



## Lesson Plan for “Thrust Experiment”

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### INTRODUCTION/BACKGROUND INFO

Let’s talk about Rockets! What makes them move up? How can such a large object get off the ground and fly into space?

Everything on Earth experiences a gravitational force. That’s what keeps our feet on the ground and what makes up fall down when we jump. However we can overcome the gravitational force

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

### STUDENT OBJECTIVES

Learn about thrust and gravity and how weight affects thrust.

### TOPIC(S)

List the topic areas: Thrust, Gravity, Forces

### OVERVIEW OF LESSON PROCESS

- 1) Q’s to ask: How does a rocket work? What is thrust?
- 2) Demonstrate jumping. When you jump, you’re creating thrust with your legs, which push off the ground and cause you to go up. Unfortunately, the legs can only create thrust when in contact with the ground. Once you’re in the air, you don’t have anything to push off of, which is why you eventually return to the ground. Gravity is the reason that you return to the ground.
- 3) Kid demo: Have a kid jump. See how high they can jump. Then give them one book and have them jump. Do they go as high? Give them more books. As we see, the heavier you are, the harder it is for your legs to push you off the ground. You are still creating the same amount of thrust (unless you can swap your legs) but the thrust can’t overcome the weight of the additional book. This is the concept of net force.
- 4) Problem: Once you’re in the air, you don’t have anything else to push off of. Also, rockets don’t have legs.... Now what?
- 5) Solution: Demonstrate with a balloon. Blow up and let go. It moves! Draw this out on the board.

Thrust: Net force due to an imbalance of forces in the balloon

QuickTime™ and a TIFF (LZW) decompressor are needed to see this picture.

Air escapes

Balloon



**MATERIALS (PER GROUP)**

Description	Where to buy	Price
String	Ace, Longs,	
Masking Tape	Longs	
Balloons	Longs	
Straw	?	
Small paper cups (3 oz size)	Longs	
Paper clips (weights)	Longs	
Binder clip		
Ruler (optional)		

**PROCEDURES**

1. Measure the distance from the ceiling to the floor.
2. Add 15 cm to that measurement and cut a length of string for that amount.
3. Tape or tie the string to a spot on the ceilingf.
4. Thread the straw onto the string.
5. Stretch the string taut and tape it to the floor.
6. Cut 3 pieces of string 30 cm each.
7. Using a hole punch, punch three holes evenly spaced around the top of the cup.
8. Tie one string in each hole of the cup.
9. Blow the balloon up, but do not tie it off. Use a binder clip to keep the air in.
10. Position the cup under he balloon and tape the other ends of the strings to the balloon so that it looks like a hot air balloon with a basket under it.
11. Tape the balloon to the straw.
12. Lower the balloon to the floor, count down, and release.
13. Mark how high the balloon rose on the string.
14. Measure and record.\*
15. Blow up the balloon again but this time place 5 paper clips in the basket.
16. Repeat steps 12-14.
17. Repeat steps 15-16 adding five paper clips at a time until the balloon will no longer launch.
18. Analyze data and draw a graph.

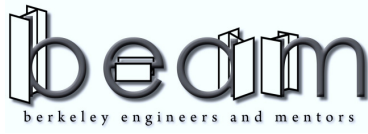
# of paper clips	Launch height
0	
1	
2	

Example table

\*If you don't want to record you can also do a qualitative analysis of the experiment.

**RESOURCES**

<http://www.sciencenetlinks.com/afterschool/gravity/facilitator.html>



<http://scifiles.larc.nasa.gov/episodes.html>