

DESMOND PUCKET

And the
MOUNTAIN FULL OF MONSTERS

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TEACHER'S GUIDE

Science Curriculum Connections



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Desmond Pucket and the Mountain Full of Monsters

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AMP! Comics for Kids

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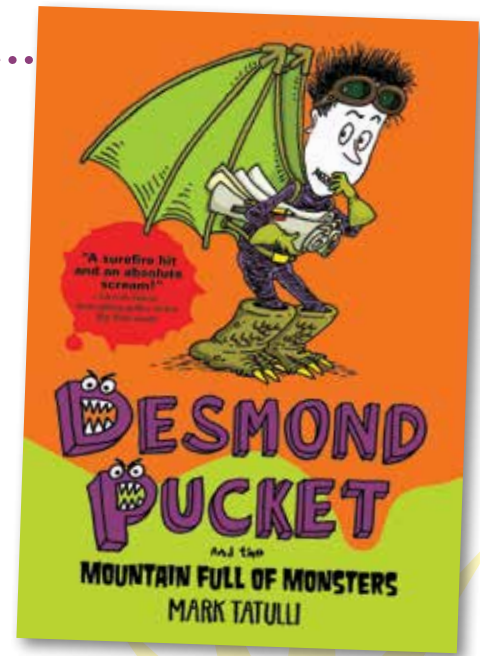
GRADE LEVEL: 3–7

Overview

Desmond has been waiting his whole life for this day. It is the sixth-grade field trip to Crab Shell Pier, home to the world's most awesomely fantastic ride: the Mountain Full of Monsters. Once inside the amusement park, Desmond finds that the ride is all he dreamed it would be—but he also finds out that the ride is closing at the end of the season! It's time to cook up a plan to save the ride, and Desmond has to enlist help from friends and enemies alike.

Objective

Enjoy Desmond's story with the class, and then let the class explore the science of invisible ink, roller coasters, bumper cars, and pendulum rides through these experiments. Do the experiments as a class, in small groups, with partners, or individually.



Invisible Ink

Desmond could have been saved some embarrassment if he'd only used invisible ink for his note to Tina Schimsky! Try these different ways to make invisible ink.

With Lemon Juice:

What's Needed: A lemon, a bowl and spoon, water, a cotton swab, a piece of white paper, and a lamp or light bulb.

Squeeze some lemon juice into the bowl, and mix a tiny bit of water into it. Dip the cotton swab into the concoction, and then use it to write a message on the white paper. After it dries, becoming completely invisible, heat the paper by holding it over a light bulb, and the message will appear.

With Baking Soda:

What's Needed: ¼ cup of baking soda, grape juice, water, a cotton swab, a paintbrush, and a piece of white paper.

Mix the baking soda with an equal amount of water. Dip the cotton swab into the mixture, and then use it to write a message on the piece of paper and let it dry completely. To read the message, use a paintbrush to paint grape juice across the paper, and the message will appear.

With Milk:

What's Needed: A bowl of milk, a cotton swab, a piece of white paper, and a lamp or light bulb.

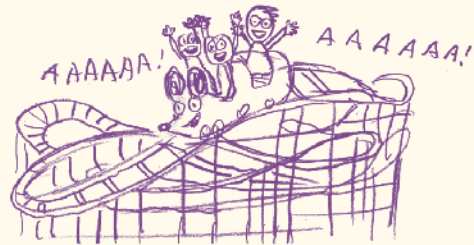
Dip the cotton swab into the bowl of milk and use it to write a message on the piece of paper. After it dries, hold the light bulb over the paper to see the message appear.

Amusement Park Science: Roller Coasters

Explore how roller coasters work using gravity, energy, and centripetal force.

Find This Out:

- * What is gravity?
- * What is potential energy?
- * What is kinetic energy?
- * What is centripetal force?



Experiment: Convert Potential Energy to Kinetic Energy

Make a model roller coaster to find out how potential energy gets converted to kinetic energy.

What's Needed: Marbles, 6 feet of flexible tubing (such as ¾-inch foam pipe insulation), scissors, and masking tape.



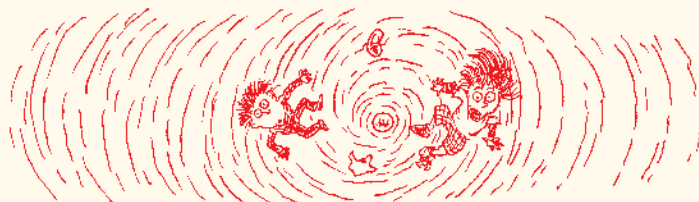
Cut the tubing in half to make a narrow “track” for the marble to roll down. Tape one end of the tube to a table and the other to the floor, making a steep hill for the marble to roll down. Use the rest of the tubing to make smaller hills and one or two loops. Put the marble at the beginning of the coaster and let it roll. Then make changes to see how the marble’s speed is affected—raise the beginning higher, add some curves, or add some more loops.

Experiment: Centripetal Force

Investigate the force that helps keep riders in their seats!

