Teacher's Guide for:

Egg in a Jar

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.

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(Numbers in the text are **time codes,** so you can refer back to the video.)

[00:03;09]

Egg in a Jar
filmed July, 2009

For Rock-it Science Internal Use Only

Demo Quick Recap: Egg in a Jar

- Remind students to always have a fire extinguisher (cup of water) close by when working with fire.
- Show that egg will not fit through mouth of juice jar.
- Light paper and push it down into jar. Then place egg on top. If egg is too big, it won't go in.
- Repeat with a large glass flask. Pinch off the rubber tubing, but release it before the egg is sucked in all the way. Just before releasing it, ask students to notice the sound it makes.
- Let a student pull off the egg from the first jar to feel the suction.

Place egg on top of jar.

Experiment Quick Recap

Experiment : Water Balloon "Egg" in a Jar

- Students work in groups of three. Each group gets a cup of water, a juice jar, a piece of paper, and a small water balloon.
- Instructor brings a butane lighter to each group, one at a time, and assists them. He places the paper in the mouth of the jar.
- One student holds the jar sideways while the second student lights the paper.
- The Instructor turns the jar upright and sets it down. Then the third student places the water balloon on top. Balloon is sucked inside.

Placing Water Balloon on top of jar with burning paper inside.

- Remind students to leave the balloon in the jar for now, and do not pour water into the jar.
- After all students have their balloons in their jars, each group will remove it, one at a time.
- One student pours baking soda into the jar, the second one pours in vinegar, and the Instructor helps the third one quickly flip over the jar so the balloon will come out.
- One group tries it without flipping over the jar to see if the balloon will float out. It doesn't.

Dumping out the Water Balloon.

Equipment List: *"Egg in a Jar"*

Items needed for Instructor:

- Glass juice Bottle
- Paper Towel
- Butane Lighter
- 16-oz Plastic Cup
- Water
- Hard boiled egg, peeled
- Large glass flask with narrow neck and rubber tubing
- Hair Dryer
- Funnel

Prep Work:

- Prepare Hard Boiled Eggs (cook & peel)

Items needed for Students:

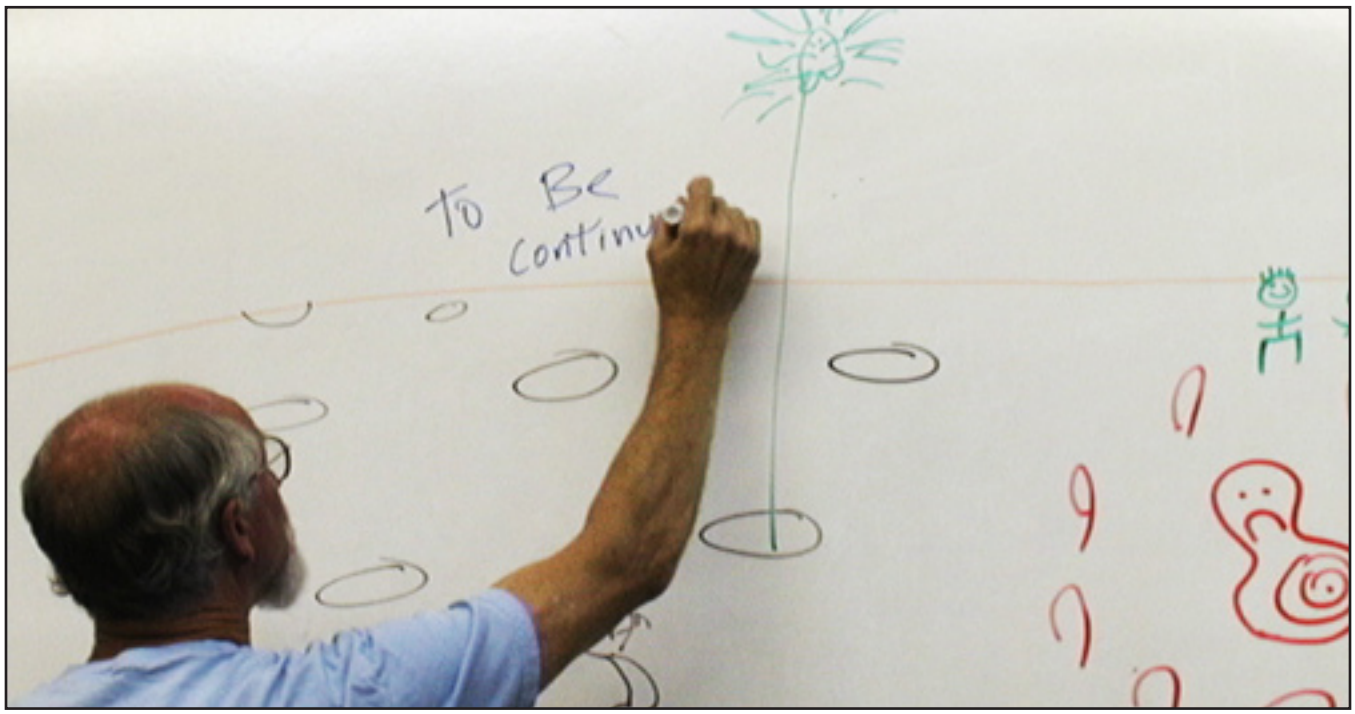
Consumables (per students):

