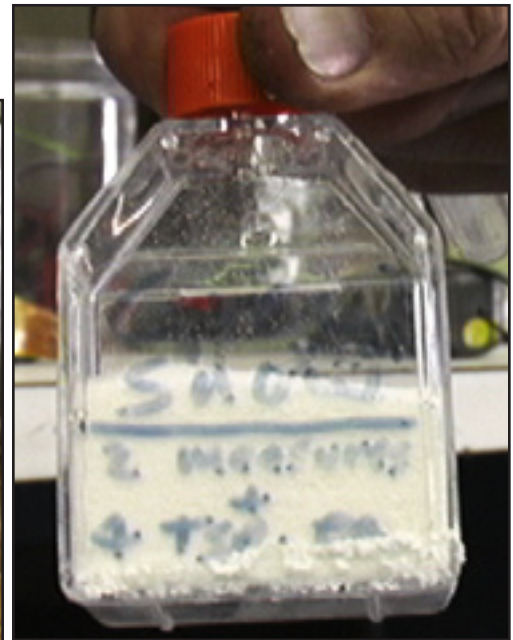
- Markers, permanent, colored (to write name on bag)

Prep Work:

- "Soil Moist" can be found at gardening supply stores.
- "Grow Snow" can be found online, but you can also get these small crystals by cutting open a disposable baby diaper and taking them out of the lining. We found a web site that gives step-by-step instructions for how to do this:
http://www.education.com/activity/article/Diaper_Science_middle/

