

# How to Build a Homemade Rube Goldberg Machine

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Rube Goldberg (1883-1970) was a scientist and cartoonist who produced satirical work on people's overly complex problem solving methods. In his comical cartoons, he linked together chain reactions with simple machines to complete basic tasks, like turning on a lamp or frying an egg.<sup>[1]</sup> Designing and building a Rube Goldberg machine requires innovation and patience. While every machine is different, many builders include versions of other people's ideas, tweaking them or linking them in exciting ways.

Part  
1

## Part 1 of 3: Preparing for the Assignment or Competition



**1 Understand the rules.** If you're building a Rube Goldberg machine for a class or **official competition**, you will get a packet of information and rules. Before you plan or build your machine, read through this material carefully. While you read, identify the goal, requirements, and restrictions.

- If the material is unclear, ask your teacher, parent, or an official to clarify.
- If you don't follow the rules, you may get a poor grade or be disqualified from the competition.<sup>[2]</sup>



**2 Select a basic task for your machine to accomplish.** Rube Goldberg machines are complex structures that rely on chain reactions to execute one simple task. Before you design your machine, determine what you want the machine to do. If you are competing in a Rube Goldberg competition or completing an assignment for school, you may not have the freedom to choose this task. If can pick, consider some of the following options:

- Open or close a door
- Turn on a light
- Turn off an alarm
- Pour a bowl of cereal
- Turn on a faucet



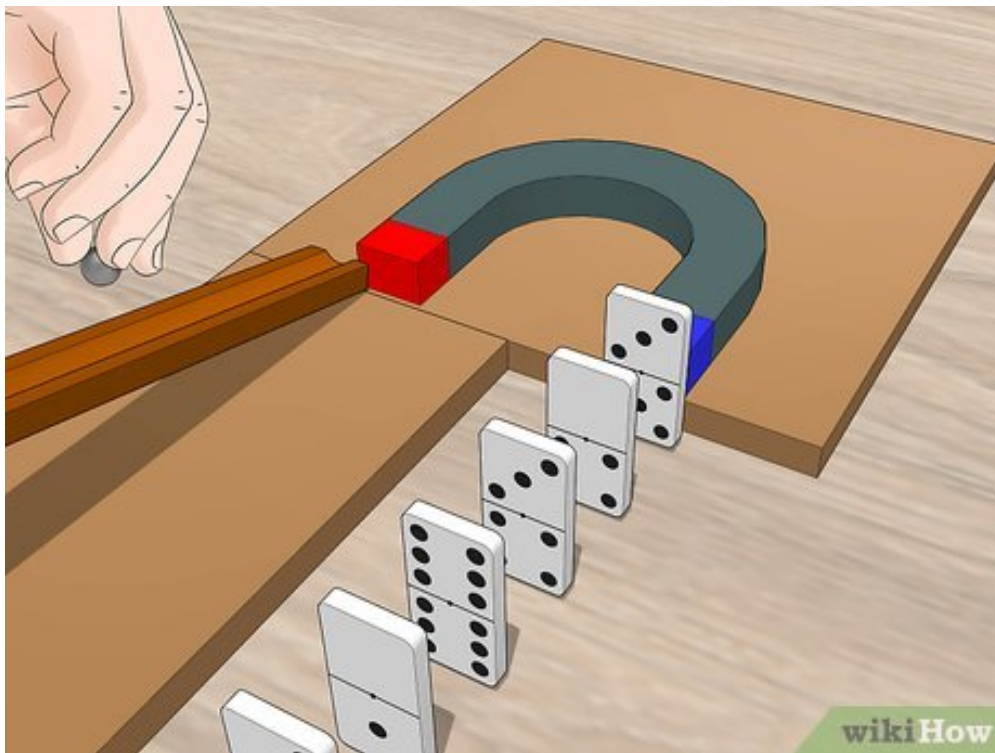
**3 Look for inspiration.** Developing a zany, complex machine is not an easy task. Before you create your own Rube Goldberg machine, you may find it helpful to see some examples. While you should use these examples as a source of inspiration and direction, do not copy someone else's machine. Instead of replicating these machines, make it your goal to improve, alter, or modernize them. Potential sources of inspiration include:

