



## Teacher's Guide for: **Squirt Guns**

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: (No Intro. Lesson begins with the Story.) . . . . .
- Experiment: *Build a Squirt Gun* . . . . . page 2
- Equipment List . . . . . page 3
- Story, Part 1: *The Marshmallow Men's Race* . . . . . page 4
- Story, Ending . . . . . page 5

#### Video Transcript:

- Intro: (No Intro. Lesson begins with the Story.) . . . . .
- Story, Part 1: *The Marshmallow Men's Race* . . . . . page 6
- Experiment: *Build a Squirt Gun* . . . . . page 7
- Story, Ending . . . . . page 9

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## Title Page of Video

Squirt Guns  
A Rock-it Science Lesson  
Filmed June, 2010

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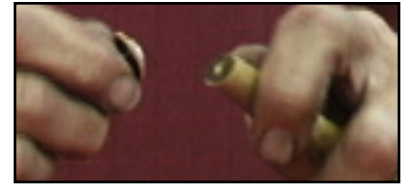
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## Intro Quick Recap:

[No introduction. This lesson begins with the Story.]

## Experiment Quick Recap: "Build a Squirt Gun"

- Each student receives a stick with a hole in the end, a round piece of leather with a hole in the center, a screw, a washer, and a phillips head screwdriver, a cork with a hole through the center, and a piece of PVC pipe.
- Instruct students to assemble the squirt gun as follows: First put the washer on, then the leather, then the screw.
- Students dip the end of the stick in water to get the leather wet.
- Then they push the stick through the PVC pipe and push it up and down a few times to bend the leather upwards.
- Then they push the cork into the top of the tube, but they don't shoot it yet.
- Students go outside, dip their tubes in water, and pull the stick out from the bottom of the tube in order to draw in water through the hole in the cork. Then push the stick up into the tube to make the water squirt out through the cork. The object is to see how high it will go.
- After a few minutes, the Instructor gives students a syringe tip to stick through the hole in the cork.
- Students shoot water again to see which method makes it go higher -- a small hole or a larger hole.



Push tip of screw through leather and washer, then attach to wooden stick.



Tighten with screwdriver



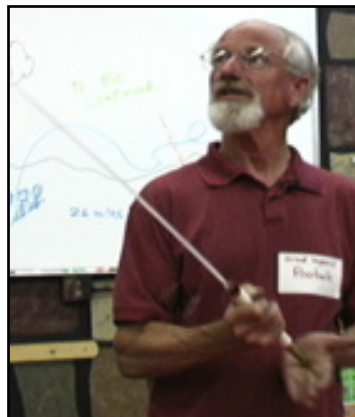
Drop stick into tube from the top, then pull it out from the bottom. Repeat a couple of times.



Add a cork at the top.



Pull stick out to get water.



Push stick in to squirt water.

## Equipment List: "Squirt Guns"

### Items needed for Instructor:

- Cup, clear plastic, 16 oz., with water
- Buckets of water, 2

### Items needed for Students:

#### Consumables (per student):

- PVC pipe, 1/2", about 6" long
- Wooden dowel, 3/8", about 8" long, 1/8" hole drilled in one end for screw
- Screw, phillips, #6 x 1/2"
- Washer, metal, #10
- Leather disc, 5/8", with 1/8" hole in center
- Plastic cork to fit PVC pipe, with 1/8" hole in center
- Plastic syringe, any size

#### Other:

- Phillips Screwdriver

### Prep Work:

- Cut 1/2" PVC Pipe to 6" lengths
- Cut Wooden Dowels to 8" lengths
- Drill holes in Dowels
- Drill holes in Corks
- Punch Holes in Leather Discs
- Cut Syringes to size