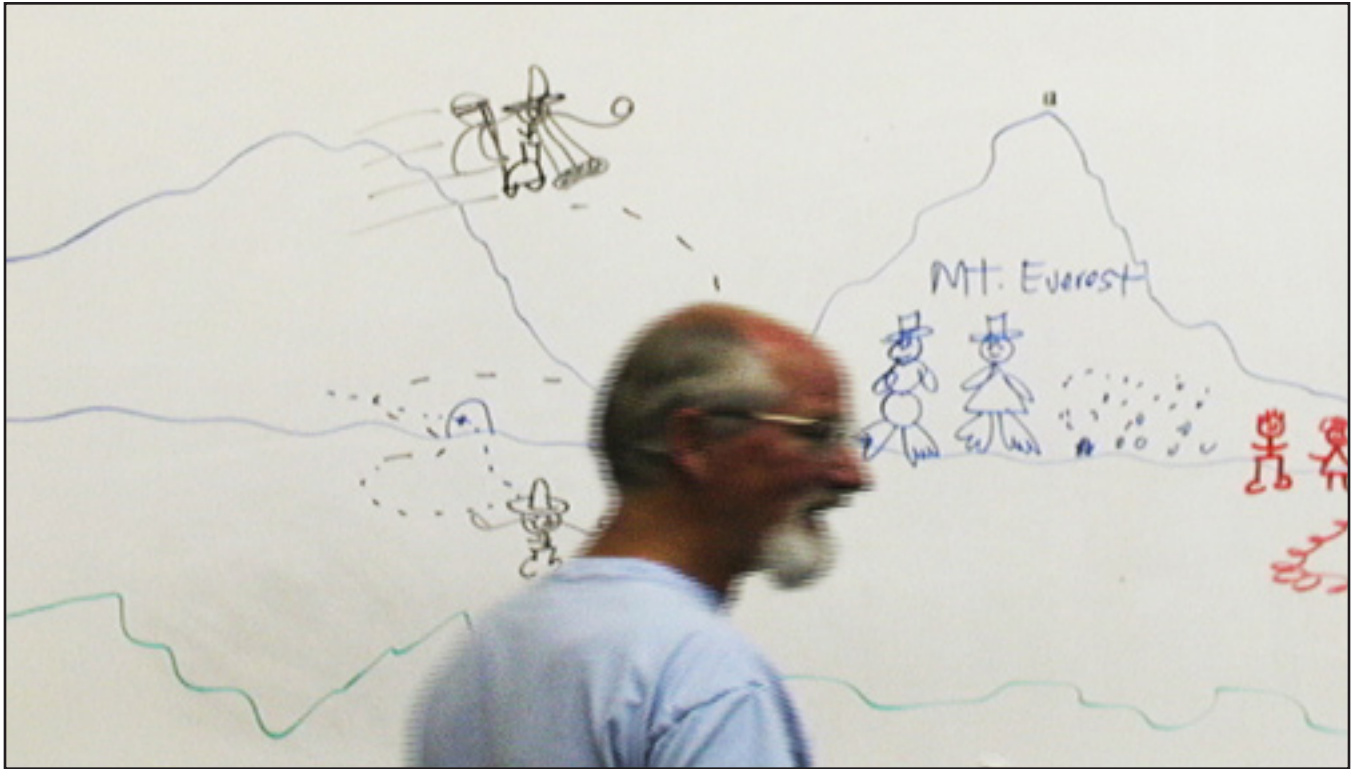


"Soil Moist" -- Large-grained Polyacrylamide Copolymer crystals.



"Grow Snow" -- Fine-grained Polyacrylamide Copolymer.

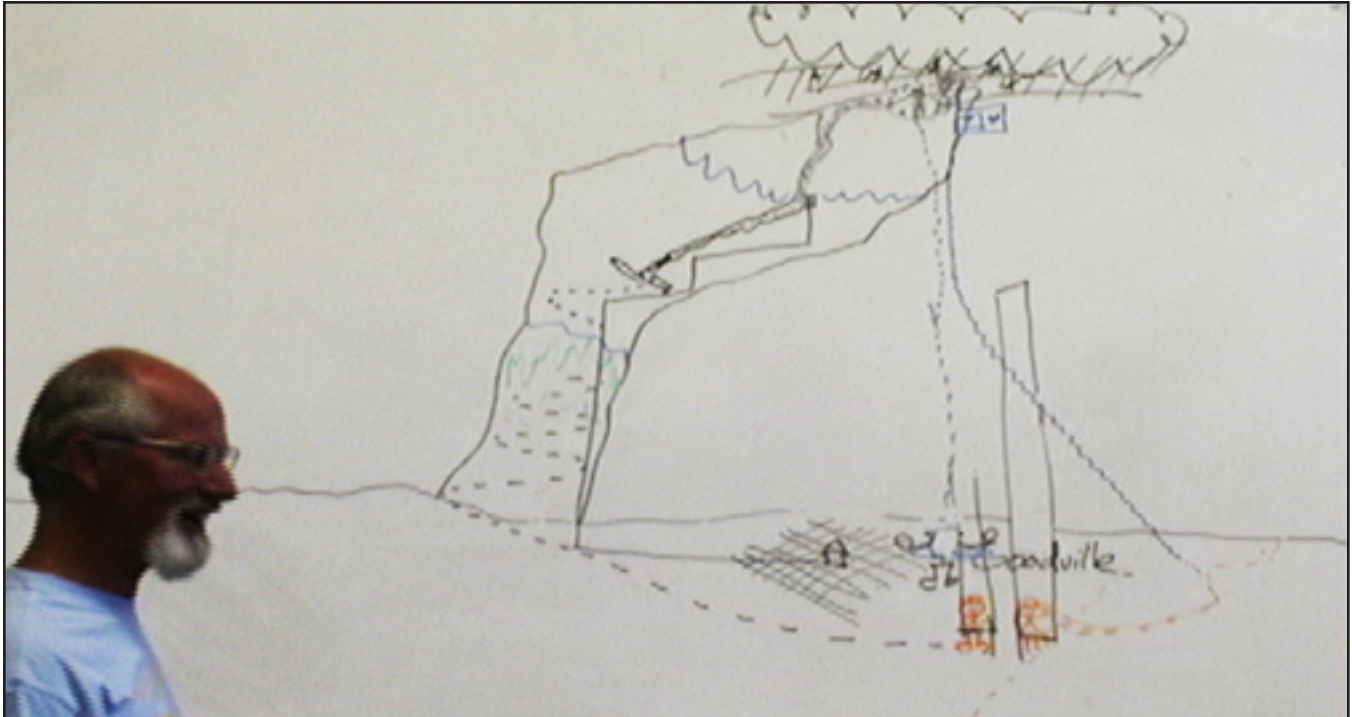
Story Recap: "The Abominable Snow Babies"



