



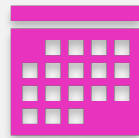
# Mousetrap Car

Quarter Project 2

## Important Dates



Preliminary- Tuesday,  
November 19<sup>th</sup>



Final- Tuesday, December 3



# Rules

Construct a car powered by the spring action of a single mousetrap.

You may use just about anything you wish to construct the car.

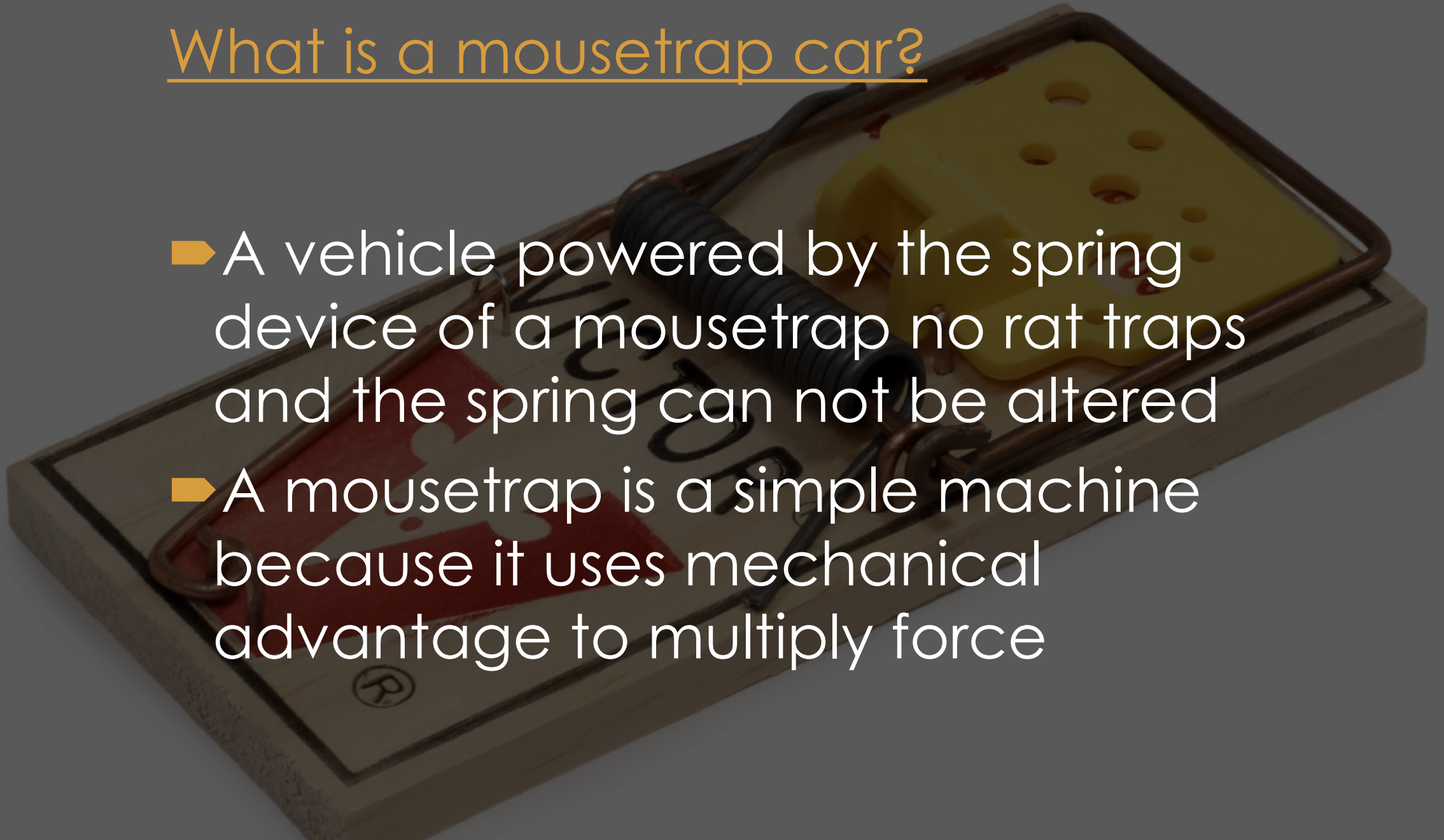
You will need to supply all of the materials.

The vehicle is to be constructed out of class.

**KITS ARE NOT ALLOWED.**

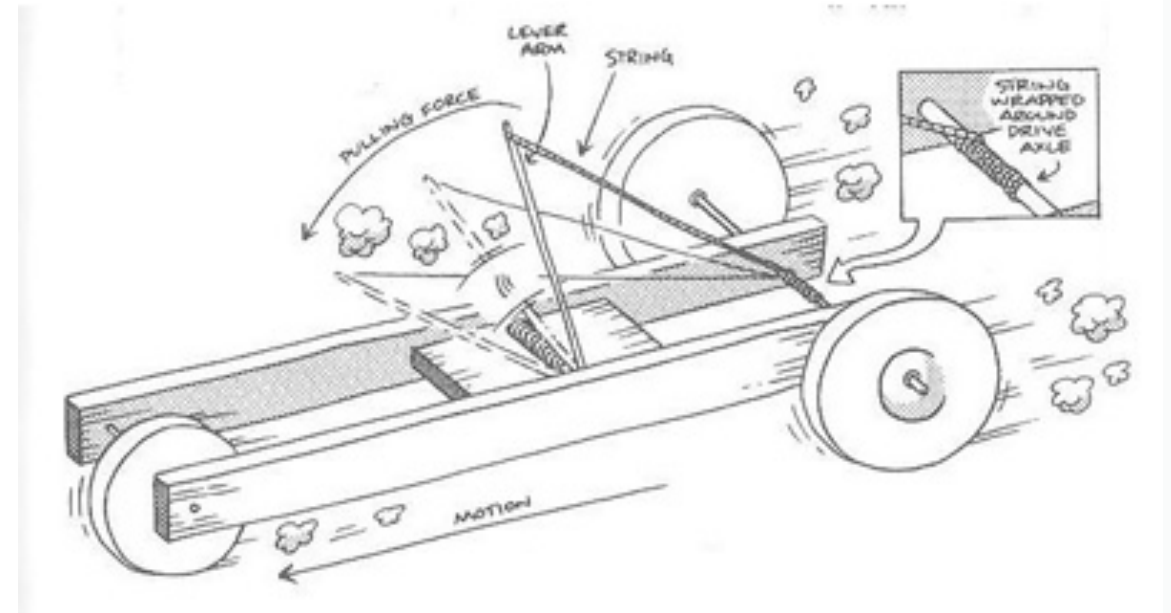
## What is a mousetrap car?