- Rube Goldberg's [original cartoons](#)
- [Rube Goldberg Competition submissions](#)
- YouTube videos of functioning Rube Goldberg machines



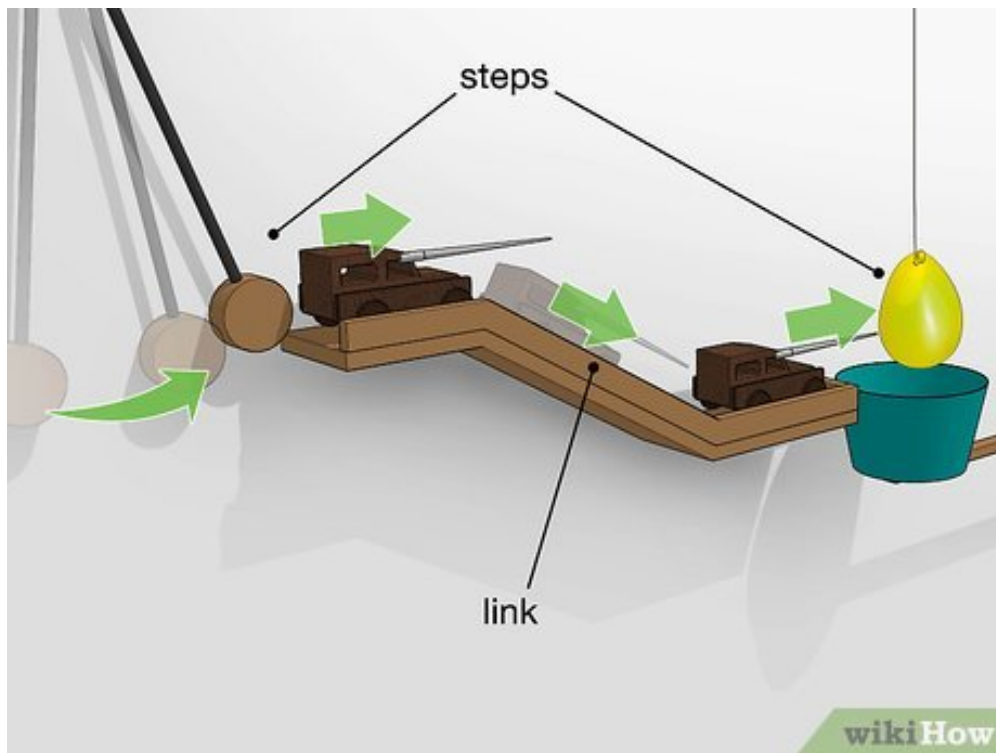
**1 Collect your materials.** Rube Goldberg machines transform traditional building materials, everyday items, and unique objects into functional pieces of equipment that work together to execute a simple task. Spend time gathering items from around your house, purchasing materials from stores, and/or hunting for unique objects at flea markets. Possible building materials include:

- Dominos
- Wooden boards
- Toilet paper rolls
- CDs or floppy discs
- Fans
- Toy cars
- Skateboards
- Action figures
- PVC pipe
- Duct Tape
- Peg boards
- Zip Ties
- Magnets
- Marbles
- String
- Get creative!<sup>[3]</sup>



