

Gravity Vehicle Building Notes

Designing

Before you start thinking about building you want to think about your design. Research what makes a car good and what makes a car bad. Draw a sketch of what you're thinking of on paper to get your ideas out. Brainstorm ideas that are unique but keep all the aspects that will bring you to first place.

Material

Designing your car to become the best it can be requires a good building material. Things competitors have used before are wood, metal, plexiglass, etc. 3D printing parts can also be a good idea. Wood is easy to work with and light but can be hard to be really precise with. Sheet metal can help you be precise but it's harder to work with and is heavier. They each have pros and cons so it's a good idea to use a combination of them. For my designs I usually use wood and sheet metal.

Running in a Straight Line

In order to get your car to run straight I split my front and back half into two pieces and put a bolt in the middle. The bolt lets you rotate the two halves to make them perfectly straight. Another way to make your car go straight is making one of your axles adjustable or even using a three wheeled design. Another plus to the three wheeled design is less friction with one less wheel.

Stopping/Braking

I prefer the threaded axle and wing nut version of stopping the most. The idea is as the car rolls a wingnut moves down the threaded axle until it jams against something like a nut and causes the axle to stop rotating. It can be very accurate and is used on most winning designs. There are many variations to this method and has room to improve. For a more detailed explanation look at the Scrambler page.

Wheels

I use 3 CDs for each wheel to make them smooth and a wider width. I also add 2 balloons to them to add traction. With just the CDs the car tends to slide around a lot and cause problems. You can also find manufactured wheels made for rc planes that would work well. If you have problems with sliding when your braking mechanism engages then try using either wider wheels or a grippier tread.

Axles

Like I mentioned above, using a threaded rod as an axle works well because it can be put together and taken apart easily. You might want to think about using bearings to make your car run smoothly too. Using lubricants can help or damage your car. Too much can make it slower so be careful. A thicker grease may not work as well as a thin liquid or even graphite.

Ramp

The ramp design I am using gives the rear axle a longer period of time to help propel the car forward than a regular linear ramp. Another possible shape would be the [Brachistochrone Curve](#). I use wood framing to make the structure of the ramp then add a plexiglass surface to ensure that it is smooth and consistent. Sheet metal can also be used to make a smooth ramp surface. I say smooth but not slick. You don't want your car sliding down the ramp, it should roll down the ramp.

Launch Mechanism

I plan on using a spring loaded hook that attaches to the back of the vehicle. Remember it must be started by an unsharpened #2 pencil.

Track

You want to test on many surfaces like a gym floor and/or tile because you never know what you're going to get at the competition. You also want to make sure loose debris is clear every test. Cleaning the track can help improve accuracy.

Testing

Before you get to competition you need testing. You want to make a practice log and keep a record of runs. Measuring and testing many different target points is essential to winning. Think like every run is the real thing and record your results.

Troubleshooting

Car isn't fast enough? You could add weight to the back of your car or make the ramp taller.

Not going the distance? Higher ramp or add bearings.

Not going straight? Adjust the axles and keep testing.