



Teacher's Guide for:
Foosh and Boom

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:

Quick Reference Sheets:

- Intro:page 2
- Experiment: *Foosh and Boom*page 3
- Equipment List: *Foosh and Boom*page 4
- Story, Part 1: *Jack & Jill and the Underground Planet*page 5
- Story, Ending.page 7

Video Transcript:

- Intro:page 8
- Story, Part 1 : *Jack & Jill and the Underground Planet*page 9
- Experiment: *Foosh and Boom*page 13
- Story Endingpage 15

Title Page of Video

Foosh and Boom
A Rock-it Science Lesson
Filmed July, 2012

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Intro Quick Recap:



- A match head has three chemicals on it: red phosphorus, white phosphorus, and potassium chlorate.
- Demonstrate how to light a match on a rough surface.
- If you hold the match upside down, you'll burn your fingers.
- If you hold it horizontally, it will burn for a long time. Instructor demonstrates this by reciting something while holding the match horizontally.
- The same chemicals go into a party popper. The small opening makes the "foof" go through a small space and makes it pop.
- Today we'll experiment with tiny amounts of these chemicals and see how they act.

Experiment Quick Recap: "Foosh and Boom"

Part One: Caps

- Place table cover on table.
- Give each student two smooth rocks, one larger than the other.
- Give each student about six inches of caps.
- Working in pairs, students place their cap paper on the large rock and take turns using the smaller rock to set off the caps.
- After awhile, turn off the lights and see if any sparks show up when the caps go off.



Caps and rocks.

Part Two: Party Snaps

- Each student gets a party snap and throws it to the floor to make it go off. If there are enough left over, they can get a second one and try it with the lights off.



Party Snaps.

Part Three: Sparklers

- Students line up in a straight line arms-width apart.
- Instructor demonstrates how the sparkler lights up and how to move it safely in a small circle.
- Caution students to stay where they are and not move around, in order to avoid burning other students. Also, don't swing the sparklers around.
- Instructor hands out one sparkler to each student and lights them with a propane torch.



Sparkler.

Part Four: Party Poppers

- Each student gets a party popper and pulls the string to make it go off and shoot streamers into the air.
- Caution students to aim the poppers straight up, not at other students.



Party Popper.

Equipment List: "Foosh and Boom"

Items needed for Instructor:

- Table cover
- Propane Torch
- Box of wooden matches

Items needed for Students:

Consumables (per student):

- Caps, 6-inch strip
- Party snaps, 1 or more
- Sparkler
- Party popper

Other (per 2 students):

- Smooth rocks in two sizes

Prep Work: None.



Sparklers.



Party Snaps.



Caps.



Party Popper.

Story Recap: "Jack & Jill and the Underground Planet"



Part 1:

- Jack and Jill are on a place called Plan It Planet. The people who live there like to plan things, work all day, and never have any fun.
- Jack and Jill discovered a tunnel in the side of a volcano. They followed a steep tunnel down to a trap door in the floor.
- The door had a handprint on it, and when Jill placed her hand on it, the door opened and Jack and Jill fell through.
- They fell into a huge underground space with trees, lakes, birds, and people with elongated heads. The people there communicate by mindreading, so their lips don't move.
- They have chairs made of solid gold, and their houses have giant diamonds for windows and doors. They told Jack and Jill they used the gold and diamonds for everything because they were plentiful and cheap there.
- Jack and Jill noticed a big pool of red mud. The people told them it was dangerous stuff and not to mess with it.
- They also said to watch out for the C-gulls, because they poop on your head.
- Evil Mister Fred was flying by on his vacuum cleaner, with a bunch of minions in the bag. He noticed Jill's hair on the surface of the planet and realized Jack and Jill were there.
- He sent a minion down the tunnel to look for them. The minion landed in the underground place and jumped on a guy's head. Then he used it as a diving board and bounced onto the gold chair. Then he bounced around from tree to tree and landed in the red mud.