- A vehicle powered by the spring device of a mousetrap no rat traps and the spring can not be altered
- A mousetrap is a simple machine because it uses mechanical advantage to multiply force




# How does it work?

- ▶ The spring propels the hammer, which causes an enormous release of energy
- ▶ The hammer is connected to a string that is wound around the drive axle. One axle has to be exposed.
- ▶ The string unwinds as the hammer snaps— making the car roll!





# Grading



Your car will be graded  
on its performance using  
the following scale:  
STRAIGHT LINE DISTANCE

- A: 12 meters distance
- B: 8 -12 meters distance
- C: 6- 8 meters distance
- D: up to 6 meters distance

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# How to get started

1. Design your car

2. Gather your materials

3. Build

3. Initial Test

4. Improve Test and Improve – true engineering

5. The purpose is the process!!



# What do you need?

- ▶ Consider what materials would work best and would be easiest to find for each part of the car.
- ▶ You'll need
  - ▶ Wheels
  - ▶ A Mousetrap
  - ▶ A Body
  - ▶ An extension
  - ▶ String
  - ▶ An Axle



# Finding your Materials

- Body – balsawood, bass wood, Styrofoam, plastic, aluminum, 5 gallon paint stick etc.
- Wheels – CD's, hobby wheels, foam wheels, push-up pops etc.
- Extension Arm – wooden dowel, metal tube, stiff hanger etc.
- Axle – wooden dowel, metal tube, plastic rod, push-up pop etc.
- String – Thin string, craft string, etc NO YARN
- Miscellaneous – DUCT TAPE wheel spacers, string hook, ball bearings, balloons, spool, tape, glue, etc.
- And of course, the mousetrap!

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# Designing

- ▶ Every part of the mousetrap catapult can be changed and customized to meet three different goals
  - ▶ Power
    - ▶ How fast your car goes. Committing to power means you might lose accuracy or distance
  - ▶ Accuracy
    - ▶ The middle ground of distance and power. Deciding how far you want to go and making sure it gets as close to that as possible
  - ▶ Distance
    - ▶ How far you want your car to go. It might take awhile to get there, but speed is not important.



## Design Choices

- ▶ Size of the body and materials at least 10-12 inches
- ▶ Placement of mousetrap on the front
- ▶ Length of the arm – as long as the car
- ▶ Length of the string – as long as the car
- ▶ Size and type of wheels – round and parallel to each other and perpendicular to body
- ▶ Wheel-to-axle ratio !!!! Tricycle vs Bicycle
- ▶ Your design decision should depend on your goal of speed, distance, or accuracy

# Build



- ▶ Put everything together!  
Make sure when taking any permanent actions you are confident in your decision. Use duct tape
- ▶ You may use online guides and get help from family but make sure you make your own mousetrap car.
- ▶ **KITS ARE NOT ALLOWED**

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## Test

- ▶ It may be hard to test these at home unless you have 12 straight meters of non carpet floor.
- ▶ What may work is trying these outside on the sidewalk, or use a shorter distance at home and try to estimate whether you think it could make the distance based on the amount of speed and how much string was left.
- ▶ You can schedule a lunch time to test your car. It is best to test with a partner.

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## Modify for Success

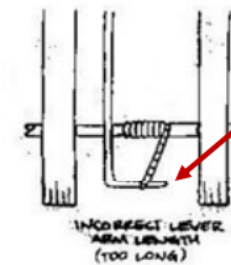
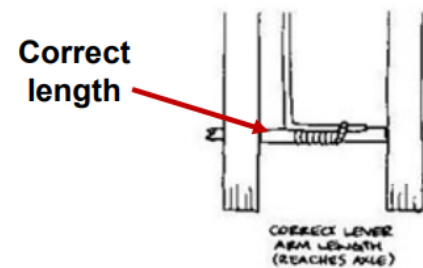
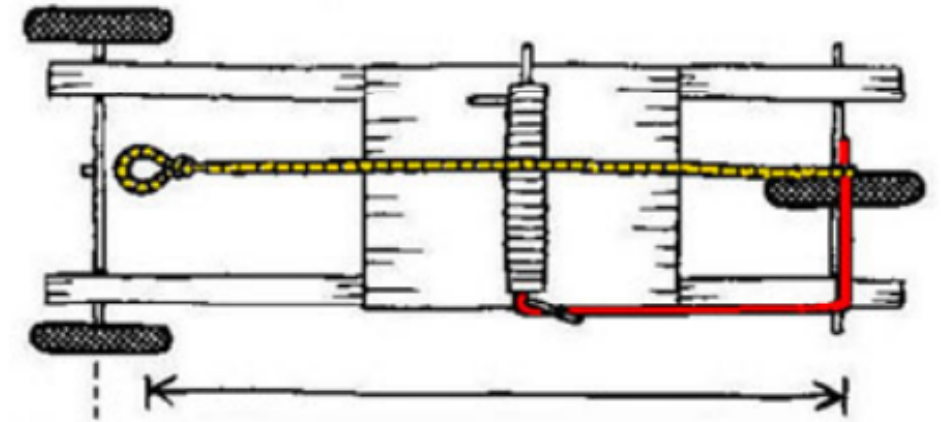
- ▶ If results are not what you wanted you can:
  - ▶ Increase the wheel size
  - ▶ Decrease the rear axle size
  - ▶ Maximize the length of the arm
  - ▶ Maximize the amount of string
- ▶ Keep trying new combinations and testing them



# Quick Tips for Distance

- ▶ You want to build a car as light as possible
  - ▶ A lighter car will be easier to move and experience less friction.
- ▶ However too light of a car will not have enough traction which could cause the wheels to spin out as soon as the trap is released
- ▶ Longer arms will provide less force, but more distance.
  - ▶ With a longer arm, more string will be pulled off the axle
  - ▶ This causes the wheels to turn more times and allows the vehicle to cover more distance

- The lever arm should just reach the drive axle when it's in the ready position
- The string length should be a little shorter than the distance from the lever arm to the drive axle when the trap is in the relaxed position



Too long!