Part 1:

- Mr. and Mrs. Abominable Snowman live on Mount Everest. They're extremely tall.
- They have hundreds of snow babies.
- The babies are so small, their parents are always stepping on them.
- They want to find a way to make the babies grow faster, so they call Jack and Jill.
- The Abominable Snowpeople assure Jack and Jill that they're not evil; they just scare people because they sneak up on them.
- Jack and Jill suggest packing more snow onto the babies, but the parents already tried that and it didn't work.
- Evil Mister Fred is flying around on his vacuum cleaner looking for the Abominable Snowman's footprints so he can capture it and use it to scare people to death and take over the world.
- He spots the footprints but also sees Jack and Jill there.
- He orders a flute from the Acme Store of Everything and starts playing it.
- The snow babies are attracted to the flute music, and Evil Mister Fred leads them into a cave and locks them in.
- He sends a ransom note to the Abominable Snowman, telling him to bring the money in person. He intends to trap the snowman, take the money, and not give back the babies.

Story Recap (cont.):



Ending:

- The minions with their baseball bats are guarding the front of the cave.
- Jack and Jill start throwing snowballs at the minions, who try to hit them with their baseball bats.
- When they throw a snowball exactly halfway between two minions, both minions will try to hit the snowball and hit each other instead.
- They all start fighting each other, so Jack and Jill can sneak up to the door.
- They hear Evil Mister Fred inside being tortured by the snow babies.
- Jack and Jill call the Acme Store of Everything and order some food for the babies.
- They add lots of polyacrylamide copolymer to the food, leave it at the cave entrance, knock on the door, and run away.
- Evil Mister Fred brings in the food, not noticing that the minions aren't guarding the entrance.
- As the babies eat, they get bigger and bigger until Evil Mister Fred starts getting crushed.
- The babies got so big, they lifted the mountain off its base, and there were large cracks in the side of the mountain that looked like an evil face.
- The minions see the evil face and run away.
- The giant baby snowpeople came running out, and one of them accidentally stepped on Evil Mister Fred.

Transcript: Intro

The sponge is made out of a chemical called cellulose. Cellulose is things like sawdust, plant material, leaves, and things like that. If you guys eat cellulose, it goes right through you. It doesn't digest well inside of humans. If a cow eats cellulose, it goes into its stomach. There's bacteria there that goes chomp, chomp, chomp, chomp, chomp, and eat it all up. Well, some scientist said it would be fun to take cellulose and mix it with other chemicals and see what happens. And he did. And when he was all done, he said, "Whoa! This is the most fantastic thing I've ever invented. I'm going to be rich, and I'm going to be famous." And the product he created is used in almost any family's house. I'm not going to tell you what the product is until later. But first, we need a crazy story.

Story: "The Abominable Snow Babies"

Let's see. Once upon a time, let's make this take place in someplace where there are really tall mountains. China. Okay, let's make this take place in China. [Student: Mount Everest.] Okay, this is Mount Everest. And there's snow everywhere. Below the snow there's rocks. Below the rocks there's forest. Up on Mount Everest, there's a snowman called the Abominable Snowman. He wears a hat, and he's got evil eyes, and he's got big feet. And the Abominable Snowman met Mrs. Abominable Snowman, so I guess she'd be Mrs. Abominable Snowwoman. There. And she's got big feet, like that. And the Abominable Snowman is about as tall as this building is inside. He's really big. And he and Mrs. Abominable Snowman had babies. But the babies were little tiny snow people. There were lots and lots of little baby snowmen, all over the place. And the Abominable Snowman was ashamed of his little children because they were so tiny and it was hard for him to move around, because wherever he stepped he'd have to actually watch -- "Oh, no! Oops, there goes another one." -- because they were always underfoot. And he said, "We've got to do something about this. We need to make those little kids grow fast."



