



# MAKE IT MOVE



## RATIONALE FOR ADVENTURE

This adventure teaches the boys about action and reaction. Using common objects, Bear Scouts will learn about chain reactions, pulleys, and levers. The boys will take all of the things that they learn and create a fun Rube Goldberg-type machine.

The term “Rube Goldberg” is defined in the Merriam-Webster dictionary as “doing something simple in a very complicated way that is not necessary.” The use of the term was inspired by the cartoons of Rube Goldberg, an engineer-turned-cartoonist who lived from 1883 to 1970. Goldberg’s cartoons depict humorous “inventions” that make use of many principles of physics that Bears will encounter in this adventure. This adventure is all about creating a chain reaction to accomplish a simple task—and having a lot of fun along the way!

## TAKEAWAYS FOR CUB SCOUTS

- Learning about action and reaction
- Cooperating as a den to complete a task
- Encouraging your fellow Scouts
- Looking at common objects (such as dominoes, craft sticks, marbles, string, paper cups) from different perspectives and exploring how they balance, tip over, stack, and fall to create Rube Goldberg machines

## ADVENTURE REQUIREMENTS

*Bear Handbook, page 206*

1. Create an “exploding” craft stick reaction.
2. Make two simple pulleys, and use them to move objects.
3. Make a lever by creating a seesaw using a spool and a wooden paint stirrer. Explore the way it balances by placing different objects on each end.
4. Do the following:
  - a. Draw a Rube Goldberg-type machine. Include at least six steps to complete your action.
  - b. Construct a real Rube Goldberg-type machine to complete a task assigned by your den leader. Use at least two simple machines and include at least four steps.

### NOTES TO DEN LEADER

The cartoons of Rube Goldberg are intended to serve as inspiration for the spirit of fun and experimentation behind the activities in this adventure. As a leader, you will need to review any specific cartoons, drawings, or videos you might choose to share to ensure they are appropriate for Cub Scouts.

Remind Bears that safety is of the highest importance in all Scouting activities and that all of their inventions must align with age-appropriate guidelines for Scouts.

Between Meeting 2 and Meeting 3, Scouts will have a Do-at-Home Project for which they will be designing an imaginary Rube Goldberg machine (requirement 4a). This machine does not need to be something they can execute, so Bears can use their imaginations to create an invention on paper that would not be possible to create in reality. Bears will also need to bring materials to Meeting 3 to be used in the den’s creation of a simple Rube Goldberg machine (requirement 4b). See suggested items in the Meeting 3 Plan.

**Consider searching online and previewing some sample videos of the “exploding” craft stick activity in Meeting 1 and the Rube Goldberg machines in Meeting 2 to share with the den and generate excitement. You can find a variety of creative machines featured in videos on the Rube Goldberg official site: [www.rubegoldberg.com/?page=video](http://www.rubegoldberg.com/?page=video).**

# MEETING 1 PLAN

## PREPARATION AND MATERIALS NEEDED

- U.S. and den flags
- Materials for Sticky Stop game
- Materials and an appropriate space for Activity 1, the “exploding” craft stick chain reaction investigation
- Prepare for the “exploding” craft stick activity by reviewing the instructions in advance and searching for sample videos online. You might choose to share a video with the Scouts if you feel they will benefit from seeing an example. Be sure to carefully preview any videos in advance.
- Materials for Knot Circle closing

## GATHERING

Play the Sticky Stop game.

### Materials:

- Table or other flat surface
- Double-sided tape
- Marbles (probably two per Scout)

### Instructions:

Place the double-sided tape at one end of the table. Scouts with marbles are at the other end.

Each Scout must roll his marbles across the flat surface, trying to get them to stick to the double-sided tape on the opposite end. The trick is to find the correct speed: If it’s too slow, the marble won’t make it; if it’s too fast, the marble will fall off the table.

## OPENING

- Conduct a flag ceremony of your choosing that includes the Pledge of Allegiance.
- Have the Scouts gather in either a circle or a straight line, standing about arm’s length apart. The den chief or Akela begins with the words “A Scout is ...” He then touches the shoulder of one Scout, who in turn says “Trustworthy” and then touches the next Scout’s shoulder. He in turn says “Loyal” and touches the next Scout’s shoulder and so on, until all 12 points of the Scout Law have been recited.

Each Scout must signal the next Scout before the word is said, creating a chain reaction. This can be tied into the activity later in the meeting.

