

PAPER CAR CRASH

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UNDERSTANDING CAR CRASHES: WHEN PHYSICS MEETS BIOLOGY ACTIVITY

PAPER CAR CRASH!



Key Question

- » Is it possible to build a car frame and body from paper and glue that is strong enough to protect a raw egg during a head-on collision?
- » What engineering and design features determine a vehicle's crashworthiness?

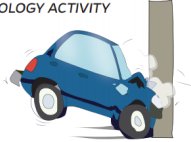
Purpose

The object of the Paper Car Crash Contest is to apply your science and engineering knowledge and skills to design and build the most crashworthy car that includes a minimum of three safety design features. The winning car's crashworthiness will be based on two criteria:

1. The car with the greatest momentum at the time of collision, and,
2. A car in which the occupant (raw egg) is neither injured (cracked shell) nor killed (broken shell) as a result of the collision.

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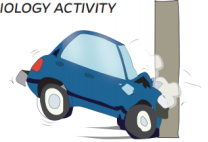


Design Product/Presentation

Your challenge is to design and build a car with the greatest momentum (i.e., fast and massive) using only two sheets of copy paper and unlimited amounts of glue for the car's frame and body. Your paper car must be able to carry a raw egg down an inclined track ramp and protect it during a crash with a concrete block.

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Rules & Specifications

1. Maximum car width: less than equal to 6.5 centimeters (including axles and wheels)
2. Maximum car length: less than or equal to 16.5 centimeters
3. Minimum car mass without the egg: greater than or equal to 40 grams
4. Glue, paper, wheels, axles, and the straw-axle housing are the only construction materials allowed. The entire frame of the car must be made of paper and glue.
5. Your vehicle will be disqualified if it exceeds length and width dimensions, does not meet minimum mass requirements, or contains stickers, paint, tape, cardboard or any other non-licensed materials that contribute to the structural integrity of the vehicle.
6. Vehicle designs must allow for easy access to and removal of the egg (occupant) for inspection after the crash.
7. Vehicle designs should be able to withstand 2-3 trials/collisions without parts replacement or repairs.
8. There can be no physical contact between the vehicle and the designer once the vehicle has been released onto the track.
9. All vehicles must visibly display the following information on their frames:
 - a. vehicle name
 - b. vehicle mass in grams
 - c. vehicle length in centimeters
 - d. vehicle mass in grams

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Design Timeline

DAY 1	BRAINSTORM AND BUILD
DAY 2	BUILD
DAY 3	FINISH BUILD AND CONDUCT TIME TRIAL
DAY 4	CRASH DAY!

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MATERIALS NEEDED

- » Two sheets of 8½" x 11" standard-weight paper
- » Four wheels*
- » Two axles
- » One plastic drinking straw (for axle housing only)
- » Access to a metric balance
- » One large, Grade A raw egg
- » Glue
- » Scissors
- » Centimeter ruler
- » Colored pencils, crayons, and markers for vehicle decoration and for writing car name and student/team name on car (no stickers or paint)