



## Connecting Industry to Mathematics Instruction

NSF ATE Award # 1954291

### Cooling Chickens

#### *A Solidify Understanding Task*

**Purpose:** There are two parts to this activity:

1. The purpose of the first part is for students to determine the pulley diameters required to obtain a specific speed of shaft rotation.
2. The purpose of the second part is for students to determine the correct size of a Clean in Place Tank.

**Career Field:** Mechanical Engineering

Morris and Associates

**WTCC Associate Program of Study and Contact Person:**

Mechanical Engineering Technology

Steve Hudnut

**Unit Alignment:**

WTCC Math 121

Unit 1 after studying proportions

**Common Core State Standards for Mathematical Practice**

2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

**Prerequisite Skills**

*These skills could be reviewed in a warm-up and are addressed in the Desmos Activity*

- Solving Proportions

**Time Required**

The time required to complete this activity is approximately 90 minutes.

**Materials Needed**

- Student sheet

In partnership with



**WAKE COUNTY**  
PUBLIC SCHOOL SYSTEM



- Desmos activity
- Launch video

### **The Teaching Cycle:**

**Launch:** Students should work in groups of 2-3 if in a classroom. Larger groups would be fine for a virtual scenario. Have students complete the [Desmos Launch Activity \(opens in a new window\)](https://teacher.desmos.com/activitybuilder/custom/601a888bbf3c530d1e29dc8d?collections=5f6cae0049988f0bfcd6f9f8) for this lesson [plain text link: <https://teacher.desmos.com/activitybuilder/custom/601a888bbf3c530d1e29dc8d?collections=5f6cae0049988f0bfcd6f9f8>].

**Explore:** Students will use the given information to determine the Driven Sprocket Diameter needed to slow the gears down to a speed appropriate for cooling chickens. Students will have to determine some missing information, determine where in the ratio it belongs, and then solve for the missing piece. After this, the students will consider the effect of needing to cool the chickens for a longer period of time as well as the significance of changing just the pulley diameters and not the gears and motors.

After that, students will use the size of the tubes to determine the correct size of the clean in place tank. Students will have to consider that they want to make sure the tank never runs out of water and factor that into their calculations.

**Discuss:** Students will provide a brief summary of their activity as part of the discussion. Encourage students not to provide a step-by-step explanation of the math used but an overall picture of the purpose and solution of the project. Then students will answer the following questions:

1. Provide a short summary of the goal and results of your project. DO NOT go over every question and every calculation.
2. How will the initial temperature of the chickens affect the speed rotation of the main shaft in the machine?
3. The general rule of thumb is to only change out the pulleys, not the other pieces of the machines to achieve a particular reduction rate. Why do you think that is?
4. Why is it important for the tank to never run out of water?

**Exit Ticket:** Name one new thing you learned today in class. Name one thing you still have questions about.