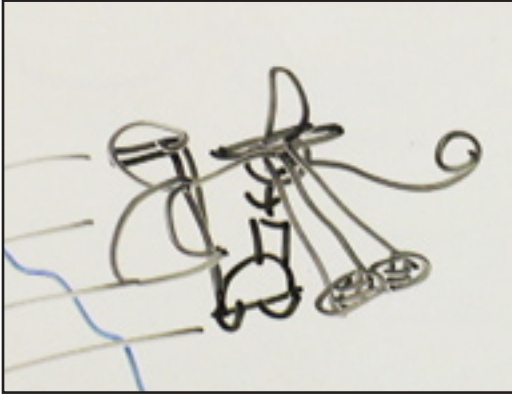
The Abominable Snowman and his wife.

So they called Jack and Jill. They said, "Hey, Jack and Jill, we need some real help up here. We have children, and the children are really tiny, and we keep stepping on them. Then we have to put them back together again." So Jack and Jill showed up and said, "Wait a minute! Aren't you two the Abominable Snowpeople that everybody's so afraid of?" And they said, "Yeah." And Jack and Jill said, "But, do you beat up people, or eat them?" And he said, "No, not really. We just go out there when they're in our territory and we sneak up on them. And when they least expect it, we tickle them behind the ears. When they turn around, they see us because we're huge, and we go 'Hi!' and they run away screaming. I don't understand why. We're just trying to be friendly." And Jack and Jill said, "Okay, I think I understand what's going on here." And they looked at the itty-bitty little



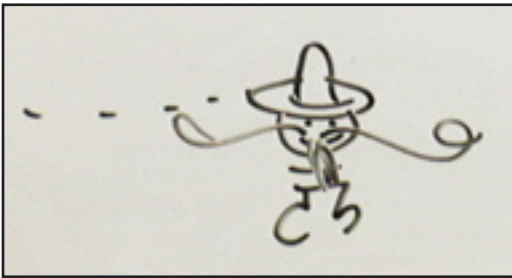
Jack and Jill and the Snow Babies

snowmen, and they held one in their hands, and they said, "Wow! These are really small. Have you tried packing them with more snow?" And the Abominable Snowman said, "Yeah, we've packed them with more snow, but they just kind of fall off and it's like a snow egg around them."



Evil Mister Fred and his Binoculars.

Now, Evil Mister Fred heard about these Abominable Snowmen, and he wanted to capture them and use them to scare people to death so he could take over their cities. So he's out flying around on his vacuum cleaner, searching for snowman footprints. There he goes. And if you're looking for snowman footprints, you need some good binoculars. So he's flying around, searching the ground, and he finds snowman footprints. He goes, "Whoa, I'm on the trail!" And he runs right across Mr. and Mrs. Abominable Snowman and sees Jack and Jill there. And he says, "Oh, no! My enemies found them before me. This is terrible! But I'll catch them some way. I'll use my crafty cleverness to catch them."



Evil Mister Fred playing his Flute.

So Evil Mister Fred landed his vacuum cleaner, called the Acme Store of Everything, which is right nearby, and he ordered a flute. And Evil Mister Fred was walking around playing the flute. And as he played the flute, the music reverberated off the cliffs and was going everywhere. And the little tiny snowmen could hear the music. And they said, "Oooooohh, I like that music!" And they started walking towards Evil Mister Fred. And Evil Mister Fred was walking backwards, playing the flute, and little did he notice, but soon all thousand of the

little tiny Abominable Snowmen started to come towards him. He said, "Yeah!" And they followed him closer and closer, and he walked backwards and backwards, until he came to a cave. And he went inside of the cave, and all the little Abominable Snowmen went in with him into the cave. And he closed the door -- ka-boomf! Now he's got all the little babies.