- 11" Balloon, partly filled with water
- Paper Towel
- 16-oz Plastic Cup, 1 per 3 students
- Water
- Baking Soda, 1 tsp per bottle
- Vinegar, about an ounce per bottle

Other:

- Glass juice Bottle, 1 per 3 students

Story Quick Recap: *Evil Mister Fred's Mutant Minions*



Part 1:

- Jack and Jill have lots of Kick-Mes, creatures that are only happy when you kick them around.
- They take the Kick-Mes on vacation to Swiss Cheese Land, where there are lots of holes, so Jack and Jill can kick the Kick-Mes down the holes.
- Evil Mister Fred has a huge chamber underneath, where he's doing experiments to turn his minions into supermen.
- He uses a microwave oven to change the genetics of mosquitos, then lets the mosquitos bite the minions so they'll mutate.
- One minon grew a big head, another giant feet, another big eyeballs. One of them came out really buff, and it grew arms and hands. But it had a really tiny voice. It was also still stupid.
- There were all kinds of minions down there, and they were fighting with each other all the time.
- Jack and Jill heard the commotion, and Jill ordered a stethoscope from the Acme Store of Everything so she could listen through the ground. She heard Evil Mister Fred's voice and realized he was up to something.
- Then a minion shot up through a hole in the ground, and it was really hairy. Jack and Jill wanted to find out what Evil Mister Fred was doing, so Jack went down a hole next to Evil Mister Fred's chamber. He listened from the other side of the wall, and Evil Mister Fred was talking about taking over Earth with his super-powered minions.

Story Quick Recap (cont.)

Ending: *[The end of the story is missing from the tape, so there is no illustration.]*

- Jill called the Acme Store of Everything and ordered a giant bottle with rocket engines attached.
- Jill threw a bunch of M&M's along with some paper and matches into the bottle.
- When the minions found it, they all jumped in to get the M&M's, except the biggest one, who got stuck in the opening.
- Evil Mister Fred saw two buttons inside the bottle that said, "Go to Earth" and "Go Someplace Else."
- He jumped up and down on the stuck minion, yelling, "Stay away from those buttons!"
- As the minions were fighting, they stomped on the matches and lit the paper on fire.
- The stuck minion got sucked in, along with Evil Mister Fred.
- Evil Mister Fred landed on the "Go Somewhere Else" button, and they all disappeared into the clouds of Jupiter.

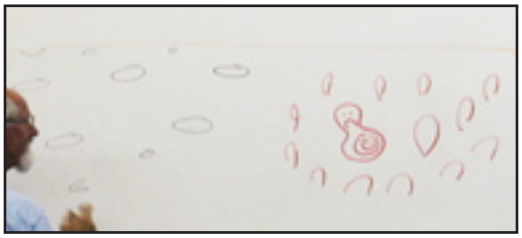
Transcript: Introduction

[01:00:11;02] Sometimes, magicians will make a rabbit pop out of a hat. I've never seen a rabbit pop out of an elephant. I've never seen a rabbit pop out of a hippopotamus. And I've never seen a hat pop out of a rabbit. But they do make rabbits pop out of hats. I don't know why they have a rabbit pop out of a hat. It could pop out of a shoe, for that matter.

We want to make something pop into something else, and then pop back out again. So we've got to make it do that. We know that hot air gets bigger when it gets hot, and it gets smaller when it gets cold. Maybe that will help us out. First we need a crazy story.

Story: *"Evil Mister Fred's Mutant Minions"*

[01:00:51;12] Jack and Jill have Kick-Mes. And the Kick-Mes are always sad. They're happy if you kick them really hard, or if you kick them into something like an explosion. And then they blow up, and then you just hear this laughing cloud. And the cloud comes back together again and bounces onto the ground, and it's a Kick-Me again. And Jack had lots of Kick-Mes all over the place. And they took the Kick-Mes on vacation to, let's see, how about Swiss Cheese Land? *[Student: Switzerland?]* It could be Switzerland. Is that another name for Swiss Cheese Land?