What's Needed: A small bucket with a handle, 3-foot long rope, and water.

Tie one end of the rope to the bucket handle, and fill the bucket half-full with water. Have someone wrap the rope around her hand and ask everyone else to stand back while she spins the bucket in a vertical circle. If it’s done fast enough, water will not come out of the bucket—the centripetal force keeps it there. Try spinning slower and slower until the water starts to splash out.



Experiment: Investigating Gravity

Long before modern amusement parks were invented, a scientist named Galileo wondered what would happen if he dropped two items of different sizes from the same height, at the same time. Replicate his experiment to see what he discovered.

What's Needed: A feather, a rock, a small action figure, a basketball, a wiffle ball, a tennis ball, a ladder or raised platform, a pen, some paper, and a partner.

One person stands on the ladder and drops two objects at the same time. The other person watches to see which object hits the ground first and records the result. Test these pairs: light versus heavy object, small versus large object, and solid versus hollow object. Look at which objects fell the fastest and the slowest, and try to decide why. Would the results be the same if you were doing this experiment on the moon, with no gravity?

Just for Fun: Video Extension

<http://science.howstuffworks.com/4661-how-roller-coasters-work-video.htm>

This video from *How Stuff Works* explains how roller coasters work.

Amusement Park Science: Bumper Cars

Investigate Sir Isaac Newton's laws of motion.

Find This Out:

- * What are Newton's three laws of motion?
- * What is inertia?
- * What is acceleration?
- * What is momentum?



Experiment: Explore Newton's Second and Third Laws

What's Needed: A handful of marbles of different sizes and a flat surface (floor or table).

Have two students take a marble of the same size and roll them into a collision, observing what happens when they hit. Try again with both students moving farther apart. Try a third time with both students rolling the marbles as fast as they can. For fun and more collisions, add more students and marbles, varying the size of the marbles and observing the effects. Also find out what happens when a moving marble hits one that is sitting still.

Experiment: Energy Transfer

What's Needed: A soccer ball and a tennis ball.

Put the tennis ball on top of the soccer ball with one hand under the soccer ball and the other on top of the tennis ball. Let go of both balls at the same time and see what happens. When they hit the floor, the tennis ball should bounce off the soccer ball and into the air because the kinetic energy is transferred from the larger ball to the smaller one. Is it the same result as hitting a "sitting" marble with a moving one, as above?



Amusement Park Science: The Pendulum Effect

Pendulum rides work the same way that the swings on the playground do—moving you back and forth in an arc, sometimes even taking riders over the top in a complete circle.

Find This Out:

- * What is a pendulum?
- * What is weightlessness?
- * What are G-forces?

Experiment: Make a Pendulum

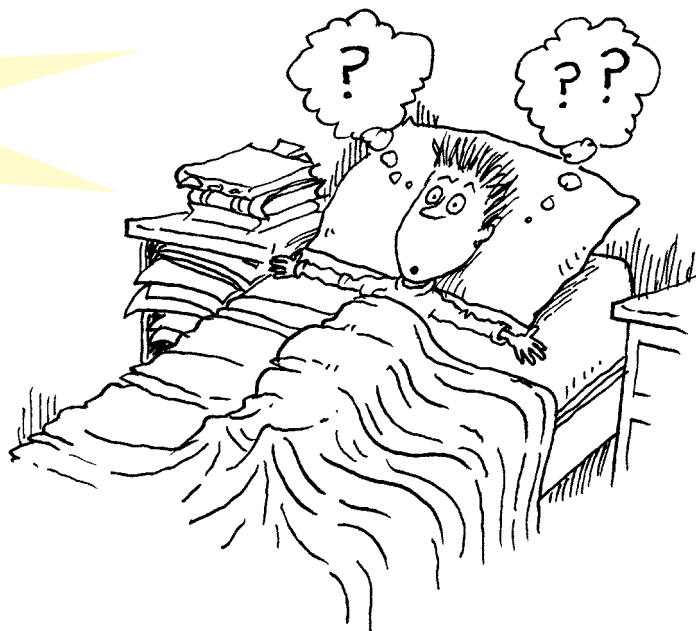
What's Needed: Small bolts of different sizes, a 3-foot long piece of string, two chairs, a broom handle, a ruler, and a stopwatch.

Set the chairs back to back, leaving them about 3 feet apart, and lay the broom handle over the backs. Tie the bolt to one end of the string, and tie the other end to the middle of the broom handle. Give the bolt a push to start it swinging. Count how many times the pendulum swings from one side to the other in one minute and record this. Try using heavier bolts with the same string and record the results. Then shorten the string and repeat. Then review what you've recorded. What are the differences with heavier weights and different size strings?

Just for Fun: Video Extension

<http://www.pbs.org/opb/circus/classroom/circus-physics/activity-guide-pendulum-motion/>

This video shows how a pendulum works—with a grandfather clock and a circus trapeze artist!



Video Note: All of the online videos in this guide were current and working as of July 2014, but please check them before you share them with the class.