Phillips head screws

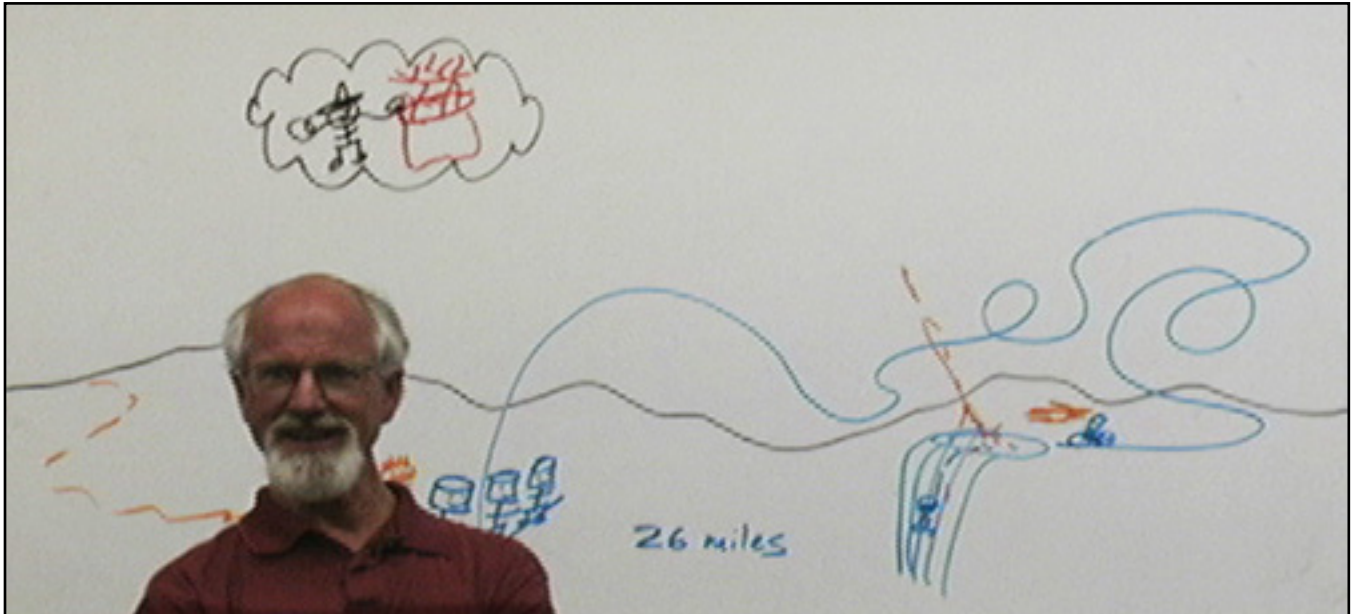


Metal washers & leather discs



PVC pipe with cork at top and wooden dowel inside.

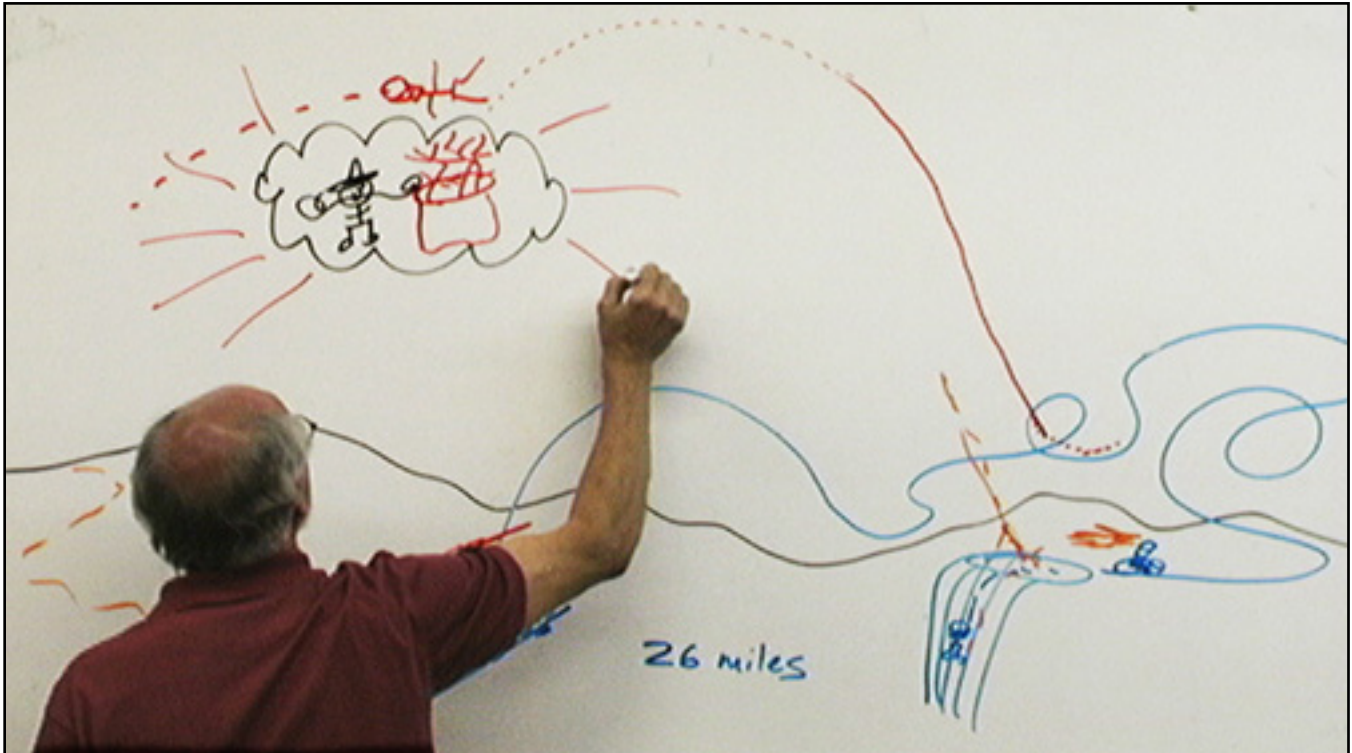
## Story Recap: "The Marshmallow Men's Race"