Leading the Snow Babies to the Cave.

And he sent a letter to Mr. and Mrs. Abominable Snowman. He said, "If you ever want to see your children again, you've got to pay me a billion dollars and come deliver it in person." He figured now they'll come to him, he'll trap them, and he won't even give them the babies back. He'll take the billion dollars, steal the Abominable Snowman, and then go on his way as happy and as rich as he can possibly be.

Now Jack and Jill are there. They saw the ransom note, and they knew what Evil Mister Fred was up to. If you were Jack and Jill, what would you do to stop The Evil Mister Fred?

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: "Grow Snow"

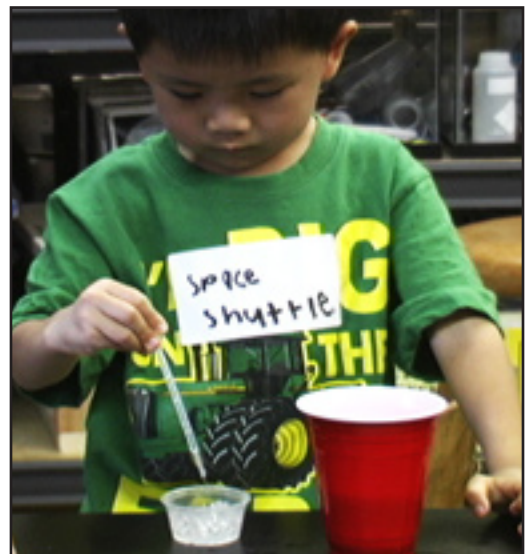
We're going to give you each a cup like this one. And we're going to put in one-quarter teaspoon of snow stuff. And then we're going to give you water and a squirter, and you're going to keep squirting water in it and see what it does. *[Assistant passes out cups and pipettes.]* Okay, now we'll put a few cups of water around so you can get water. *[Puts cups of water on table, one cup per two students.]* And don't squirt the water at your neighbors. Don't squirt it anywhere exactly until we give you your snow stuff. Then when you get your snow stuff, you're going to dribble it in one at a time and see what happens. Should we do the fast stuff first or slow stuff first? Let's do the slow stuff first. Slow stuff is easy. Slow stuff is SoilMoist you can buy at garden supply. It's like crystals. *[Instructor puts the snow in each cup.]* You can feel these crystals. This is not food. It won't hurt you, but don't eat it. It says right here on the box, this is polyacrylamide copolymer. As soon as you have the stuff and a squirter and a water, then you can start adding water to it. *[Student: You mean the salt?]* It's not salt, it's polyacrylamide copolymer. *[Students start slowly adding water to their snow.]* Keep squirting the water in there. You can squirt slow, you can squirt medium, you can squirt as many times as you feel like. But you have to do squirts, you don't get to pour.

When it gets about half full, try stirring it awhile and see if you see anything going on. You can stir with your finger. You can feel them if you stir with your finger. *[Student: What's this stuff on my fingers?]* The stuff on your fingers? It's gel. It's polyacrylamide copolymer. Now, if you end up with a whole bunch more water and it just looks like a lake, you can pour some of the water back into the cup. Just put your hand over it and pour the water out. Then look at what you've got. You've got jellyfish in a jar.

Now we're going to set those in front of you. Just set them aside. We'll give you a new cup. *[Assistant passes out new cups.]* We're going to give you something else. This is also



Squirting Water into the SoilMoist crystals.