Story Recap: “*Jack & Jill and the Underground Planet*”

Part 1 (cont):

- Then a C-gull pooped on the minion's head and the minion went back up the tunnel.
 - He told Evil Mister Fred about the underground land and everything he saw there, including the gold and diamonds.
 - Evil Mister Fred went down the tunnel himself and started grabbing as much gold and diamonds as he could carry, and Jack and Jill couldn't stop him.
-

Story Recap (cont.): "Jack & Jill and the Underground Planet"



Ending:

- While Evil Mister Fred was underground, the minions in the vacuum accidentally hit the Eject button, and a couple of hundred minions shot out.
- They ran around trying to find Evil Mister Fred, discovered the tunnel, and ran down into the underground land.
- They bounced all around and landed in the red mud. As they ran around, the mud dried on them and then the C-gulls pooped on their heads.
- Evil Mister Fred told them to get out of there, so they all climbed back up the tunnel and got back into the vacuum cleaner bag.
- Evil Mister followed them up, carrying a bunch of gold and diamonds, and got back on his vacuum cleaner.
- Inside the vacuum cleaner bag, the minions were all covered with the red and white stuff. One of the minions grabbed his baseball bat and hit another minion on the head. There was a huge explosion.
- When the bag exploded, all the gold and diamonds that Evil Mister Fred had been carrying went flying out of his hands, fell into the tunnel, and ended up back where he found them.

Transcript: Intro

A match. It's got red stuff on it, and it's got white stuff on it. *[Student: The red stuff is phosphorus.]* You're right. The red stuff is called red phosphorus, because it's red. Yeah, the white stuff is white phosphorus, and there's also potassium chlorate in there. Three basic chemicals, along with some sulphur, that make a matchhead.

And if you rub it on something rough, it lights. *[Lights match.]* If you hold it this way *[upside down]*, you burn your fingers. If you hold it that way *[horizontally]*, it'll usually keep burning. And you could have it burn for a long time. *[Instructor recites a poem while match burns.]*

Twas brillig, and the slithy toves
Did gyre and gimble in the wabe.
All mimsy were the borogoves,
And the mome raths outrgrabe.

Beware the jabberwock, my son.
The jaws that bite, the claws that catch.
Beware the jubjub bird, and shun
The frumious bandersnatch.

See? Still going. *[Blows out match.]*

If you take the same chemicals and put them in a tight package, you wrap them all up with paper, and you rub on them, same as like rubbing a match. You rub on them, they go foof! But instead of the foof just spreading out across the whole room, the foof has to go through a little tiny hole in the package, and it blows up the package.

So this has less chemicals than that matchhead. But if I pull on the string, it's going to rub some chemicals together, and we'll see what it does. Ready, get set -- *[ignites party popper]*. And there's streamers in there. And some smoke.

So today we're going to experiment with tiny bits of chemicals to see how they act. But first, we need a crazy story.



This way will burn your fingers.



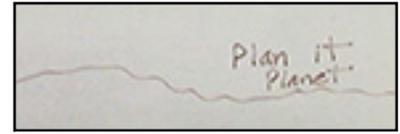
This way will burn a long time.



Party popper.

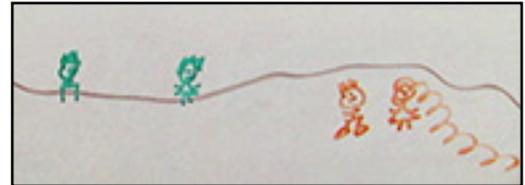
Story: "Jack & Jill and the Underground Planet"

Let's see, once upon a time there was a planet. And the planet was named Plan It. Plan It Planet. Because they planned everything. And the people that were on top of the planet, the people that lived on the surface of the planet planned everything and never had any fun. All they did was work all day long. There they are, people working all day long, like that. They didn't know, because they never explored. They should have explored, and then they would have known that there was something else going on in this planet. There happened to be two people up there that didn't plan things very well. One was named Jack, and one was named Jill. There they are.



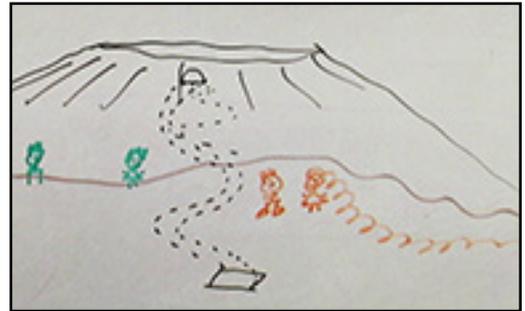
Plan It Planet

And Jack and Jill found a volcano on Plan It Planet. And they thought, "Wow! Let's climb the volcano." So they went up. Partway up, they found a tunnel. They said, "Ooh, a tunnel. Let's go in. It smells bad, it's dark in there, there's spiders in there, might be monsters in there, but that's great!" So they ran in as fast as they could.