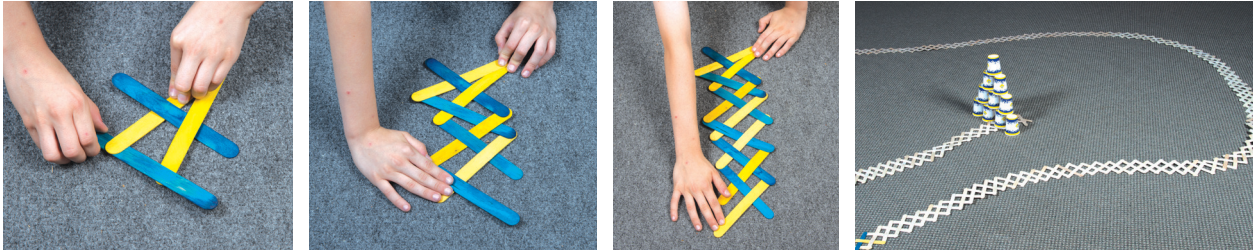
## TALK TIME

- Carry out business items for the den.
- Allow time for sharing among Cub Scouts.
- Introduce Scouts to Rube Goldberg machines and look at the sample cartoon in the *Bear Handbook*. Try to pick out different steps—both the logical ones and the funny or creative ones. Remind Scouts that the inventions in the machines were not intended to actually be made or tried out as they were drawn. However, many people in recent years have created amazing Rube Goldberg machines using their imaginations and science.

## ACTIVITIES

### ◆ Activity 1: “Exploding” Craft Stick Reaction (Requirement 1)

- Review the steps for creating this investigation in advance. Perform a small test reaction to get a better understanding of the process and any challenges you may encounter.
- Using the steps in the *Bear Handbook*, work together as a den to create an “exploding” craft stick reaction.



#### NOTES TO DEN LEADER

This is a great opportunity for teamwork in your den. Be prepared for this to take the entire den activity time. To build a chain that is approximately 15 feet takes 20 minutes. If you have extra time, have the boys experiment with curves and inclines. Consider using two different colored craft sticks to help the boys keep their pattern straight. If you don't have two different colors, mark one set with a number or letter to set it apart. If you have a large den you may want to break Bears into smaller groups to stay within the time frame available for this activity.

- After completing the activity, discuss the reaction the boys had to your experiments. Ask questions such as the following:
  - How did the investigation go?
  - Where did your team come up against obstacles, and in what way did you solve them?
  - If you were to describe your reaction in sounds only, what would it sound like?
  - Did you notice how weaving the craft sticks held them together, but you had to use your hand to hold the end in place until you were ready to let them spring apart?
  - How many cups were you able to stack?
  - How long of a chain reaction were you able to make?
  - Was it easier to do this as a team?

## CLOSING

### Knot Circle

#### Materials:

Length of rope or string (6 to 8 inches) for each boy and each adult who might be in attendance

#### Instructions:

1. Begin with two Scouts, and have them tie their strings together at one end only. There should now be one longer piece of string with a knot in the middle.
2. Have another Scout tie his piece of string to one end of the longer piece, creating an even longer piece of string. All Scouts should hold on to their pieces of string as the process continues.
3. Continue until all those in attendance have tied on their pieces of string. (The type of knot is unimportant; however, you may ask for a Scout knot in order to teach and reinforce knot tying.)
4. Now the first person and the last person should come together and tie the two ends together to create a circle of string with everyone still holding on to it.

Explain that each piece of the string was needed to make one complete circle. Just as the strings make one circle, each member of the den plus the leaders and parents come together to make the den complete. Without everyone, the Bear den circle is incomplete. Also, you may add that their Bear den is a “string” in the pack—helping to form the circle with all the other dens—or that each member of each Bear’s family is a “string,” helping to make the family complete.

## AFTER THE MEETING

- Serve refreshments, if desired.
- Record completion of requirement 1.
- Work together to clean up the meeting place.

# MEETING 2 PLAN

## PREPARATION AND MATERIALS NEEDED

- U.S. and den flags
- Materials needed for Toppling Tower gathering activity
- Candles and matches (or flashlights, etc.) for Opening
- Materials needed for lever and pulley investigations (See Meeting 2 Resources.)
- Copy of the Do-at-Home Project for each Scout (See Meeting 2 Resources.)

