

### Overview

Agriculture is the cultivation of animals, plants, fungi, and other life forms for food, fiber, biofuel, medicinal and other products used to sustain and enhance human life. In Canada, agriculture is often a business that operates on a large or small scale. Increasingly, agricultural operations have some aspect of their work that is automated in some way, regardless of the size of the operation.

### Design Rationale

Each time there is a downturn in oil prices, Canadians are reminded how important it is to have a diversified economy.<sup>6</sup> For example, British Columbia exports lumber and farmed fish as well as promotes tourism. Canada competes in a global marketplace, so it is important that we remain as competitive as possible. Around the world, automation and mechanization have dramatically increased productivity in many areas of agriculture. The spin-off industries that refine raw products require technological innovation to strengthen the economy and increase jobs and services.

### Problem Scenario

Your team has been selected to develop a prototype<sup>7</sup> of a tool or piece of equipment that will improve an aspect of an agricultural operation and improve its functionality. Your prototype must improve on existing economic viability, safety, effectiveness, or provide something absolutely new. Because this is a prototype, it may be full size or a scale model.<sup>8</sup> However, your prototype needs to represent / illustrate the components of its functionality, and it needs to look real as possible.



### Suggested Grade Level

- Upper elementary through to secondary school

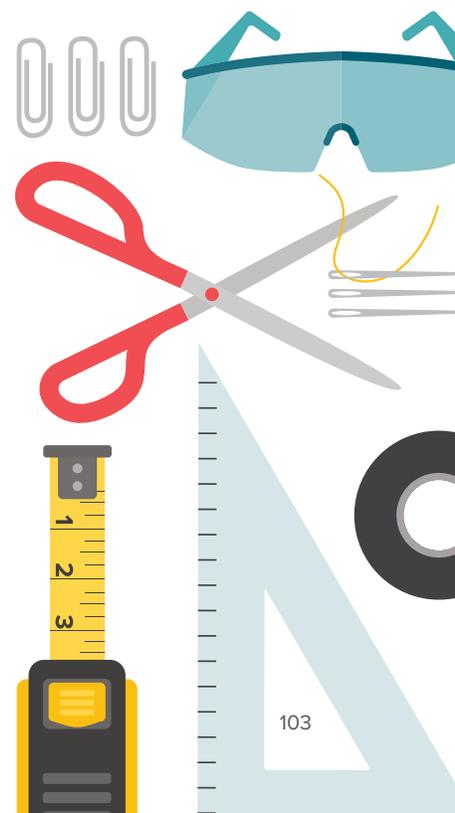
### Suggested Subject Area

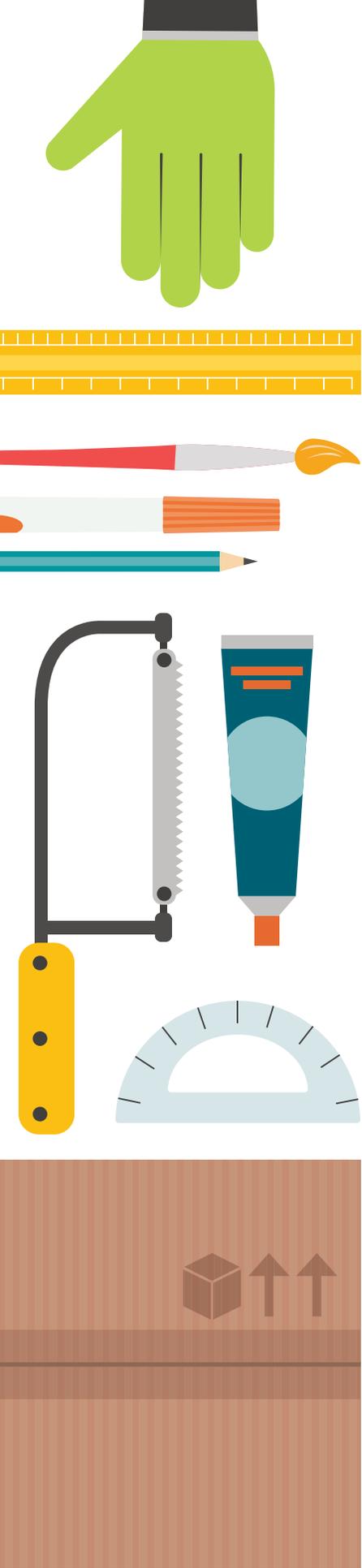
- ADST
- Economics
- Science
- Social Studies

<sup>6</sup> A diversified economy means that a region is not solely reliant on single source of revenue.

<sup>7</sup> A prototype is a model that illustrates the functionality of an idea or design. It may be life sized or scaled to a model that fits in your hand. However, a prototype needs to be as real looking as possible, using the materials available.

<sup>8</sup> A scale model means that your model may be much smaller or larger than the actual, final product.





## Success Determinants

Success will be determined by:

- Ability of your prototype of a tool or piece of equipment to save an agriculturist time, money, or some other needed functionality
- Alignment to design motto: “Make it smaller, stronger, do more, be easier to use, be cheaper, be clean, be greener.”
- Degree to which your prototype looks like your design sketch
- Functionality of your automation or mechanization
- Uniqueness and usability of your prototype and the degree to which it solves an actual problem
- Your ability to fully explain the physical and software aspects of your project to someone unfamiliar with agricultural operations and the problem for which your prototype is a possible solution

## Parameters

- Your prototype must have a technological component to it that is controlled by code that your team has written. That code must have at least one for loop (or while loop) or an if-else statement.
- Your project must include some use of code that you haven’t learned in class.
- Your project must include at least one sensor (physical input) and two actuators (physical output).

### Sensors (physical inputs)

- button
- photo resistor
- piezo (as a microphone)
- potentiometer
- soil moisture sensor
- temperature sensor
- ultrasonic sensor

### Actuators (physical outputs)

- dc motor
- lcd display
- led
- piezo (as a speaker)
- rgb led
- servo motor

- The only resources or materials you can use that are not provided in your participant group kit include:
  - Cardboard / corrugated cardboard
  - Duct tape
  - Hot glue
  - Pipe cleaners