Jack & Jill and the people on the planet.

And the tunnel went down really steep -- whoooooaaaaa! And Jack and Jill were running and they couldn't stop. They were running and running and running, and it was dark, and they kept going until all of a sudden they came to a floor door. Have you ever seen a floor door? It's a door in the floor. Ker-plunk! They landed on the floor door.



Volcano, tunnel, and floor door.

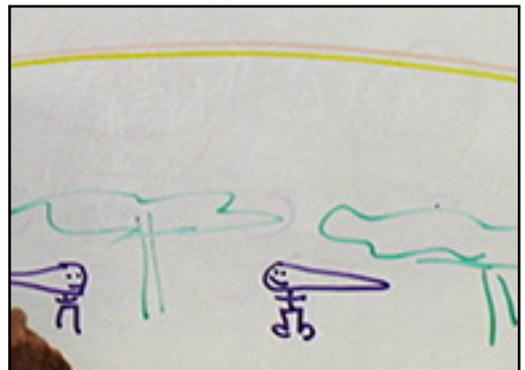
And it was dark. And they felt around. They didn't know it, but there was a handprint on the floor door. And as Jill was fooling around trying to find the handle for it, her hand fell right into the handprint. And it matched perfectly. The handprint glowed bright blue, and the bright blue coloring made the door open up. And Jack and Jill fell through.



Handprint on the floor door.

And they fell into a bright glowing place. They fell into this entire huge chamber. And down in the chamber there were trees growing. There were birds singing. There were lakes. There were things that looked kind of peopl-ish running around. And they said, "Whoa! This is like a world inside of a world."

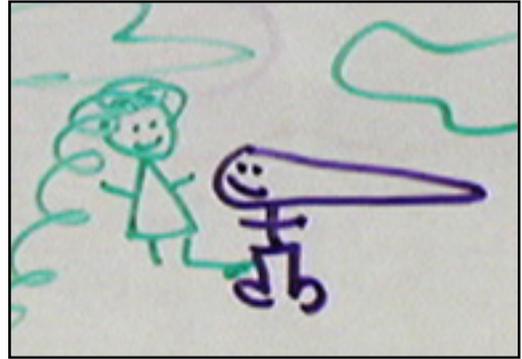
And the people that were down there had funny shaped heads, long skinny heads, and regular, almost people bodies, like that. They're streamlined. And Jack and Jill saw the people there and were talking to them. And then they realized the



People underground.

people could talk back, but their lips never moved. And Jack said, "Did you hear that?" And Jill said, "What?" And Jack said, "Exactly! When I talk to the people, they talk back, but their lips don't move and they make no sound. How can I hear them if they make no sound?" And Jill said, "I don't know."

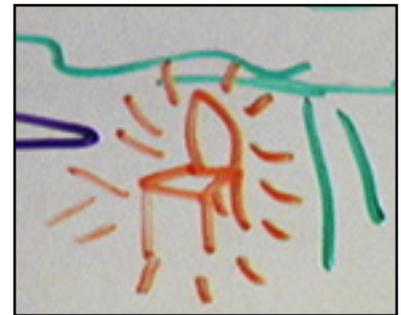
So Jill walked up to one of the people and kicked him in the foot. And Jill heard in her head, "Ouch!" And she was watching very carefully. And the purple person never opened his mouth. Jill said, "You know what? They can talk to our minds and not our ears." And Jack said, "Oh, I've got to try that!"



Jill kicks the creature.

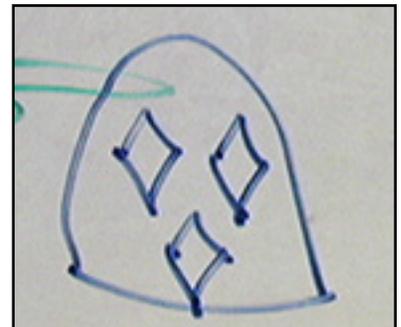
So he walked up to one of the guys and he said, "What are the decimal dimensions of pi?" And he heard these numbers in his head: "Three point one four one five six two five." And he said, "Whoa! Check it out! He can communicate without talking. I like these people."

And as they looked around, they discovered that the people had chairs made out of solid gold. And they used gold as weights to hold things down. And he asked them, "How come you use gold for all this stuff?" And the folks down there said, "Well, gold is so cheap, it's everywhere. It's like dirt to us." And Jack and Jill said, "Woww!"