### Part 1:

- The marshmallow men were going to have a contest. They had to run twenty-six miles, swim up a waterfall and across a lake, then jump on a motorcycle and zoom through a roller coaster ride and end up back at the starting point.
- Jack & Jill sponsored the race, and each racer would give money to the poor, and the winner would win some money.
- Evil Mister Fred ordered a bag of lighting bolts from the Acme Store of Everything so he could throw them down on the race. So he got on his cloud and was drifting above the race.
- Evil Mister Fred waited until the racers were swimming up the water, then threw just one lightning bolt so see them all scatter.
- When the racers got on their motorcycles and were riding through the roller coaster, Evil Mister Fred started throwing more lightning bolts, which would hit the racers on the head and make their heads burst into flame.

## Story Recap (cont.)



### Ending:

- Jack and Jill ordered giant squirt guns from the Acme Store of Everything so they could put out the fires on the marshmallow men. But Evil Mister Fred kept throwing lightning bolts.
- Evil Mister Fred threw another lightning at a racer and it hit the rail. The energy went into the motorcycle and it took off like a rocket. Evil Mister Fred was so busy throwing lightning bolts at other racers, he didn't notice.
- The racer was going so fast, he flew off the roller coast toward Evil Mister Fred's cloud. He landed right in the bag of lightning bolts, and the rider bounced off.
- The bag of lightning bolts exploded and Evil Mister Fred's cloud was eaten up by the electricity, and Evil Mister Fred went poof in a big flash of light.



## Transcript: Intro

[No introduction. This lesson begins with the Story.]

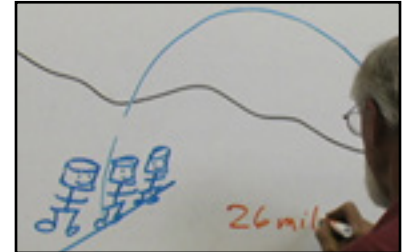
### Story: "The Marshmallow Men's Race"

Once upon a time, there was a bunch of marshmallow men. They were going to have a great contest to see who could win. In this contest, they had to start and run twenty-six miles. Then they had to swim up a waterfall, across the lake, jump on a motorcycle, and zoom through the rollercoaster ride and back to the starting point again. Jack and Jill were sponsoring this race, and each racer was going to give money to the poor, and the top racer would win some money for himself.

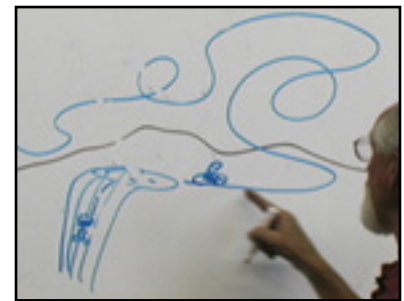
Of course, Evil Mister Fred doesn't like it when people are trying to help out the poor. And he had called the Acme Store of Everything and ordered a huge bag of lightning bolts. And he thought, "Wow, this is going to be fun. I'm going to throw these lightning bolts on them while they're racing and mess up the whole thing." So he's just drifting up there in his cloud.