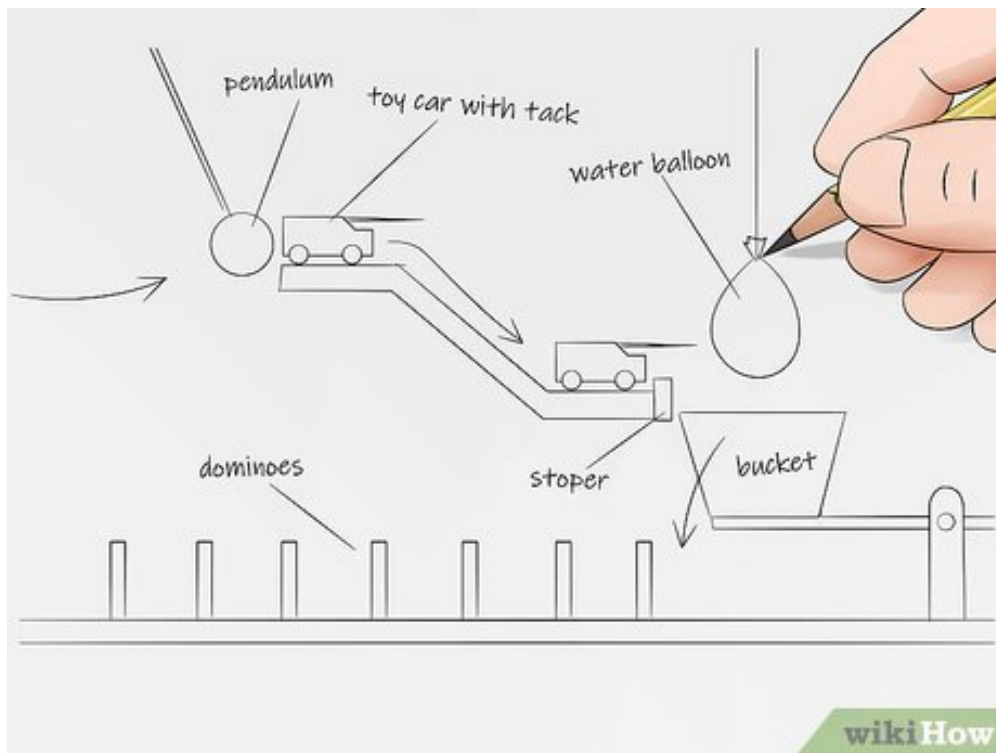
- 2 Experiment with the materials.** Lay out all of your materials on your work surface. Once you're organized, start playing with the items. As you experiment, combine the materials in unexpected ways to form chain reactions. While you work, keep a record of what combinations worked.
- Ask yourself questions throughout the process. What object can you use to send a car down a wooden ramp? What materials will you need to make a pendulum? What can you make with a lever, a marble, and an action figure?





**3 Develop a building plan.** Rube Goldberg machines complete a simple task with a complex chain reaction. You can break down the chain reaction into several different steps, or phases. The steps are connected together by a link. When you design the machine, it is helpful to start with the last step and work your way to the first step. You can create the building plan by listing these steps or drawing the machine. For example:

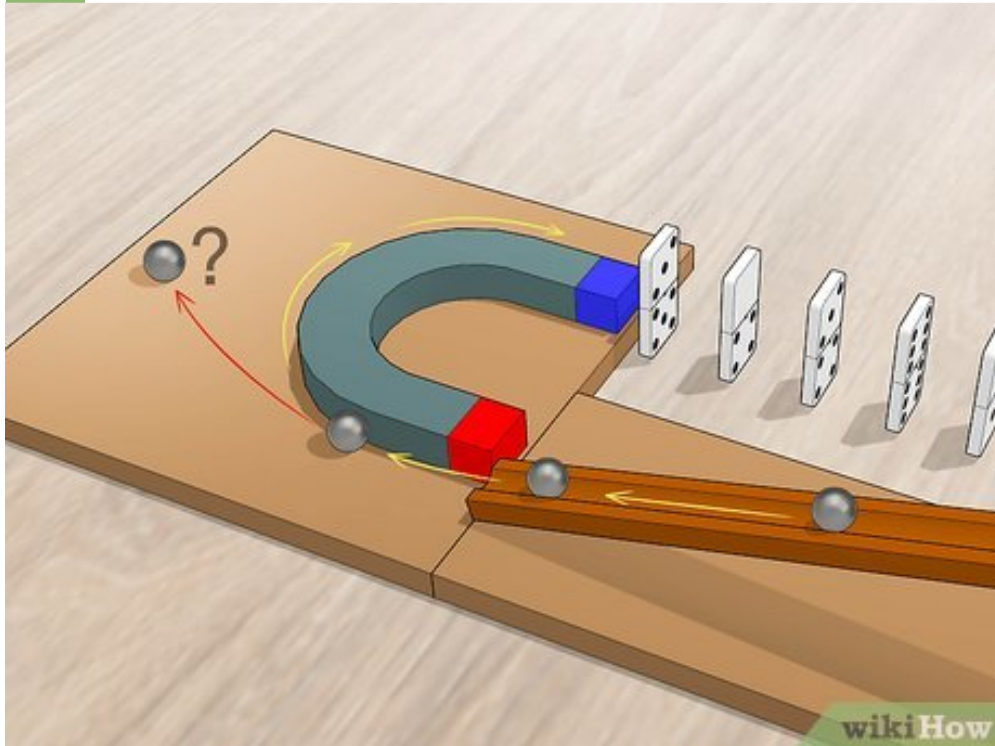
- Task: Pop a balloon.
- Step 3: A tack will pop the balloon. The tack will be attached to the front of a toy car.
- Link 1: The toy car will slide down a wooden ramp.
- Step 2: A pendulum will swing into the car and push it down the wooden ramp.
- Step 1: I will send the pendulum towards the car at the top of the wooden ramp.