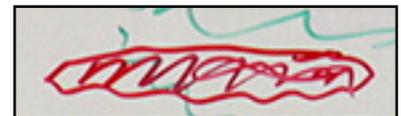
Solid gold chair.

And then they came to one of their houses. They had funny looking houses. And the houses had windows that were all diamond shaped. They had doors that were diamond shaped. And Jill said, "Whoa, are those really diamonds?" And the creature said, "Yeah! They're diamonds! Cheap. Tons of them. Want some? Have yourself a bunch of them." And Jill said, "Man, that's incredible! I like this place!"



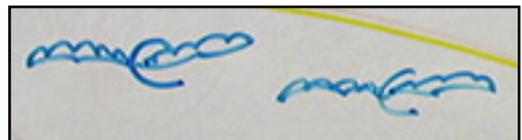
House with diamond windows.

And they came to another spot right over here on the corner, where there was a big pool of red mud. It was all gooey. And Jack and Jill said, "What's that for?" And they said, "Oh, special stuff. Don't mess with it. Dangerous, you know." And Jack and Jill said, "Okay."



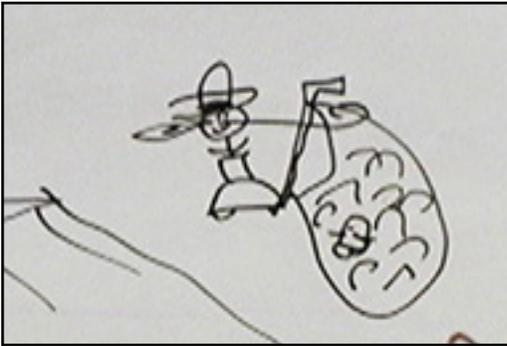
Pool of red mud.

And they looked around, and they also saw in there flying C-gulls. And they look like a big letter "C" with wings. There. So C-gulls were up there. And the creatures down there said, "Watch out for the C-gulls. They'll poop on your head." So Jack and Jill always watched out for the C-gulls.



C-gulls.

Well, Evil Mister Fred happened to have been flying by on this planet, on his vacuum cleaner. And you know what he always looks for? He looks for things to mess up, like Jack and Jill. And he spotted Jill's hair. And he said,



Evil Mister Fred on vacuum cleaner.

“Whoa! Jack and Jill are here.”
And he’s got his bag full of minions on his vacuum cleaner. Minions, minions, minions, minions.

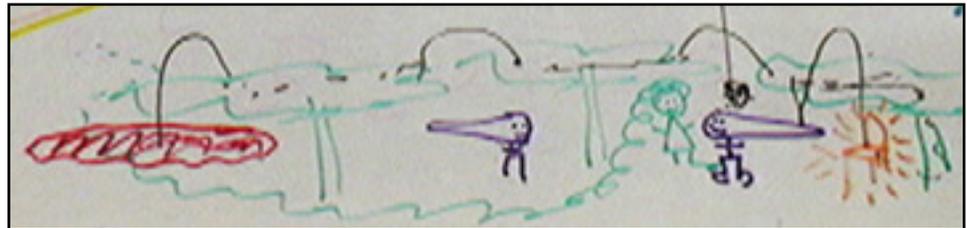
And he said, “Minions, go find Jack and Jill!” So he kicked one of the minions out. And the minion -- he was flying forwards pretty fast -- and the minion went “Aaaaaahhhhh!” -- doonk! Right into the cave.



Minion lands.

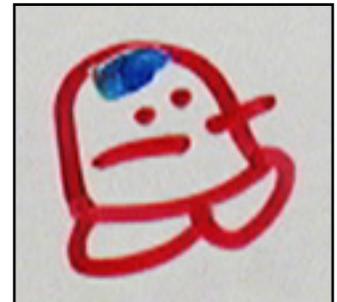
Dub, dub, dub, dub, dub, dub, dub, aaaaaahhhhh, doonk! And landed on his head. And the minion said, “Whoa, what just happened?”

And he’s running all around. He saw one of the purple guys, jumped on his head, used it as a diving board, boingggg! And landed on the gold chair. And then he jumped off the chair, climbed up into the tree, ran around inside the tree for awhile, jumped to another tree, ran into that one, jumped into another tree, ran into that one, tried to jump into another tree, and ker-splort! Right into the red stuff. And he got out. Now he’s all covered with red stuff.



Minion bounces around and lands in the red mud.