(from Doc Fizzix's  
Mousetrap  
Powered Cars &  
Boats)

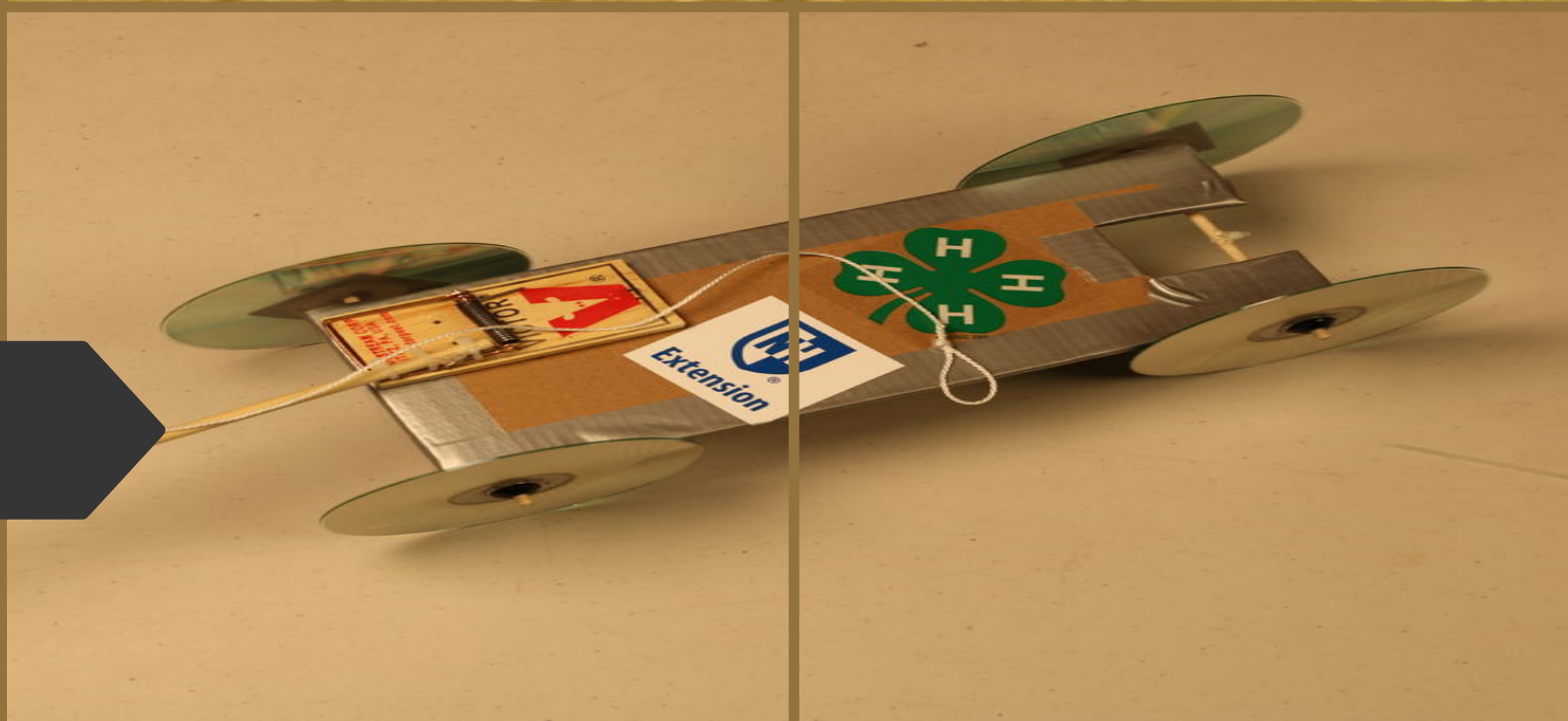


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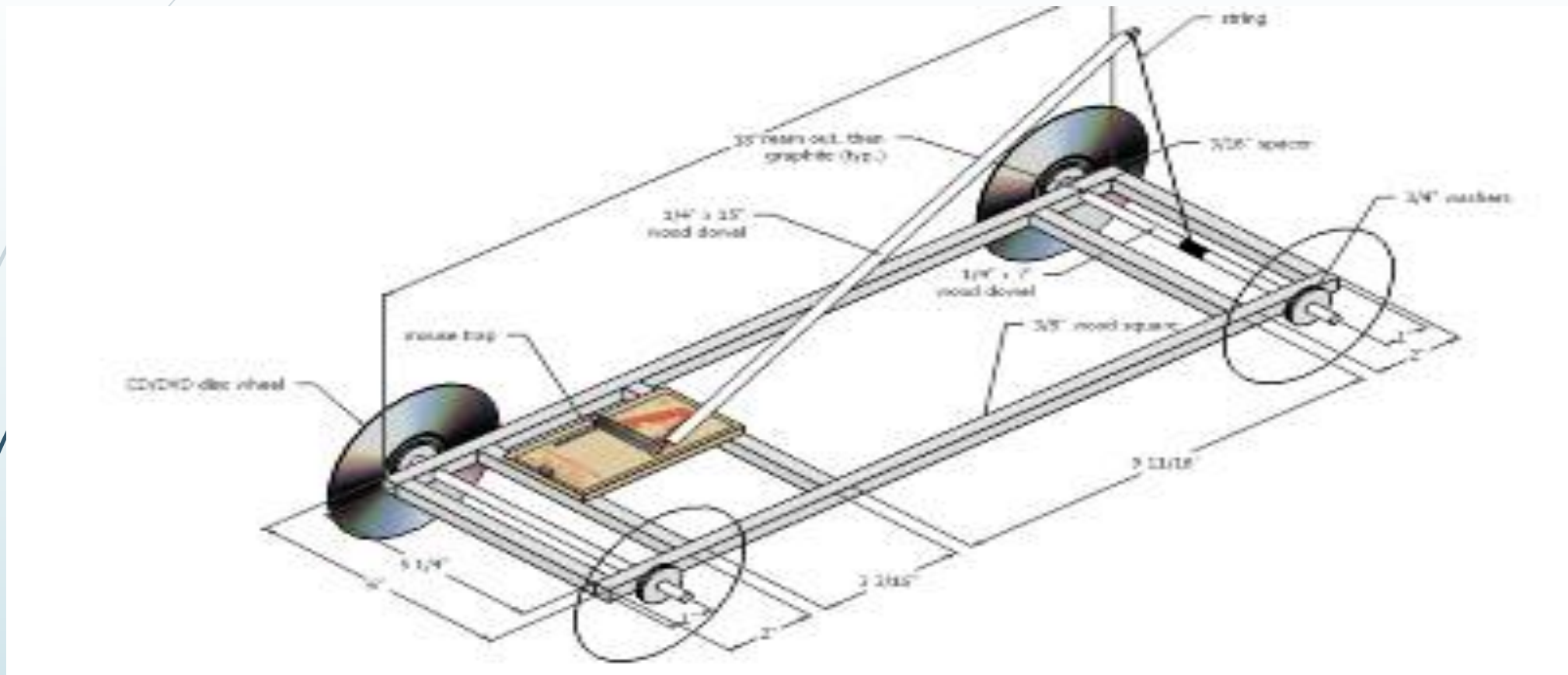
## For the rest