They started the race, and the marshmallow men ran like crazy for the first twenty-six miles, and Evil Mister Fred didn't throw any lightning bolts at them. And then they came to the waterfall, and they were all trying to swim up the waterfall as fast as they could go. And Evil Mister Fred just threw down one lightning bolt just to see them fly all over the place. And then they got on their motorcycles. And Evil Mister Fred said, "Now's my chance!" And while they were racing through the course, he'd throw down a lightning bolt, and their head would burst into flame.

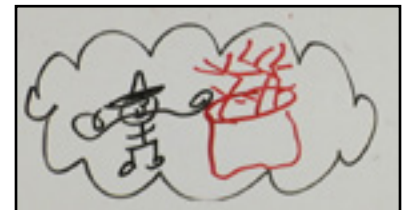
And Jack and Jill said, "Oh, no! We've got to rescue them. We can't have flaming marshmallows riding out there." If you were Jack and Jill, what would you do to help the marshmallows not burn up?



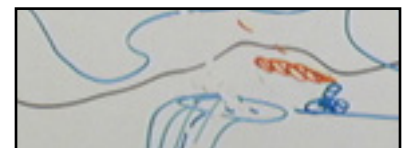
Marshmallow men ready to run 26 miles



The waterfall, motorcycle, and roller coaster track



Evil Mister Fred on his cloud with a bag of lightning bolts



The lightning bolt made the marshmallow man's head burst into flames.

## 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.)

And we're going to leave this "To be continued . . ."

## Experiment: "Build a Squirt Gun"



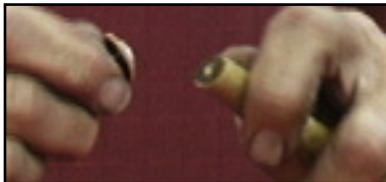
Phillips head screws

You have a stick with a hole in it, and there's a little pad of leather, and a phillips head screwdriver. There, we've got stuff, real genuine screws, genuine washers, genuine leather, and a genuine stick. You put the washer on first, which is weird, because people don't usually put the washers on first. Then you put the leather on, and then you put a screw on. So the screw goes through the leather first, it goes through the washer, and then into the stick.



Metal washers & leather discs

Have you guys ever used a screwdriver before? Cool. You turn it one way and nothing happens. If you turn it the other way, something happens. So if you're turning it and nothing happens, turn it the other way and see if something happens.



Push tip of screw through leather and washer, then attach to wooden stick.

Now you've got a stick with a genuine screw, a genuine washer, and a genuine chunk of leather on it. Pretty cool. Then you have to get it wet. *[Dips end of stick in water.]* There. Wet piece of leather on a genuine stick. And you can drop it in the tube. I like to drop it in from the top just because it helps bend the leather upwards. *[Drops stick into pvc pipe, pushes it up and down a couple of times.]* There. Perfect. *[Inserts cork into top of tube.]* It's done. Okay?



Tighten with screwdriver

What can you do with it? *[Brings out a cup of water.]* I don't know if it's going to work with this, but outdoors we're going to have a whole bucket full of water, and you'll stick it down into the water and pull up, and hopefully . . . Is there water in here?

*[Student]* I think it's a water cannon.



Drop Stick into Tube from the Top.

Oh, yeah? Let's see. *[Pushes the stick into the tube, and the water squirts out.]* The idea is to squirt water on the wall of the building outside as high as you can.



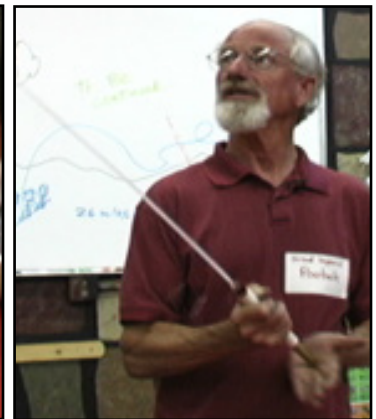
Then pull it out from the Bottom.



Add a cork at the Top.



Pull stick to get water.



Push stick in to squirt water.



See how high it will squirt.