And so you’ve got a red minion. He says, “Ahh, gooey stuff! Fun!” And he ran back here and decided to climb back up Jill’s hair, clear up out of the tunnel. Well, as he was climbing Jill’s hair, the C-gulls flew over and pooped on his head. So now he runs out of the tunnel, he’s all red, and he’s got white C-gull poop on his head.



Red minion with bird poop.

And Evil Mister Fred said, “What happened to you?” He says, “Aw, you won’t believe it. A whole world down there. Creatures, trees, lakes, everything. And birds poop on your head.” And Evil Mister Fred said, “Was there any gold?” He says, “What’s gold?” And Evil Mister Fred said, “It’s shiny, it’s metal, it’s heavy, it’s gold-colored.” And the minion said, “Oh, yeah. Chairs, weights, all kinds of gold.” And Evil Mister Fred said, “Really? Are there any diamonds?” And the minion said, “What’s diamonds?” And Evil Mister Fred said, “Little things like this, shaped like a diamond?” And the minion said, “No, no, no. They just had big ones, like that.” And Evil Mister Fred said, “Now we’re talking.”

So Evil Mister Fred zoomed down there himself. He left his vacuum cleaner parked outside. Zoom -- down he went into the hole. And he couldn’t believe his eyes when he got down there. Gold! Diamonds! Everything down there. It looked great.



Evil Mister Fred underground.

And he started picking up as much as he could so he could go back again. And Jack and Jill said, “Evil Mister Fred, don’t touch that stuff. It’s not yours, you leave it alone.” And Evil Mister Fred said, “Says who? Go away!” And he’s got his hands full of gold and diamonds. He’s going to climb back up.

If you’re Jack and Jill, and you want to stop Evil Mister Fred from stealing all their stuff, 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: "Foosh and Boom"

Part One: Caps

[Instructor places rolled-up table cover on one end of table.] So what you do is you roll this from one end to the other. Okay, roll. *[Students roll the cover down the table.]* And then we're going to put rocks on it. *[Passes out rocks.]* Let's see, you guys are going to use that for one rock and this for another rock. And then you two are going to work together. You're going to use this for one rock and that for another rock.

What we're going to use are highly explosive pieces of paper. They call them caps. They can come unrolled like this, and they have little tiny, almost imperceptibly small dots on them that have a tiny bit of that same kind of powder, potassium chlorate, sulphur, and possibly a little red phosphorus. I'll show you how you're going to do it.

We're going to tear them off into sections that are maybe six inches long. You hold it over the rock so your fingers are out of the way. And then you just tap on it with the other one, not hard just little taps. *[Taps a couple of caps.]* And then you smell it and see what you smell. So after we pass these out, you can start. And you just take turns tapping on it. See if you can make the little dots pop. Do lots of them. *[Students take turns popping their caps.]*

Get it set up so you know what you're doing, and I'll turn off the lights. Get it all set up. Are you ready? *[Lights off.]* See if it makes any little sparks or anything. Does it make anything you can see? Okay, lights are coming back on. Okay, time's up. You can leave the rocks there.

Part Two: Party Snaps

These are called party snaps. They look like little sea creatures. *[Student: They're called pop-its.]* Is that what they're called? And you can take the pop-it and -- Do you have to throw it or can you just drop it? Okay, I'll try dropping it first and see if it does anything. *[Instructor holds pop-it up high and lets it drop. It hits the floor and goes off.]* Oh! It works dropping it!

What if you drop it from really low? From like kid height? Will it work there? *[Instructor drops pop-it from about three feet. It doesn't go off.]* Aww. Okay, we'll give you each a pop-it, and you experiment with it and see if you make it pop. *[Students throw their pop-its onto the floor to*



How to place caps on the rock.



Hitting caps with rock.



Party snaps.

try to pop them.] We have some left, so if you've already popped one, come over here now and we can give you whatever is left until they're gone.

Oh! I wonder if they work in the dark. We've got to try something. Experiment time. We're going to try it with the lights off. But don't fire it until everybody has one and the lights are turned off. Lights are going out. Don't drop them until I say ready, get set, go! *[Students set off their pop-its.]* Did you see it?

Part Three: Sparklers

Line up over by those boxes, arms length apart. In the old days, children got to use sparklers. This is a sparkler. You hold it by the bottom of the reddish-pinkish-whatever-it-is stick. And you're going to hold them out like this way. We're going to catch them on fire, and while you're holding it, you're going to hold it in front of you. If you get scared, you can drop it on the ground and say, "Oh, look, it's burning on the ground." Don't throw it up in the boxes, don't stick it in your ear. And you want to stay where you are so that you don't burn your neighbor with it. Don't be swinging it around like a rocket or anything.