Expanded Crystals

polyacrylamide copolymer. It's just smaller pieces of it. So when you get this in your new cup, you can do the same as before, but do it more slowly. Squirt some water and watch it for a few seconds. Then squirt in some more water and watch it for a few seconds and see what it does. *[Instructor puts snow in cups.]* More gross jelly stuff. *[Students add water to the snow and watch it swell.]*

Did the first ones multiply, or did they grow big? *[Instructor starts passing out ziplock bags.]* When you get a ziplock bag, pour both of them, or drop both containers, into the ziplock bag and zip it closed. You can just put the whole cup in, but you can pour it in if you want. It's kind of fun to pour it in and gush it around. Wash your hands and then put your name on your bag. *[Passes out permanent markers.]* Of course, if you get your bag all gooey, the pen's not going to write on it, but that's okay.

[What did the scientist make with cellulose?] They use it for diapers. You put it in the shape of diapers and it absorbs water.

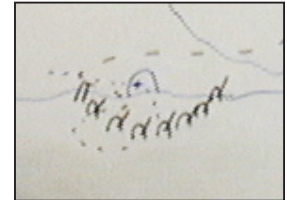


Fast-growing Crystals.

End of Story

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

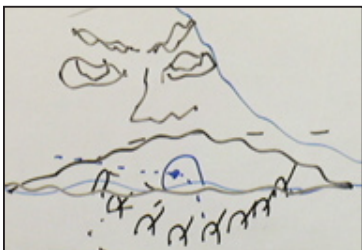
Evil Mister Fred had lured all the tiny snowmen of the Abominable Snowpeople into a mountain cave. And Jack and Jill were summoned to try and help make them big. But now they had another problem -- they're not even there anymore. And Jack and Jill followed the little tiny footprints over to the cave. And when they got there, they saw a whole bunch of minions guarding the front of the cave. So there was a circle of minions in front of the cave, Evil Mister Fred was inside, and they all had their baseball bats up and ready to fight. And Jack and Jill said, "All right, let's fight the minions!"



Minions guarding cave.

And Jack and Jill started making snowballs, and they were throwing them at the minions. And the minions, of course, with a baseball bat in their hand, were trying to hit the snowballs. And Jack and Jill discovered if you throw a baseball right between two minions perfectly, they both try to hit it and hit each other. And then they start fighting among themselves because one of them hit the other one. And they got so involved in fighting amongst themselves that Jack and Jill were able to go right up to the door. And they listened inside. And they heard Evil Mister Fred being tortured by tiny little snowpeople. The snowpeople were running all over the place, and Evil Mister Fred was saying, "Don't do that! Stop! No! Cut it out! Please, stop!" And Jack and Jill said, "Wow, this is great! Those little snowpeople are beating up Evil Mister Fred. And he can't get out. I like this!"

And so they blocked the door so Evil Mister Fred couldn't get out. And they waited for awhile, while he was being tortured by tiny little snowpeople. And then when they couldn't stand it any longer, they said, "What should we do?" And they called the Acme Store of Everything, and they ordered some food for



Scary face on the mountain.

the little baby snowpeople. And they put in the food polyacrylamide copolymer -- lots of it. And they left it in a basket right by the front door. And they knocked three times -- knock, knock, knock! And then they went and hid. And Evil Mister Fred had opened the front door -- creeeak -- and he looked out, and there was a big basket of food. And it said, "Feed the baby snowmen." And Evil Mister Fred said, "All right." He grabbed the basket, slammed the door, didn't even bother to look to see if there were minions out there, ran inside and fed the baby snowmen. And the baby snowpeople

said, "All right, food!" And then they started to grow -- bigger, and bigger, and bigger. And Evil Mister Fred was being crushed by giant snow people now. "Aaaaaah!" And they grew so big that they lifted the mountain right up off of the ground. There was a huge gaping crack in the mountain, and there were some other cracks up above. And the minions saw this giant mountain face, and they went, "Aaaaaahhh!" and ran away as fast as they could. And all the baby snowpeople, which were now big snowpeople, came running out. And one of them accidentally stepped on Evil Mister Fred. And everybody 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.