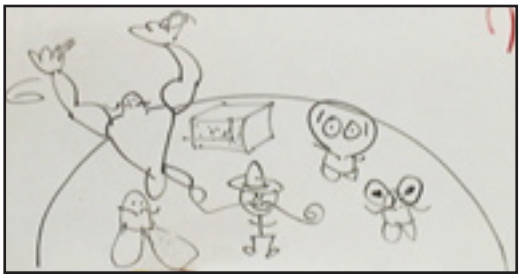
Kick-Mes in Swiss Cheese Land.

Swiss cheese has an important characteristic -- it's got a bunch of holes in it. I don't know if the holes connect to each other, but let's say that these are individual holes, like that, holes all over the place. And Jack and Jill can kick the Kick-Mes down the holes. And then they'll go boink, boink, boink, boink, boink, boink, down inside. Now, let's suppose that they don't know that on this vacation, the Evil Mister Fred has a huge chamber underneath, a place where he does experiments. And he figured if it blows up, no big deal. It's just a big chunk of cheese. He could sell the cheese. And the minions could eat it and make the tunnels bigger.

Evil Mister Fred with Microwave Oven, Mosquitos, and Minions in his Chamber.

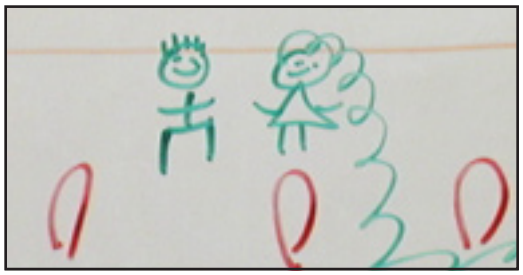
And Evil Mister Fred is doing experiments on his minions to see if he can genetically alter them so that they will become like supermen. So he also has down there a microwave oven and a bunch of mosquitos. There -- there are mosquitos in the microwave oven. And mosquitos can change the minions' genetics. Mosquitos carry little viruses, and when a mosquito bites a minion, the virus goes inside and changes the minion. So Evil Mister Fred figures all he needs to do is find the right kind of mosquito, have him go bite his minion, and the minions might become stronger. So he tried this. He bought mosquitos from all over the world and he put them in the microwave oven and buzzed them. Bzzzzzt! Til they were good and angry. And then he stuck a minion in there. And the mosquitos all went pow, pow, pow, pow -- sucked blood out of him and spit back inside of him. And he took the minions outside and set them down and let them run around.

Well, some of the minions did change. One minion grew a really big head, like that. One minion grew giant feet, like that. One minion's eyeballs grew giant. Evil Mister Fred said, "I'm so close! I'm so close!" And then he finally did it. He made one minion that was just buff. Little head, like that. And the minion, which never had arms before, grew some arms and some hands. And he said, "Whoa! I've got some really strong minions -- at least one. This is great!" And the minion, who was really huge like this, said, *[in a small squeaky voice]* "Hi. My name is George the Minion. I can do anything you want." And Evil Mister Fred said, "What's up with your voice?" The minion said, "Well, you can't get everything."


Mutated Minions.

And Evil Mister Fred said to him, "Take your baseball bat, and let's see if you can make a hole in this cheese." So the minion took his baseball bat and hit the cheese -- ghoonk -- as hard as he could. And the baseball bat bounced off and hit him back in the head. He fell down, out cold. And Evil Mister Fred said, "Well, he's still dumb. But maybe we can use some." And he tried to make more and more minions like this. And he wasn't all that successful. Some turned out strong, some turned out weak. He had minions of every variety down there. And the minions were fighting with each other all the time.

Jack and Jill were up above, kicking the Kick-Mes down the holes, having a great time. And they heard all this commotion down below. And Jill called the Acme Store of Everything and got a stethoscope and put it to the ground, and she could hear all of what was being said down inside the cheese. She said, "I hear Evil Mister Fred's voice. He's doing something weird down there. And lots of minion screaming and yelling sounds. What's going on?"


Jack and Jill heard noises down below.


Hairy Minion.

And then they saw a minion get shot through a hole in the ground, like that -- minion fireworks. He was a really hairy minion, like that. Jack and Jill said, "Uh-oh, Evil Mister Fred's got to be here somewhere. Whoa!" And they were trying to get down into these holes to find out what he was doing. Which wasn't hard, because Jill just grabbed Jack and said, "Here, Jack, go find out." Down in the hole he went.

