



## Cardboard Tractor

### PUZZLE: BUILD SOMETHING THAT CAN TRANSPORT WATER

**STANDARDS & CONNECTIONS:** NGSS.3-5-ETSI, NGSS.MS-ETSI

**SUGGESTED MATERIALS:** Cardboard, glue, tape, colored markers/pens, rubber bands, straws, scissors

**BACKGROUND:** Just like many of us, farmers have looked to technology to make their jobs easier. In the 18th century, farmers used horses and oxen to pull wooden plows. In 1837, John Deere started producing steel plows and in 1868 steam tractors were invented that no longer needed horses or oxen. Then, John Froelich invented the first successful gas-powered tractor in 1892. Today tractors are used when planting, fertilizing, harvesting, and moving items around the farm. Over 120 years later and tractors are still helping farmers and ranchers perform many agricultural tasks.<sup>1</sup>

**1. IDENTIFY:** Share the background information with the students, then share the puzzle to be solved. Determine constraints (e.g., time allotted, space, materials provided, etc.) and divide students into small groups.

**2. IMAGINE:** Ask a series of questions to help students brainstorm solutions to the puzzle. Encourage students to list all ideas – don't hold back! Before moving on, make sure each group selects a solution that fits within the constraints.

- Ask: *How can you solve this puzzle? Which of your ideas can you build a prototype for given the constraints?*

**3. DESIGN:** Students diagram the prototype, identify the materials needed to build the prototype, and write out the steps to take. Students describe the expected outcomes.

- Ask: *What steps will you take to create your solution? What do you expect your solution to look like and be able to do?*

**4. CREATE:** Students follow their design plan and build their prototypes. Monitor their progress and remind them about how much time they have.

**5. TEST & IMPROVE:** Students evaluate their creation and compare it with the expected outcomes. Students seek areas of improvement and make changes where needed.

**6. SHARE:** Students share their solution to the puzzle and communicate lessons learned.

- Ask: *What was your biggest takeaway? What would you do differently?*

**ADDITIONAL RESOURCES:** For more background information on this topic, please visit [www.purpleplow.org](http://www.purpleplow.org).



Take a tour to a local farm supply store to see a real-life tractor.

<sup>1</sup> Ag In the Classroom. (2014). *Historical timeline - farm machinery & technology*. Retrieved from: [https://www.agclassroom.org/gan/timeline/farm\\_tech.htm](https://www.agclassroom.org/gan/timeline/farm_tech.htm)