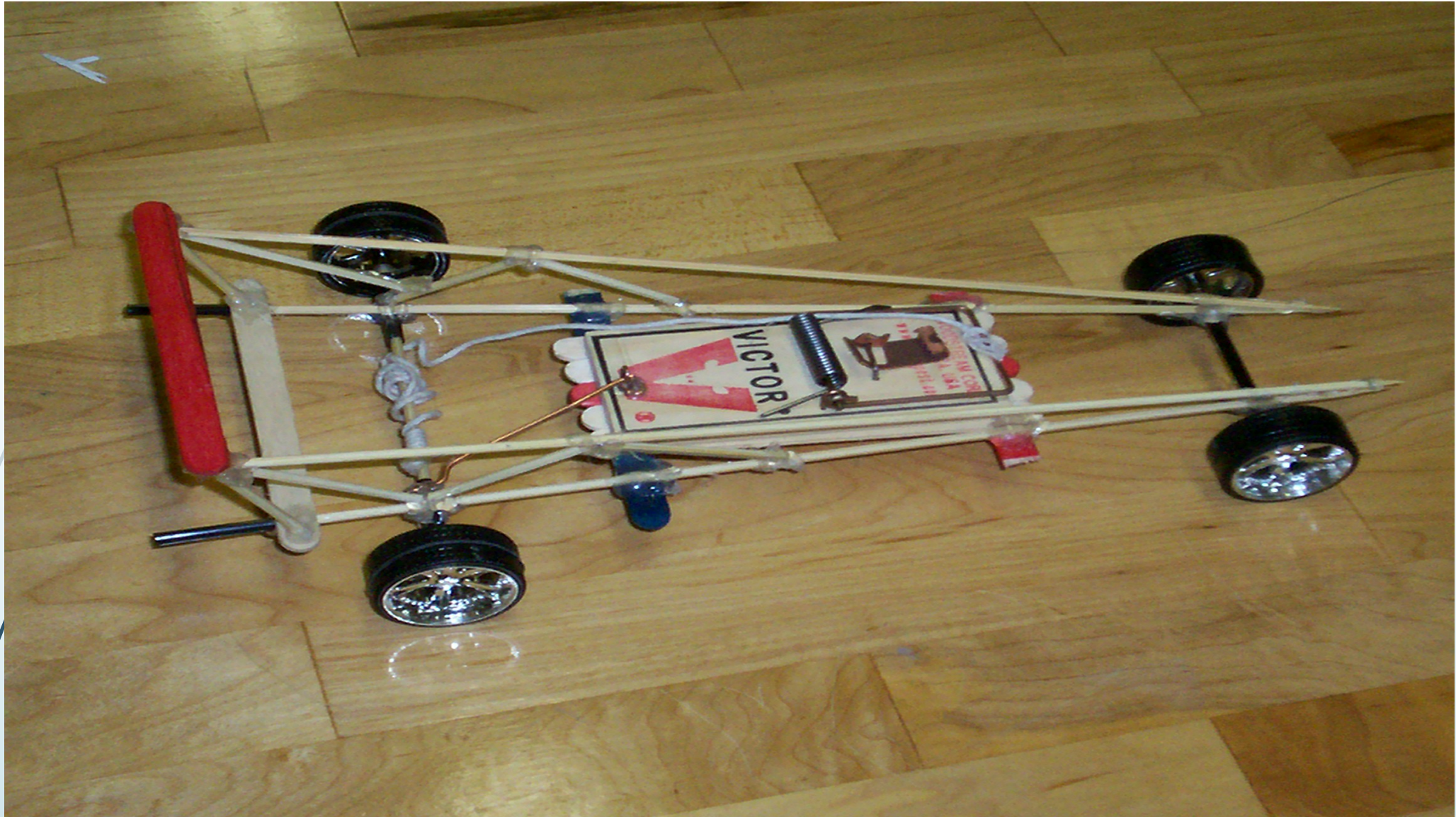
- ▶ You're on your own! Try new ideas, the internet is your resource!
- ▶ <https://www.youtube.com/watch?v=Wen6VQS6NG4>
- ▶ <https://www.youtube.com/watch?v=J6xDXaPNfwU>