I'm going to do an experiment with [this one.] I stuck it in the other side -- see it in there? It's way down inside. It works if you actually push the pointy end in the other end of the cork. I didn't think it would, but it does. I stuck it in the wrong way and cut off the excess. Now jam the cork in and shoot it. We want to see if it squirts farther with a little hole or with a big hole. Does it squirt farther with a big hole or a little hole?

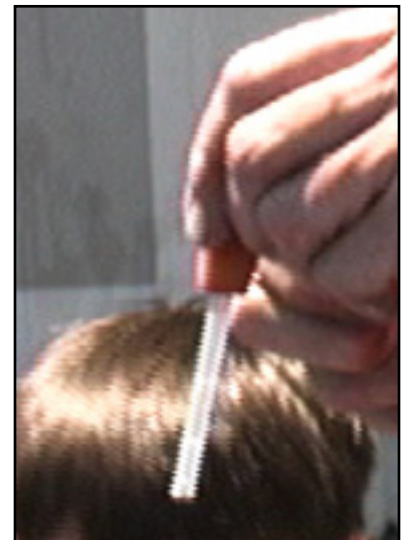
*[Student]* How about if we give the cars a bath?

Oh, I don't know if the cars would like that. Come over here and get a piece of leather. Get a screw. Get a washer. *[Students assemble their squirt guns and go outside to shoot them.]*

*[After the students shoot for awhile, the instructor brings out some plastic syringe tips.]* Come over here and I'll give you a tip to put on yours and see if it squirts better or worse with a tip. The idea is to twist and turn and try to get the tip to go into the end of the cork. And it doesn't want to, but if you're patient you might jam it in there. You want the fat end to go into the cork. If fits very tight. You have to really twist and turn and gnash and push. These have to be a tight fit, otherwise they just fall out. Maybe there's an easier way. I have an idea.



Plastic syringe tip stuck into top of cork.



Alternate method: Plastic syringe tip is stuck through bottom of cork, then excess will be cut off.

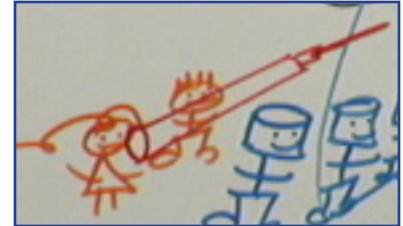


## End of Story

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

So Evil Mister Fred was saving his lightning bolts for the end of the race. And when all the marshmallow men were riding their motorcycles on the roller coaster, he was lighting their heads on fire. And Jack and Jill called the Acme Store of Everything and ordered giant squirt guns so that they could put them out. So they'd need some big tubes with corks in them. Yeah, water bazookas, like that. And they're busy squirting the marshmallow guys, putting their heads out, and Evil Mister Fred said, "They can't keep ahead of me." Crash! Crash! And he's throwing the lightning bolts all over the place.

Well, he happened to throw a lightning bolt at one guy who was riding up here. And the lightning bolt hit the rail. And the energy went into his motorcycle and it took off like a rocket. Whoooooosh! Like that. And Evil Mister Fred didn't even see him go. He was too busy throwing lightning bolts at other people. Now this guy's going way, way up high, and he hit Evil Mister Fred's cloud. And the guy's motorcycle landed right in the bag of lightning bolts. And the marshmallow guy bounced off. He flew off this way, the motorcycle hit the lightning bolts, and the entire bag of lightning bolts exploded -- crash!! And Evil Mister Fred's entire cloud got eaten up by the electricity. And poor Evil Mister Fred, he turned into a flash of light, a big poof. And a little piece of Evil Mister Fred's mustache came slowly drifting to the ground. And they all lived happily ever after, except Evil Mister Fred.



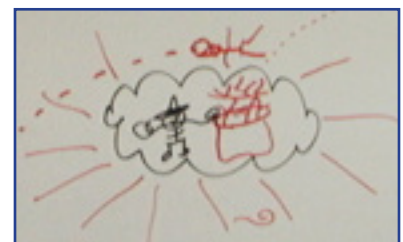
Jack & Jill's Water Bazooka.



The Motorcycle took off like a rocket.



The Marshmallow Man bounced off.



Evil Mister Fred turned into a flash of light.

## End of Lesson

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