[Instructor demonstrates by lighting a sparkler with a propane torch.] See, it lights like that. The sparks, if they land right on your hand, are kind of hot. But if they bounce off, you probably won't feel them. And then you can go like this kind of thing *[moves sparkler in small circles]*. This one is like reddish. This one has a chemical called strontium in it so it's red. Some of yours might be different colors. After it burns out, don't throw it on the floor if you can avoid it. We're going to collect them. *[Sparkler is almost burned out, and Instructor blows it out. Burnt end falls to the floor.]* Forget that. You can just throw them on the floor when they're done and step on them.



Instructor lights sparklers with a torch.

[Lights are turned out and instructor lights each student's sparkler with a propane torch. When they burn out, the lights are turned back on.]

Part Four: Party Poppers

[Instructor passes out party poppers.] Have a party popper. Wander off and yank really hard and fast on the string. Point it straight up in the air. *[Students set off their poppers.]* It's a party popper, not a pooper. When you're done, throw the party popper into the garbage can.



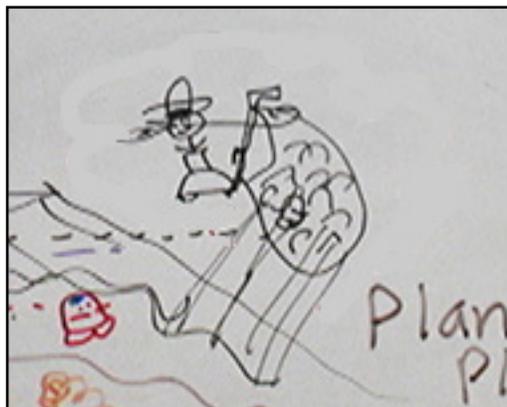
Party popper.

End of Story

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

So now Evil Mister Fred is down with all of the stuff, trying to steal the gold and the diamonds. While he was gone, of course, all the minions that he left in his vacuum cleaner are trying to get out. And they accidentally hit the Eject button. And ka-boom! It shot out a couple of hundred minions. And they're running all over the place trying to find Evil Mister Fred. And one of them found the tunnel. And he says, "Hey, boys! Over here! Yaayyy!" And they all ran and fell down inside.

And they did just like the first minion did. They ran up into the trees, jump, jump, jump, jump, jump, and fell into the red stuff. And then they jumped out, and now they're all red minions. And they're running all around the place until the red stuff got dry. What do you think the red stuff is? [*Student: The red stuff in the match!*] Yeah, on the match head.

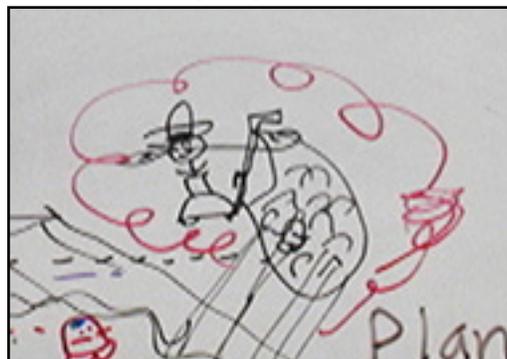


Minions eject from the vacuum cleaner bag.

And then the C-gulls flew around and pooped on them. And that's the white stuff on top of the match head. Yeah, so now you've got match head minions running all over the place. And Evil Mister Fred saw them, and he says, "What are you guys doing down here? Get out of here right now!" And the minions said, "Sorry, boss, sorry."

And they climbed back up Jill's hair. And Evil Mister Fred was trying to carry all the gold and diamonds up on top of his hat, in his pockets, any way he could. He got a bunch of it out, got back on his vacuum cleaner, and the minions are all in the bag. And they're all covered with match head material.

And of course, one of the minions is sitting there with his baseball bat and he's going, "Ha, ha, ha." And he goes whack! on one of the other minions. And all the match head stuff goes fooommmmm! And there was a huge flash of flame and smoke up in the air. And Evil Mister Fred accidentally threw all the gold and diamonds in the air. And all the gold and diamonds landed in the tunnel and went right back to where it came from. And they all lived happily ever after, except Evil Mister Fred and certain minions.



The vacuum bag explodes.

End of Lesson

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