## GATHERING

### Toppling Tower

#### Materials:

- Large bowl of water
- Plastic plate
- Five empty soda cans

#### Instructions:

Have Scouts try to stack all five cans on the plastic plate as it floats in the bowl—without tipping the cans over or sinking the plate.

## OPENING

- **Bear Scout Light:** The den leader asks Bears to sit on the floor in a circle and then dims the lights. Have a small candle and larger candle, plus matches, on a table. Flashlights or battery-operated candles may be used instead of regular candles and matches.

**DEN CHIEF:** I will light this small candle. It represents the Scout spirit shown by one Bear Scout. See how it shines? The rays from several Bear Scouts make an even brighter light. Each Scout lets his light shine by doing his best and helping other people.

**DEN LEADER:** I'll light this large candle. This represents that there is a brighter light that leads us all. Let us always think first of God, second of others, and finally of ourselves.

- Conduct a flag ceremony of your choosing that includes the Pledge of Allegiance and, as appropriate, the Scout Oath and Scout Law.

## TALK TIME

- Carry out business items for the den.
- Allow time for sharing among Cub Scouts.
- Explain the use of levers and pulleys, and ask the boys for examples that they see in their everyday life.

## ACTIVITIES

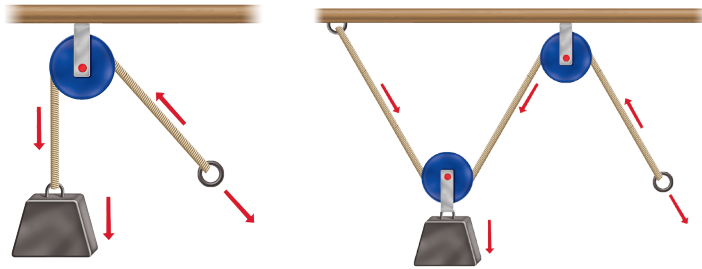
### ◆ Activity 1: Pulley Investigations (Requirement 2)

#### Pulley #1 Materials:

- Rolling pin
- String
- Heavy book

#### Pulley #2 Materials:

- Two large spools
- Two pencils or dowels (must be able to fit in the spool hole and move easily)
- 30 feet of string or strong yarn



Follow the steps in the *Bear Handbook* for the two different types of pulleys. Once the investigation is complete, discuss the boys' reaction to the activity. Ask leading questions rather than questions that can be answered with yes or no. Suggestions include:

- For the first pulley, was it easier or harder with the rolling pin? Which pulley do you think takes more strength and why?
- Where did you come up against obstacles, and in what ways did you solve them?

(If you have a large den you, may want to break Bears into smaller groups to stay within the time frame needed for this activity.)

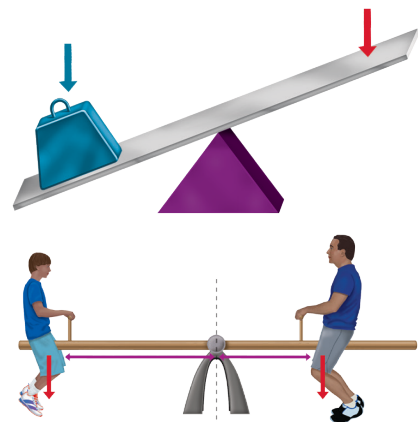
### ◆ Activity 2: Lever Investigations (Requirement 3)

A lever is a simple machine that has only two parts: a beam (this could be a piece of wood or metal) and a fulcrum (the support that the lever pivots on). You add energy when you use your hands to change the weights on each end. See what actions result.

#### Materials:

- Paint stirrer
- Pencil
- Spool (edges should be wider than the paint stirrer)
- Rubber band
- Small weights or other objects

Follow the instructions in the *Bear Handbook* to make a first-class lever. Similar levers you might see include a seesaw, a crowbar, a hammer pulling a nail, or a pair of scissors. (This last one uses two first-class levers put together.)



## CLOSING

- Den yell
- Remind Scouts of the Do-at-Home Project for next week (requirement 4a). Hand out the project instructions page in the Meeting 2 Resources.

## AFTER THE MEETING

- Serve refreshments, if desired.
- Record completion of requirements 2 and 3.
- Work together to clean up the meeting place.

## MEETING 2 RESOURCES



### Do-at-Home Project Reminder:

For the next meeting, you will be designing a Rube Goldberg machine to complete requirement 4a. This machine does not need to be possible to make. Instead, you can let your imagination run wild to come up with your “dream” invention!