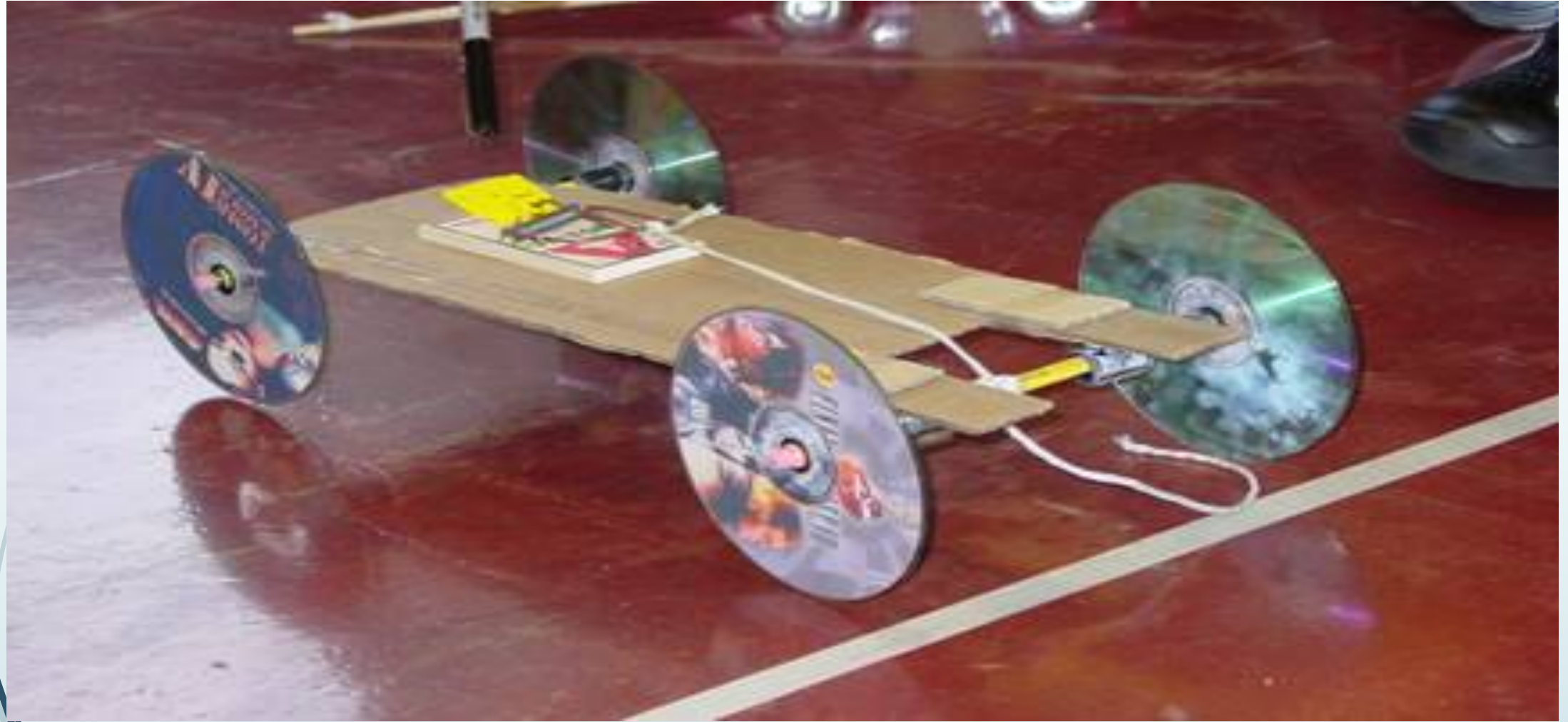
Examples:



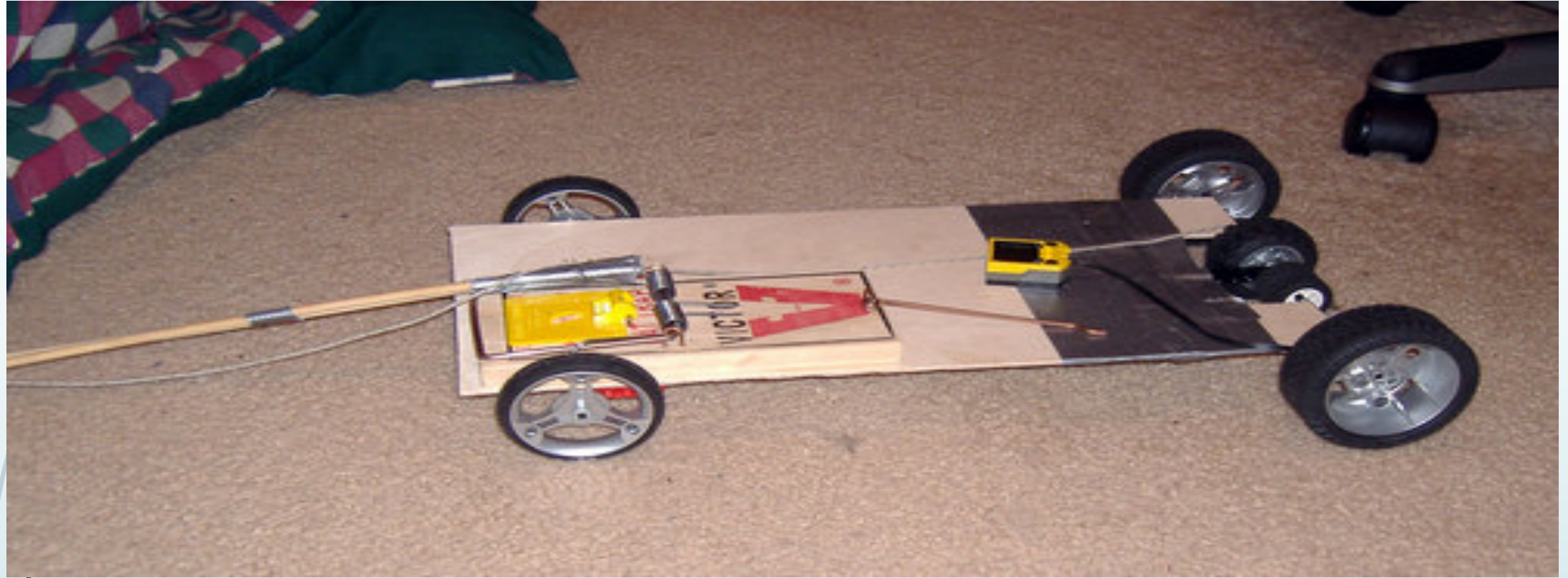
# Examples

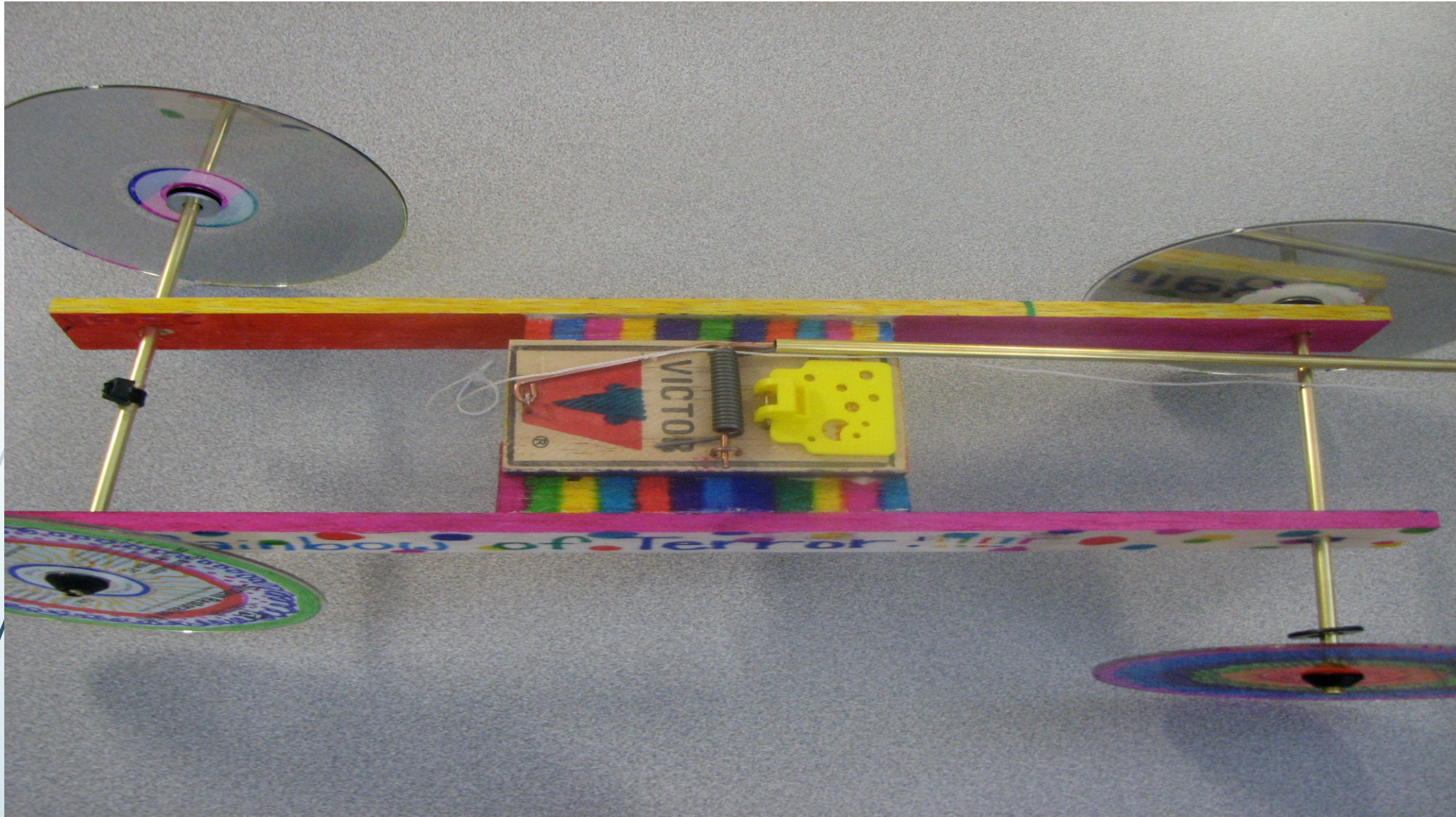




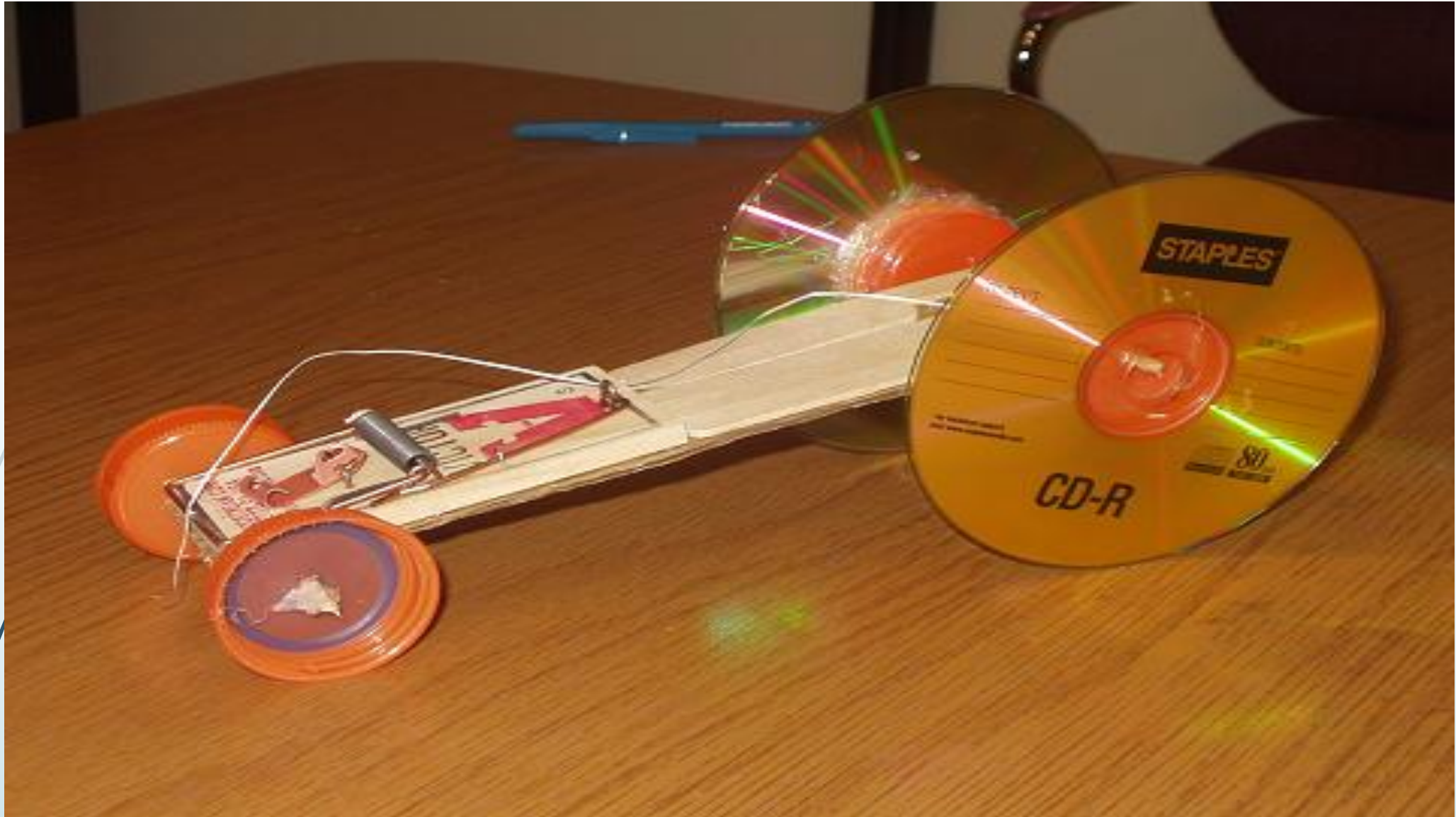




