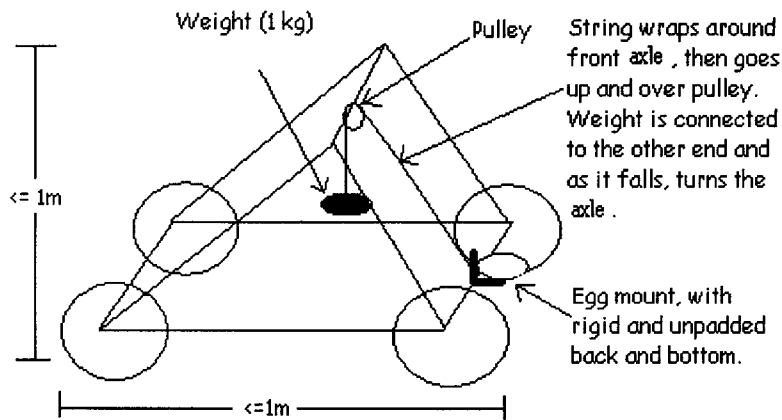


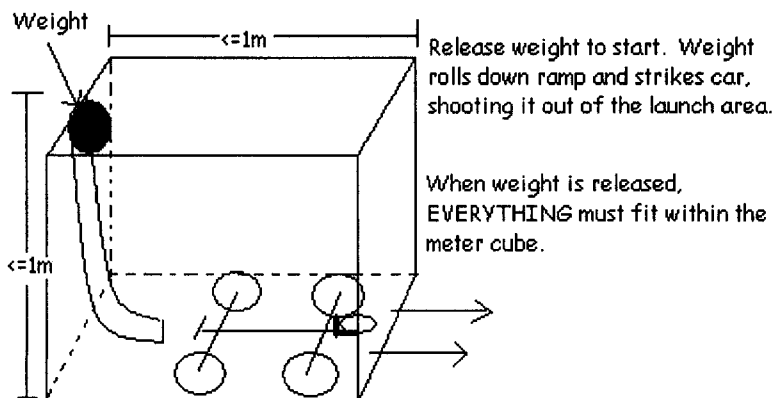
Scrambler 2005-2006

The **object of scrambler** is to build a car to carry an egg 8-12 meters on a straight and level track, and then stop before hitting a barrier and breaking the egg. You will need an egg transport system, and an energy propulsion system. There are two ways to build your scrambler: Self Contained and Separate System. Below is the basic principle of each:

Self Contained Scrambler – The energy propulsion system and egg transport system are part of the same unit. The falling mass used as energy stays with the car as it moves the egg down the track.



Separate System Scrambler – The energy propulsion system and egg transport system are separate units. In this example, the energy propulsion system consists of a weight rolling down a ramp and striking the car to launch it out. The car is the egg transport system.

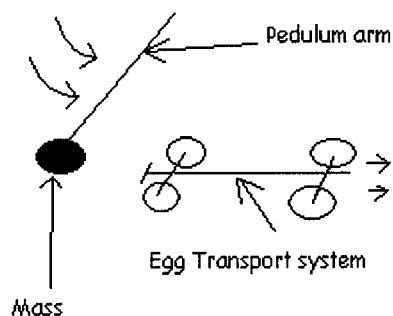


All the energy used to push the car must come from a falling mass of ≤ 1 kg.



Things to keep in mind while building your scrambler:

- **Build your scrambler soon!** Because you do not know the distance the scrambler will need to travel on competition day, you will need a way to calibrate a braking mechanism. From my experience, this is a very time consuming process.
- All forms of **energy** on your scrambler **MUST be mechanical**. No electricity! Also, any mechanical energy that comes from anything other than the initial falling kg mass must be at its lowest state when the mass is released (i.e. a spring could possibly be used to provide more energy, but it must not be compressed when you start your run).
- The entire scrambler must be able to **fit in a meter cube** in ready to launch position. This includes the egg and also any weight that you may drop or release to provide your energy.
- The **mass must be easy to remove** for measurement at competition. Keep in mind that anything that falls to give the car energy is considered part of the mass. For example, if you use a pendulum arm to swing the mass down and strike the car, the arm will also need to be measured and, thus easy to remove. At the state competition, I will ask that the mass be removed when impounded.