Here’s how to create a Rube Goldberg machine:

1. Choose a simple task (such as drying your face, putting on a hat, or opening a door).
2. Decide what working elements you want to include in your design. These could include chain reactions, pulleys, levers, ramps, balls, and more.
3. Add your imagination! How could you use those elements in different ways? How could you include building blocks, toy cars, string, or other items in your design?
4. Have fun! Bring your design to the den meeting to share with everyone.

At that meeting, you will build a real Rube Goldberg machine with your den. Your den leader may ask you to bring several disposable household items that could be used in the creation of the group machine. Remember that all materials you bring must be safe. Check with your den leader or a parent or guardian to be sure items are OK to bring in.



# MEETING 3 PLAN

## PREPARATION AND MATERIALS NEEDED

- U.S. and den flags
- Materials for the Ready, Set, Aim! gathering activity
- Miscellaneous items for constructing the Rube Goldberg machine. You may ask parents to assist you in furnishing items. Some examples are dominoes, Popsicle sticks, marbles, string, paper cups, etc.

## GATHERING

### Ready, Set, Aim!

#### Materials:

- Item with hollow center that is 1-3 feet in length (e.g., pool noodles, conduit, empty wrapping-paper rolls, etc.)
- Cups
- Marbles

#### Instructions:

1. You may want to have several lengths of hollow tube to allow for experimentation of how fast and far the marble can roll depending on which length of tube is used.
2. Secure the tube at an angle so the marble can make its exit. This can be done by leaning it against a wall or table or simply by having the Scout hold it.
3. Have each Bear drop a marble down the hollow tube, sending it rolling across the floor and into a cup that has been placed 2 feet away. When they are successful at that distance, Bears can try other distances as well.

## OPENING

- Conduct a flag ceremony of your choosing that includes the Pledge of Allegiance and, as appropriate, the Scout Oath and Scout Law.
- Sing “Head, Shoulders, Knees, and Paws.” Bears should touch their heads, shoulders, and knees as they sing each of those words. For paws, Bears should hold their hands in front of them and wave. For fun, you can change the song to be sung fast, slow, or deep (like a growling bear).

*Head, shoulders, knees, and paws  
Knees and paws  
Head, shoulders, knees, and paws*

*Knees and paws  
Eyes and ears  
And mouth and snout  
Head, shoulders, knees, and paws  
Knees and paws*

## TALK TIME

- Carry out business items for the den.
- Allow time for sharing among Cub Scouts.
- Share the Rube Goldberg drawings the Scouts brought from home. Talk about the different elements that they incorporated (requirement 4a).

## ACTIVITIES

### ◆ Activity 1 (Requirement 4b)

- Build a Rube Goldberg machine using recycled materials brought from home.
- You may wish to break your den into small groups with different tasks to speed up the machine-building process.
- Choose a simple task that the Scouts' machine should complete. Or, if the Scouts already have some ideas, provide feedback and guidance as needed to encourage a positive outcome.
- Remind Scouts that they should use two simple machine types for their Rube Goldberg machine and have at least four steps. They can review the descriptions of pulleys and levers in their handbooks to help them as they build.
- Also remind Scouts that they are likely (almost certain) to experience some failures along the way. The best Rube Goldberg machines require many changes and lots of testing to make them work. The process of working together, sharing ideas, trying things out, and staying positive when changes are needed is far more important than making a successful machine.
- Have the boys explain and demonstrate their machine. If the machine is not finished, have them share what they completed and the vision for their machine.

**There are some spectacular videos of Rube Goldberg machines available if you conduct a search on the Internet. Be sure to preview.**

## CLOSING

- Have Bear Scouts repeat the Cub Scout Motto in unison (“Do Your Best”).
- **Akela’s Minute:** Reflect with the den on the process of building the machine. Did their machine meet their expectations? What part of the process did they enjoy most or find the most challenging? What would they do differently next time? Reinforce the idea that, as long as they did their best, the Scouts were successful.

## AFTER THE MEETING

- Serve refreshments, if desired.
- Record completion of requirements 4a and 4b.
- Work together to clean up the meeting place.

Upon completion of the Make It Move adventure, your Bears will have earned the adventure loop shown here. Make sure they are recognized for their completion by presenting the adventure loops, to be worn on their belts, as soon as possible according to your pack’s tradition.