**4 Build a prototype.** Sit down at your workspace with your notes and building plan. Quickly construct a prototype of your Rube Goldberg machine. This version of your machine doesn't have to be perfect. You'll build a final product later after you test it.

- If you run into an issue, don't panic. Return to your notes and see if you can combine the materials in a different way.
- If you are using tools, ask an adult for help.<sup>[4]</sup>

### Part 3 of 3: Testing and Revising Your Machine



**1 Test your machine for feasibility.** Once your prototype is complete, test the machine. This first test is to determine if your machine works. If the machine completes the task, proceed to the next step. If the machine doesn't complete the task, rethink—don't scrap—your design.

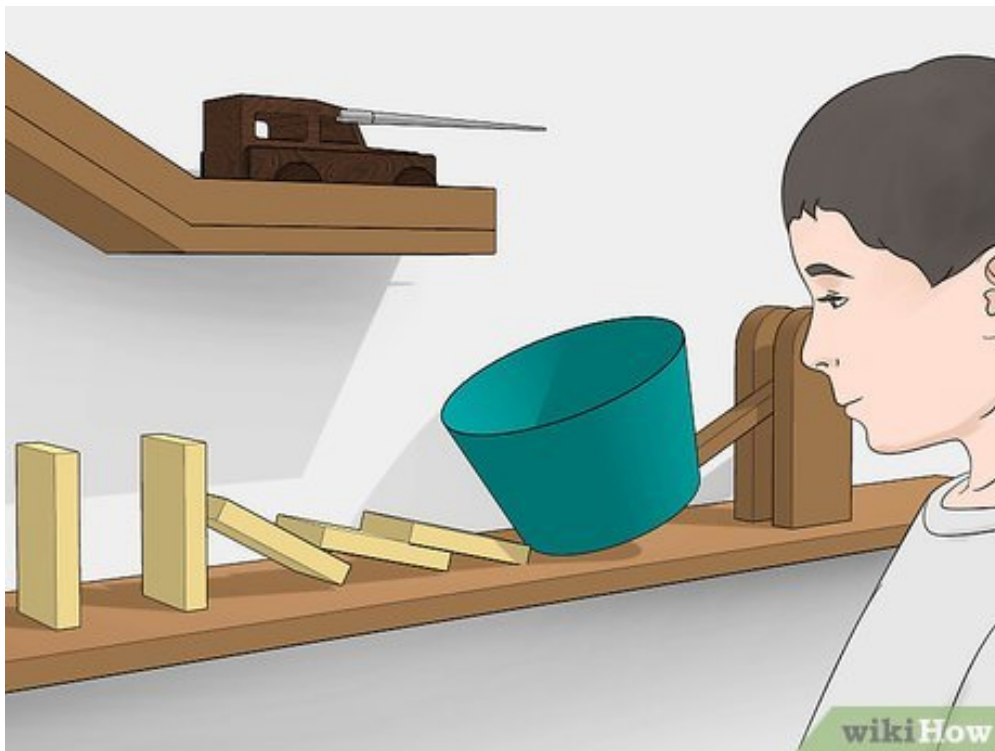
- Can you quickly fix the problem?
- Do you need to replace an entire step?
- Are you using the best materials?
- Is your task possible to achieve?





**2 Build your final product and test its repeatability.** When your machine has passed the feasibility test, you can construct a sturdier version of your Rube Goldberg machine. Assess the machine's repeatability—its ability to complete the task several times in a row. A test is successful if the machine operates on its own. Test and adjust the machine until it completes the task five times. If the test is successful, make minor alterations and continue on to the final test. If the machine doesn't produce five successful tests within an hour, redesign your machine.