And Jack was tiptoeing around in the caves, and he was listening. And he got to Evil Mister Fred's chamber. He was just on the other side, in another hole, and he could hear what was going on. And he said, "Uh-oh, Evil Mister Fred is going to go back to the Earth and take over the Earth with super-powered minions. This is not good. This is bad. He's developing an invincible army. We've got to get rid of them." If you were Jack and Jill, how would you stop the Evil Mister Fred from his terrible plan?


Jack listening through the wall.

Imagination and Brainstorming Time

[01:10:19;27] *[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 . . .

Demo: *Egg in a Bottle*

[01:08:28;07] When you burn something, what should you always have? *[Students: Fire extinguisher!]* Fire extinguisher. A cup of water is always good.

Now, if I want this egg to go into this jar, I might be able to hammer it in if I hit it hard enough. Of course, it might break the jar. We're going to put the paper towel in there, we're going to light it, and then we're going to burn the little egg. *[Instructor lights paper, pushes it into the jar, and places the egg on top.]* We've got the egg sitting on the jar. *[The students call out ideas for what they think is happening.]* There's smoke inside. Is the egg ever going to go in? It might not. What if it's too big of an egg? What if there's a chicken in the egg with his arms and legs against the walls saying, "I'm not going, no matter what!" *[Student: Burn the egg.]* We could burn the egg. But we're not going to burn the egg because I like these eggs. I eat these eggs. I think the egg is way too big to fit in there. Now, I've tried this with lots of different eggs. These kinds of eggs never go in, they always stay stuck. We'll let that one sit there so you'll be convinced that that will be a stuck egg.

Place Egg on top of Jar.

Pinch the Rubber Tube on the Glass Flask.

[Brings out a large glass flask.] This one has a slightly bigger opening, but it's got a tube stuck to the side. So, you know, we would have to pinch the tube off to make sure the air doesn't come in while we do it. We could pinch it off. So we'll put this one on here *[inserts a piece of paper in the mouth of the flask]*, and we'll grab a new egg, a regular egg, and see what goes with this. *[Lights paper, pushes it in, puts egg on top, and pinches off the air tube. Egg doesn't go down.]* Is it going down? In a second, I'm going to let go of the tube, and see what you hear. Are you ready? *[Tube makes a squeaking sound when it's released.]* Did you hear that? What made it make that sound? *[Students offer suggestions.]* So there was suction in there? Okay, and the egg was stuck in a little ways.

We need a volunteer to pull the egg off of this one. *[Lets a student pull the egg off the first jar.]* Did it feel like suction? *[Student: Yes.]*

Experiment: *Water Balloon "Egg" in a Bottle*

[01:34:34;17] Now, what we're going to do is, we have six of these jars, and we have some better quality eggs. The eggs were made by *[assistant]*. She's made Easter eggs. *[Students: They're water balloons.]* The water balloons are kind of nice because they're softer and there's a better chance that they can get sucked inside. So you guys are going to do your own. We're going to put cups of water on the table. There's six jars, and there'll be three people per jar.

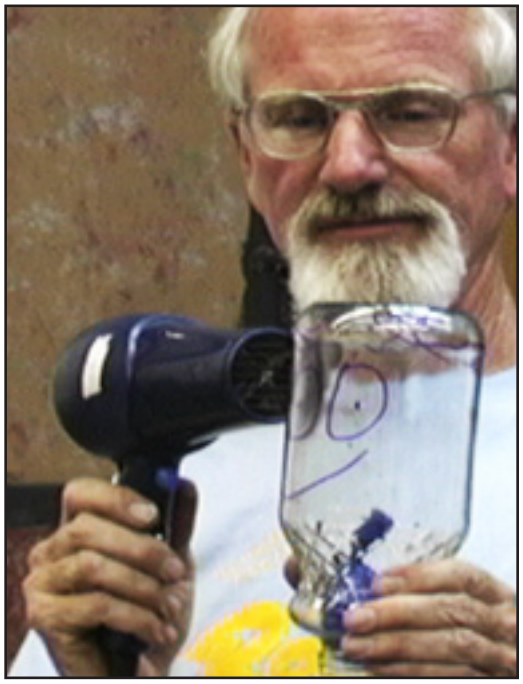
Instructor helps one student light the paper while the other holds the bottle.

