

# 4-H Hands-on Science

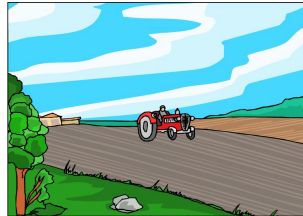
# Inquiry Card Tractor Torque

## Type of Inquiry:

Technological Problem Solving

## Process Skills:

Observing, modelling, selecting, measuring, gathering data, recording, constructing, inventing, comparing, contrasting, evaluating and reflecting.



## The Scenario:

Young scientists will be challenged to produce the best design possible of a tractor powered only by a balloon. At the end of the design challenge, they will compare their design with other young scientists based on two criteria : speed and strength.

## Open-Ended Inquiry Questions:

- How can I design my tractor to make it the fastest and the strongest possible?
- What type of balloon should I be using? Should I be using a new balloon, or one that has been inflated and deflated many times?
- Where should I attach the balloon?
- How can I reduce friction in my design?

## Instructions:

1. Describe the challenge and the rules (e.g., they may only use one balloon) to the young scientists.
2. Explain the two criteria that will be used to compare the tractors: speed (distance covered in 5 seconds) and strength (maximum weight that can be pulled).
3. Provide all the material to the young scientists (e.g. balloons of various sizes, popsicle sticks, axels, wheels).
4. Let them develop and tweak their prototypes.
5. Test each prototype based on the two criteria.

## Scientific Principles:

This activity is a demonstration of Newton's third law of motion: "To every action there is an equal and opposite reaction". When air is expelled from the balloon, the tractor will move in the opposite direction. Friction also needs to be reduced as much as possible.



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