- What steps are working?
- What steps are preventing the machine from working?
- Is your task achievable?



**3 Test the machine's reliability.** After your machine passes the repeatability test, determine if it is reliable. You will test the machine a total of four times. A reliable machine will complete the task at least three out of four times. If your machine passes this test, you've created a working Rube Goldberg machine.

- Before you present the machine, practice taking it apart and putting it back together several times.



## Community Q&A

### Question

Where can I see more simple ideas?



Community Answer

You can usually find more ideas for Rube Goldberg machines if you Google it. Pinterest is a good resource.

Helpful 169 Not Helpful 114

### Question

Why can't I do something with my hands?



Community Answer

The whole point of the Rube-Goldberg machine is for it to do it by itself, no touching allowed.

Helpful 155 Not Helpful 103

#### Question

**What are some ideas of things to do with my Rube Goldberg machine?**



Community Answer

You could have the machine pop a balloon, drop a can into a bin, throw a marshmallow, water a plant, or pour dog food in a dish.

Helpful 151 Not Helpful 95

#### Question

**Do I need to use expensive materials?**



**The\_generals2014**  
Community Answer

Not usually, but it depends; usually you can just find things around the house to make it out of, but other times you may have to buy some things. The more complex a Rube Goldberg is, the more things you will have to buy.

Helpful 96 Not Helpful 67

#### Question

**How am I supposed to start the machine?**



Community Answer

Usually just a person does one thing to start it. For example, in the YouTube video "OK Go This Too Shall Pass Rube Goldberg Machine," the starting action was the guy in the red pushing the car into the rest of the machine, which set off the chain reaction.

Helpful 100 Not Helpful 89

#### Question

**How long does this generally take to build?**



Community Answer

For me, this project took around 2 hours. Some of my friends completed it in one hour, though. It depends on how quickly you work.

Helpful 74 Not Helpful 136

#### Question

**Can it turn off a light in six steps?**



Community Answer

Yes. The only limit for number of steps is space and cost. For example, you could push a toy car down a ramp, which lowers onto a platform attached to a cigarette lighter, which lights a fire, boiling water on top of a seesaw, which causes the other end to sink downwards onto a button, turning on a laser pointer, shining it into a detector, cutting a rope attached to a ball, landing on the switch.

Helpful 49 Not Helpful 105

#### Question

**Do I have to use the engineering process?**



Community Answer

Yes, that is the whole point. The engineering process is what makes a Rube Goldberg a Rube Goldberg.

Helpful 48 Not Helpful 83

#### Question

**What can I use to build a homework machine for the Rube Goldberg project?**



Community Answer

You can't really make a homework machine, because it is not a simple task. I would recommend doing something more common, such as pouring lemonade, turning off an alarm clock, etc. Even a complicated computer might not be able to do your homework for you accurately, so it would be impossible to make a Rube Goldberg machine that does this.

Helpful 38 Not Helpful 71

#### Question

**How do I use different materials to make a Rube Goldberg machine?**



Community Answer

Be creative! Look around your house for materials that you can use. You shouldn't have to go to the store to get your items. Some materials you can use are: Toilet paper rolls, dominoes, rolling balls, etc.

Helpful 45 Not Helpful 42

[See more answers](#)



### Tips

- Use materials that you can easily adjust, like peg boards, building blocks, etc.
- Before you construct your entire machine, you may want to test each step and link.



### Warnings

- Be cautious and work under adult supervision if you are using potentially dangerous items.

## References

1. ↑ <https://www.rubegoldberg.com/about/>
2. ↑ <http://static1.1.sqspcdn.com/static/f/853277/11788139/1303160446880/HowtoBuild.pdf?token=katFNsAhIL9TaIXmyhvObs5POFk%3D>
3. ↑ <http://mousetrapcontraptions.com/tips-9.html>
4. ↑ <http://static1.1.sqspcdn.com/static/f/853277/11788139/1303160446880/HowtoBuild.pdf?token=katFNsAhIL9TaIXmyhvObs5POFk%3D>

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