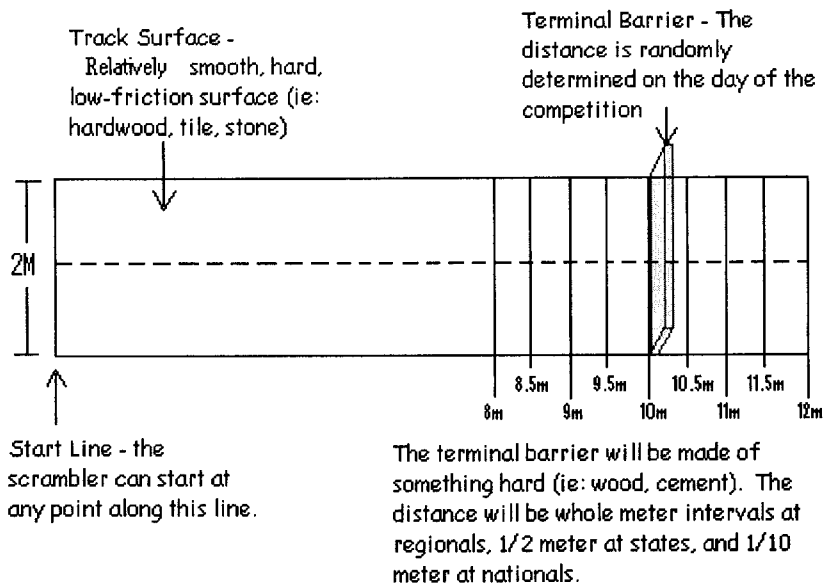


- Nothing on the device can **damage the floor** or do anything to the track that will interfere with subsequent runs (ie: putting substances on the wheels for traction that will scratch the floor or leave residue behind will result in penalty).

Things to keep in mind when running your scrambler:

- No part of the scrambler may go outside of the 2 meter track, which will be outlined in tape.
- You are not allowed to push or pull your scrambler in any way to start it. You must either release a falling mass, or the egg transport system, but not both.
- You only have ten minutes to make two runs. The time begins when you get your scrambler from impound, and does not include the time it takes to measure your first run. You will be allowed to finish the 2nd run the mass is released before the time limit is up.
- The distance will be measured from the egg to the closest point of the barrier, not from the center of the barrier as was in the past.
- No part of the transport system may hit the barrier before the egg.

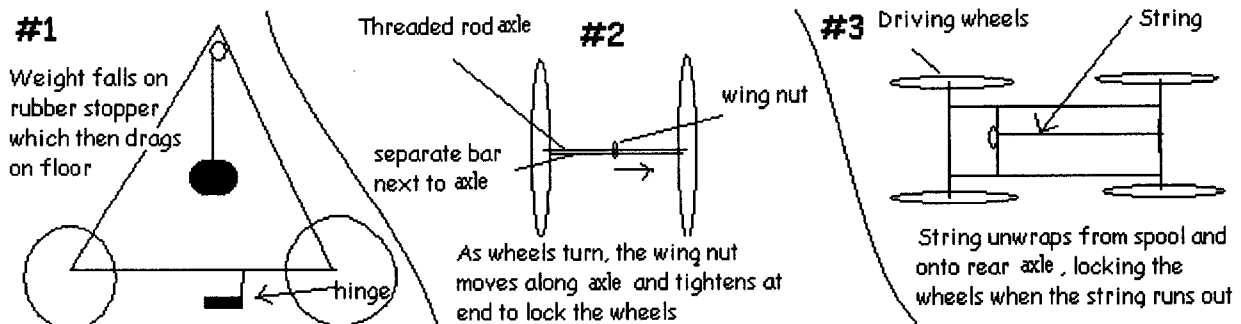
The Track:



Braking Mechanisms:

Because you do not know the distance the scrambler will need to travel on competition day, you will need a way to stop your scrambler. This must be **mechanical energy**, and **self contained** on the egg transport system. No outside forces will be allowed.

Example of braking systems:



Scoring:

- **Performance Value (PV)** = 3 * Run Time (in seconds) + Stopping Distance (in cm)
- Lowest PV wins
- The better of the two runs is taken (the worse of the two is not used in any way).
- **IMPORTANT** – if the egg is broken (enough to leave a wet spot on a paper towel) on the first run, a second run will not be permitted, and this team will be ranked below all projects that do not break the egg of the first run. However, if you do not break the egg on your first run, you will not be penalized if you break the egg on your second run. Your first run will be used to computer your PV.



Sample Score sheet – Scrambler 2006

Building Specification Checklist: (all must be checked in order to participate)

- The entire scrambler fits in a 1 meter cube in ready to launch position.
- The falling mass does not exceed 1 kg.
- The scrambler has a rigid, unpadded egg mount, (backstop and bottom surface).

Run time checklist: (all must be checked in order to participate)

- The bottom of the egg is between 5-15cm above the floor.
- At least 2 cm of the egg extends beyond any portion of the transport system.
- The scrambler caused no damage to the floor and did not do anything that will interfere with subsequent runs.
- All energy used was mechanical and at no point during the run was the scrambler given any outside assistance. (this includes pushing or pulling the device to start its motion)
- All devices that provide energy to the scrambler (other than the 1 kg falling mass) were at their lowest energy state when the run began.

Run 1:

- The egg was broken. (This will result in not being able to make a second run)
- The scrambler went outside of the 2m track during the run.
- Some part of the transport system hit the barrier before the egg.
- The device did not travel $\frac{1}{2}$ the distance of the track.

Performance Value = 3 * Run time _____ seconds + Stopping Distance _____ cm

Run 1 Performance Value = _____

Run 2:

- The egg was broken.
- The scrambler went outside of the 2m track during the run.
- Some part of the transport system hit the barrier before the egg.
- The device did not travel $\frac{1}{2}$ the distance of the track.

Performance Value = 3 * Run time _____ seconds + Stopping Distance _____ cm

Run 2 Performance Value = _____

FINAL SCORE (best run) = _____