[Instructor twists and clamps the rubber tube on the flask so it stays shut.] There. Can you imagine having that on your nose? Boy, that would hurt. Okay, we'll give each group a balloon. *[Instructors pass out glass jars, cups of water, paper, and balloons. Groups do their experiments one at a time, with the instructor guiding them. One student holds the jar, the second one lights the paper with the instructor's butane lighter (instructor pushes the burning paper into the jar), and the third student places the water balloon on top.]*

Third student places balloon on top.

[After all students have completed the experiment] Now, we've got a balloon in a jar. How are we going to get it out. You could just pull on its tail and he'll come out, but how can you make it come out if you're holding it like this *[holds bottle upside-down]? [Students offer suggestions.]* If you burn it on the inside, will it create enough pressure to blow the balloon out? Usually it creates suction, doesn't it?

What if this is somebody's head and they're having a bad hair day? *[Draws a face on the jar.]* And they need to blow dry their hair. I'd better take the paper out because I think it's going to mess it up. *[Removes the paper from the jar.]* There's the little guy -- let's put him with his balloony thing pointing upwards *[positions balloon in the neck of the jar]*. We'll put this on high *[turns on hair dryer and points it at the jar]*, and we'll warm it up. Will that do anything? *[Students: No. Yes.]* Will it expand? Let's see how long it takes. *[After about a minute and a half, turns off hair dryer. Balloon is still in bottle.]* So, you can heat it up with air, but it doesn't create very much pressure inside. The jar's hot -- feel the jar.



Instructor uses Hair Dryer to heat bottle.

So we did an experiment yesterday that will help us get the balloon out. What experiment did you do yesterday that will get the balloon out? Baking soda and vinegar.

[Pulls the balloon out of the bottle by hand.] It's fun to pull it out. Go ahead and pull yours out and see how much force it takes. *[Student: But our paper is still in there.]* Take your paper out. Let's give our balloon a little bit of baking soda *[puts a teaspoon of baking soda into a student's jar]*. We'll try one teaspoon on this one. How should we do it? Should we pour the vinegar and then turn it upside down real fast? Would all of the vinegar run out on the table? Cool -- let's try that way. Okay, I'm going to pour in the vinegar and then I'm going to turn it upside-down and we'll see if it's quick enough to get the balloon out. Oh, it works. And it made an appropriate mess. That's good.

Next one, we're going to put the vinegar in the jar and then dump in the baking soda and turn it upside-down. *[Lets each group in turn put in the baking soda and vinegar, then turn over the jar to get the balloon out. Some put in baking soda first, others vinegar first.]*

One students adds Vinegar, another adds Baking Soda, and the third flips the Jar over so the Balloon pops out.

Okay, they want to do an experiment here. They want to see what happens if you don't tip it over. Can you get enough fizz to make it work without tipping it over? *[Instructor adds several teaspoons of baking soda to the bottle.]* That would presume that the balloon floats. We'll find out. Who's going to pour the vinegar? You're going to have to pour really fast. *[Instructor places a funnel in the bottle to make it easier for the student to pour the vinegar in quicky.]* Okay, we're going to vote on this: How many people think the balloon will come out like a volcano erupting? *[Students: Yes!] [Student pours vinegar into bottle. It foams up and overflows, but the balloon doesn't come out. Then the Instructor pours in some more vinegar and turns the bottle over, and the balloon comes out.]* No, you have to turn it upside down because the balloon didn't float.

Upright Jar doesn't work.

End of Story

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

[01:34:34;17] *[The end of the story is missing from the tape.]*

So, Evil Mister Fred wanted to use his super-power minions to take over the world. Jack and Jill have discovered his plan and want to stop him.

Jill called the Acme Store of everything and ordered a giant bottle with rocket engines attached. When it arrived Jack said, "What did you get this for? We don't want Evil Mister Fred to get to earth!" But Jill said, "Just watch, I think something else will happen." And then Jill threw a bunch of M &M's along with some paper and matches inside, and she and Jack ran away to hide and watch.

When the minions found it they immediately spotted the M &M's inside and jumped in to get them. All of the minions fitted through the opening except the biggest one who became stuck in the opening.

Evil Mister Fred came and saw two buttons inside: one said "Go to Earth" and the other said, "Go Someplace Else" so he jumped up and down on the head of the stuck minion yelling, "Stay away from those buttons!"

As the minions were fighting for the M & M's they stomped the matches, the matches lit the paper, and the stuck minion went PUUUNK! And popped through the hole along with Evil Mister Fred.

Unfortunately, Evil Mister Fred landed on the "Go Someplace Else" button and the rocket took off and disappeared into the clouds of Jupiter.

And they all lived happily after except Evil Mister Fred.

End of Lesson