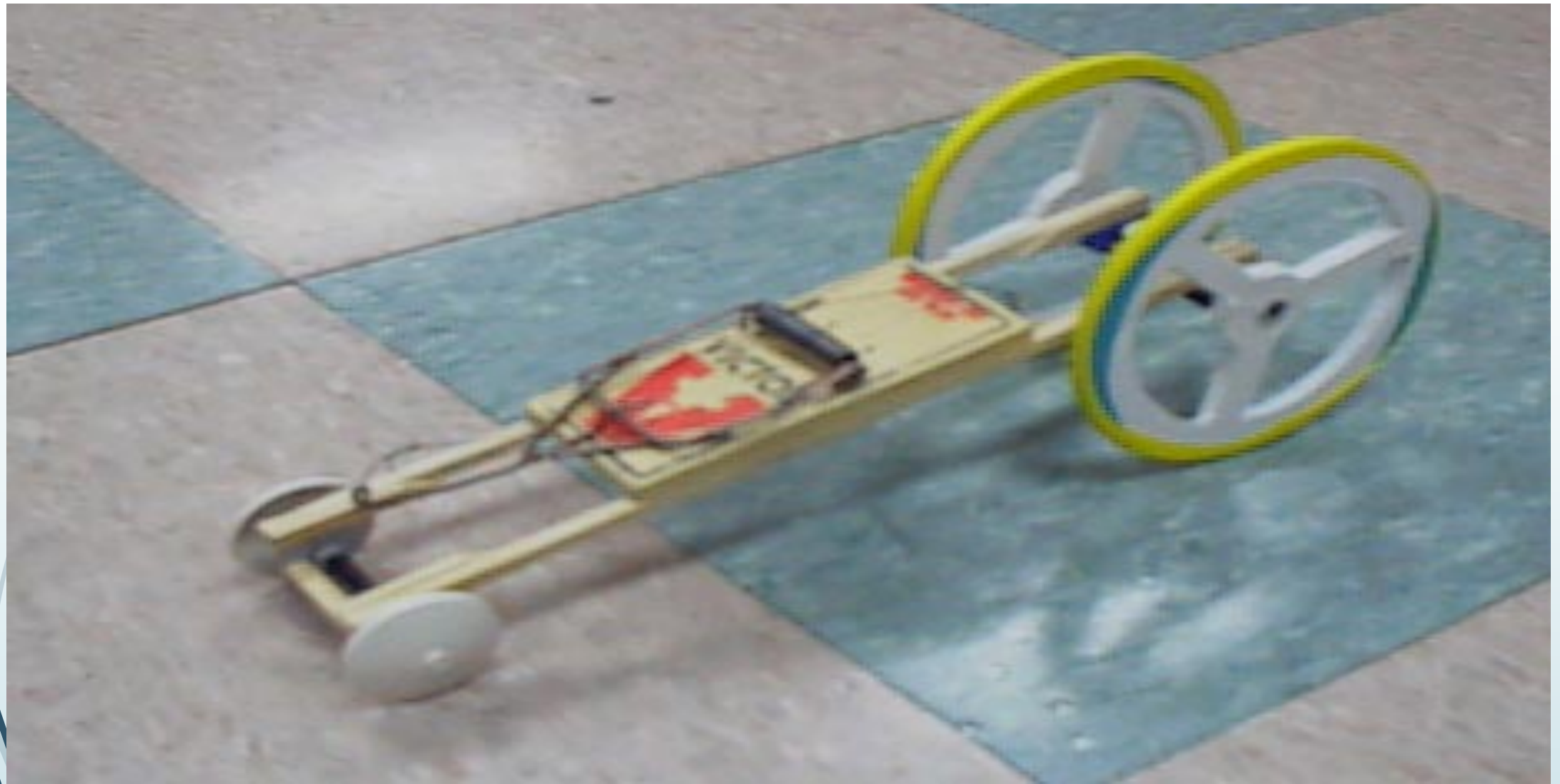


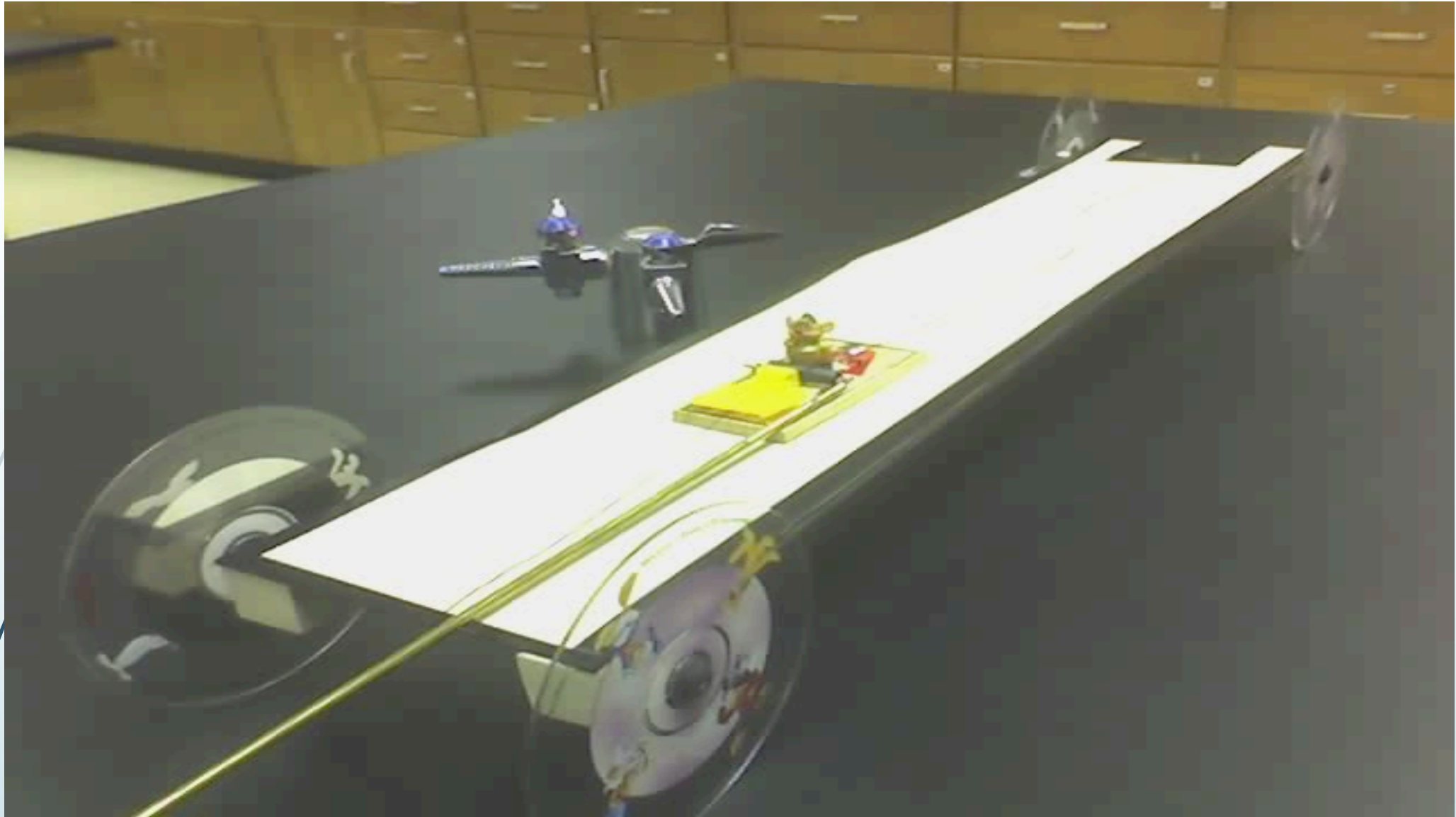




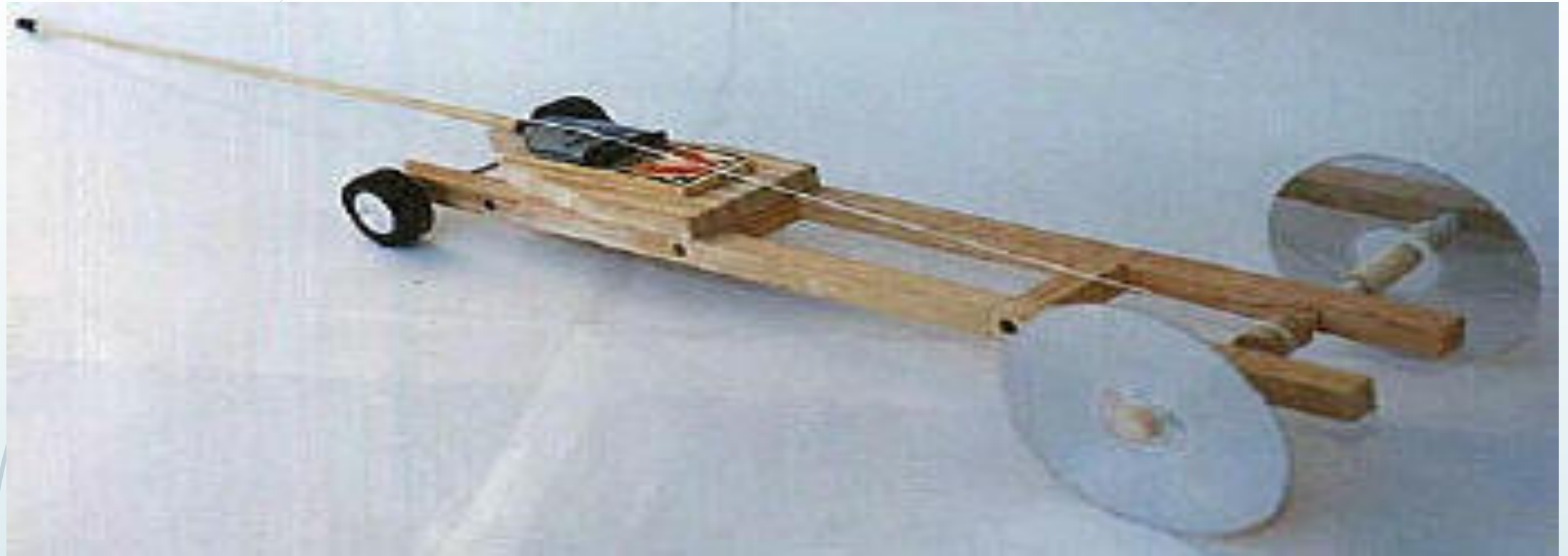














# Helpful Hints

- ▶ <http://www.docfizzix.com/>
- ▶ <http://www.instructables.com/id/Mouse-Trap-car/>
- ▶ But Remember... NO KITS ALLOWED!!!!!!