Teacher Activity Guide

Candy Auction to Revenue Analysis
Period A & Period F

November 18, 2024

Quick Links

- **Blooket Game**: https://dashboard.blooket.com/set/691725bd5c2e794a1c52510b
- **Desmos Calculator**: https://www.desmos.com/calculator
- **Materials Needed**: WKS_Auction_to_Revenue_Analysis.pdf (English & Spanish versions)

Period A Schedule

Status: Already completed candy auction and initial Desmos plotting

Opening 10 minutes

1. **Vocabulary Review via Blooket** 8-10 min
   - Navigate to: https://dashboard.blooket.com/set/691725bd5c2e794a1c52510b
   - Game mode suggestions: Tower Defense or Gold Quest (engaging for review)
   - Key terms to emphasize: Revenue, Demand, Fixed Cost, Variable Cost, Profit, Break-Even
   - ⚠ Let students know these terms will be critical for today's analysis
2. **Quick Recap** 2 min
   - "Last class, we ran our candy auction and plotted demand data"
   - "Today, we're converting that to revenue and finding the optimal price"

Main Activity 30-35 minutes

Distribute: WKS_Auction_to_Revenue_Analysis.pdf (+ Spanish version)

1. **Part 1-2: Data Transfer** 5 min
   - Students copy their auction data from last class
   - Fill in Price and Quantity Demanded columns
   - ⚠ Walk around to verify everyone has their data
2. **Part 3: Calculate Revenue** 5-7 min
   - Guide calculation: Revenue = Price × Quantity
   - Have students identify highest revenue point
   - 💻 Project example calculation on board
3. **Part 4: Desmos Revenue Graph** 8-10 min
   - Open new Desmos table (or modify existing)
   - Enter Price (x_1) and Revenue (y_1) data
   - Students should see parabolic shape forming
   - ⚠ Help struggling students with Desmos interface
4. **Part 5: Quadratic Regression** 7-8 min
   - Type in Desmos: `y_1 ~ a*x_1^2 + b*x_1 + c`
   - Record equation as $I(p) = ap^2 + bp + c$
   - Discuss why a is negative (parabola opens down)
5. **Part 6: Find Vertex** 5-7 min
   - Click on maximum point in Desmos (graphical method)
   - Calculate using $x = -\frac{b}{2a}$ (algebraic method)
   - Verify both methods give same answer
   - Interpret as "optimal price for maximum revenue"

Closing 5 minutes

1. **Business Interpretation**
   - Complete Part 6, Step 9-10 if time allows
   - Write 2-3 sentence business recommendation
2. **Preview Next Class**
   - "Next time: Apply this to real local businesses"
   - "You'll choose between Golden Monkey, Mandee's, or Yas Chicken"
   - Collect worksheets or have students keep for reference

Period F Schedule

Status: Need to complete Desmos plotting from auction data

Decision Point

Do you have the original auction papers from last class?

- **YES** → Follow Path A below
- **NO** → Follow Path B below (re-run quick auction)

Opening 10 minutes

1. **Vocabulary Review via Blooket** 8-10 min
   - Same link as Period A
   - Consider different game mode to keep it fresh
   - Emphasize: Demand, Revenue, Profit, Variable Cost

PATH A: If You Have Original Papers 35 minutes

1. **Reconstruct Data Table** 5 min
   - Have students find their auction papers
   - Create Price vs. Quantity Demanded table on board
   - Students copy into notebooks
2. **Initial Desmos Plot** 7-8 min
   - Open Desmos Calculator
   - Create table: Price (x_1) vs. Quantity Demanded (y_1)
   - Observe demand curve pattern
   - ⚠ This completes what Period A did last class
3. **Distribute Worksheet & Continue** 20-23 min
   - Hand out WKS_Auction_to_Revenue_Analysis.pdf
   - Follow same sequence as Period A (Parts 3-6)
   - Calculate revenue, plot revenue curve, find regression, identify vertex

PATH B: If Papers Missing 35 minutes

1. **Quick Re-Run Auction** 10 min
   - Announce: "We'll quickly recreate our data"
   - Run 5 rounds with different prices
   - Suggested prices: \$0.50, \$1.00, \$1.50, \$2.00, \$2.50
   - Record on board: Round, Price, Total Quantity Bought
   - ⚠ Groups can buy multiple candies per round
2. **Immediate Desmos Entry** 5 min
   - Students enter data directly into Desmos
   - Create Price vs. Quantity scatterplot
   - Should see downward trend (demand curve)
3. **Distribute Worksheet & Continue** 20 min
   - Hand out WKS_Auction_to_Revenue_Analysis.pdf
   - Move through Parts 3-6 as time allows
   - Priority: Get through revenue calculation and graphing

Teaching Tips & Troubleshooting

Common Issues & Solutions

- **Desmos won't do regression**
  - Make sure to use tilde (~) not equals
  - Check that x_1 and y_1 match table column names
  - Try: `y1 ~ a*x1^2 + b*x1 + c`
- **Students getting different vertex values**
  - Rounding differences are OK
  - Emphasize both methods (graphical & algebraic) should be close
  - Use this as teaching moment about precision
- **Negative revenue values**
  - Check multiplication: Price × Quantity
  - Revenue should always be positive
  - Common error: subtracting instead of multiplying
- **Spanish-speaking students need help**
  - Distribute Spanish version alongside English
  - Pair with bilingual student if possible
  - Key terms: Ingreso (Revenue), Demanda (Demand), Precio (Price)

Key Questions to Ask Students

- "Why does revenue go down if price is too high OR too low?"
- "What does the vertex represent in business terms?"
- "How would this change if we cared about profit instead of revenue?"
- "Could we use this same method for the school cafeteria?"

Checklist for Success

Before Class

- ☐ Blooket game loaded and tested
- ☐ Copies of WKS_Auction_to_Revenue_Analysis.pdf (English)
- ☐ Copies of WKS_Auction_to_Revenue_Analysis_Spanish.pdf
- ☐ Desmos calculator bookmarked on class computers
- ☐ Example calculations ready for projection
- ☐ (Period F) Located auction papers OR prepared for quick re-run

Materials per Student

- ☐ Worksheet (English or Spanish version)
- ☐ Calculator (phone or physical)
- ☐ Access to computer for Desmos
- ☐ Previous auction data (Period A) or blank paper (Period F)

Learning Goals

- ☐ Students can calculate revenue from price and quantity
- ☐ Students can create and interpret a revenue parabola
- ☐ Students can find optimal price using vertex
- ☐ Students can explain the business meaning of their findings

Next Class Preview: Students will select a local business (Golden Monkey, Mandee's, or Yas Chicken) and begin analyzing real pricing data using these same techniques!