

## Sample Maple CDE Problem Solving Scenarios

### Tapping Time Calculation:

- A maple syrup farm taps 200 trees, and the sap flows for an average of 35 days during the tapping season. If each tree yields an average of 10 gallons of sap per day, calculate the total gallons of sap the farm can expect to harvest during the season.

### Sap to Syrup Ratio:

- It takes approximately 40 gallons of sap to produce 1 gallon of maple syrup. If a farm collects 800 gallons of sap, how many gallons of maple syrup can they expect to produce?

### Tapping Efficiency:

- A maple syrup producer taps 300 trees, but due to various factors, only 80% of the trees produce sap. If each productive tree yields 12 gallons of sap per day, calculate the total daily sap production for the entire farm.

### Boiling Time Calculation:

- It takes 40 minutes to boil down 1 gallon of sap into maple syrup. If a farm collects 120 gallons of sap, how many hours will it take to boil down all the sap into syrup?

### Revenue Calculation:

- A maple syrup producer sells each gallon of maple syrup for \$30. If they produce 500 gallons in a season, calculate the total revenue from maple syrup sales.

### Temperature Impact on Sap Flow:

- Research shows that sap flows best when daytime temperatures are above freezing, and nighttime temperatures drop below freezing. If the temperature during the day is 45°F and drops to 25°F at night, what is the average temperature and is it conducive to sap flow?

### Percentage Increase in Production:

- In the first year, a maple farm produced 300 gallons of maple syrup. The next year, they increased production by 20%. Calculate the total gallons of syrup produced in the second year.

### Cost Analysis:

- A maple syrup farm incurs expenses of \$2,500 for tapping supplies, \$1,200 for fuel during boiling, and \$800 for packaging. Calculate the total production cost if they tap 150 trees, and each tree produces an average of 15 gallons of sap.

### Sap Collection Efficiency:

- A maple syrup farm uses buckets to collect sap from 250 trees. Each bucket has a capacity of 3 gallons. If, on average, 90% of the buckets are filled daily, calculate the total daily sap collection in gallons.

### Maple Syrup to Sap Value:

- If a maple syrup producer sells 1 gallon of maple syrup for \$35 and it takes 40 gallons of sap to produce 1 gallon of syrup, what is the value of 1 gallon of sap in terms of potential syrup revenue?

### Estimating Sap Requirement:

- If a maple syrup producer collects 1,000 gallons of sap with an average sugar content of 2%, how many gallons of maple syrup can they expect to produce using the Rule of 86?

### Sap Collection Efficiency:

- A maple farm taps 150 trees, and each tree produces an average of 10 gallons of sap per day. If the average sugar content is 1.5%, calculate the total gallons of sap collected in a day and estimate the potential syrup production using the Rule of 86.

### Sugar Content Adjustment:

- If a producer has sap with an average sugar content of 1.8%, how does this affect the Rule of 86? Calculate the new estimate for the gallons of sap needed to produce 1 gallon of maple syrup.

### Rule of 86 Application:

- A maple syrup farm taps 200 trees, and they collect 120 gallons of sap with an average sugar content of 2.2%. Estimate the potential syrup production using the Rule of 86.

### Converting Sap to Syrup:

- If a producer collects 100 gallons of sap with an average sugar content of 2%, how many gallons of maple syrup can they expect to produce using the Rule of 86?

### Sugar Content Requirement:

- A maple syrup producer aims to achieve a higher sugar content of 3% in their sap. How does this impact the Rule of 86, and what would be the new estimate for the gallons of sap needed to produce 1 gallon of maple syrup?

### Sap Quality and Production:

- A farm collects 80 gallons of sap with an average sugar content of 1.5%. How does the lower sugar content impact the potential syrup production according to the Rule of 86?

### Comparing Sugar Content:

- Compare the sap requirements using the Rule of 86 for two scenarios: one with sap at 1.8% sugar content and another with sap at 2.5% sugar content.

Rule of 86 Interpretation:

- Explain the significance of the Rule of 86 in maple syrup production and its implications for sap-to-syrup conversion.

Sap to Syrup Conversion Challenge:

- Challenge students to collect sap from their school's maple trees, measure the sugar content, and estimate the potential syrup production using the Rule of 86. This hands-on activity integrates math and practical application in maple syrup production.