# Integrating Modeling into a Functions Corequisite

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# Functions Corequisite

**Functions:**

- Typical college algebra content
- Business, economics, and game design students
- Students with a 2.7 high school GPA do not need a placement test

**Corequisite class:**

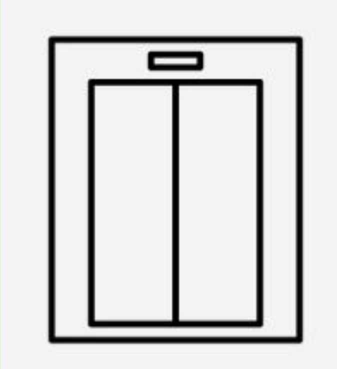
- Review and build up background quantitative skills
- Provide extra practice/help with Functions topics
- 50 min of class per week, but not credit-bearing
- Required of **all** students enrolled in Functions

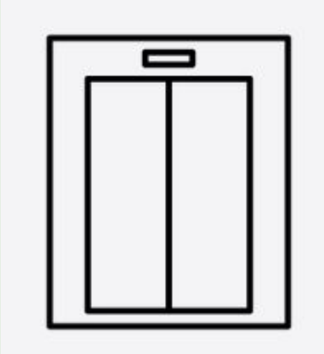
# Why Modeling in the Coreq?

- Applications (sometimes modeling) in the main course
- Reframing review topics
- Providing support for ways of thinking, not just content
    - Doesn’t have to be the full process!

# First Day: Team Problem Solving

At 2:00pm, two elevators leave the sixth floor and head down to the first floor.



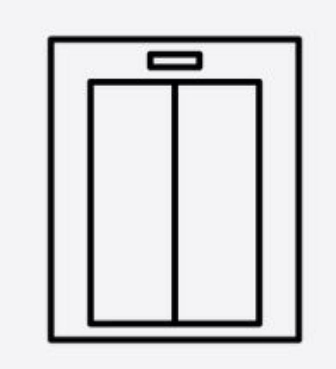
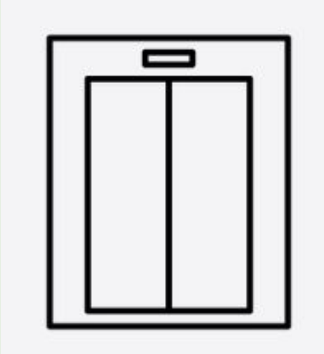


The faster elevator takes one minute between floors and the slower elevator takes two minutes between floors.

The elevator that reaches a floor first must stop for three minutes to take on passengers.

**Initial questions:** Which elevator will reach the ground floor first? What if they didn't start on the sixth floor?

# First Day: Team Problem Solving

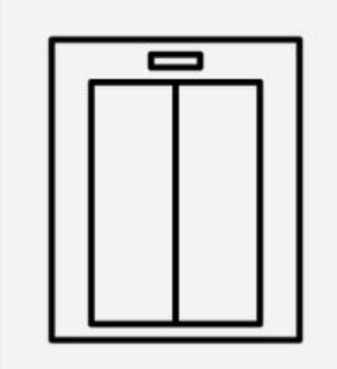
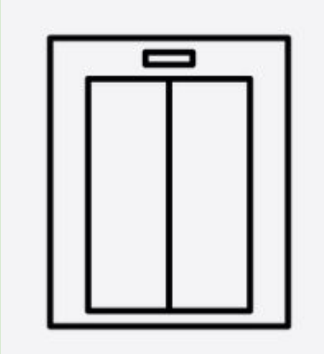
**Extending:**

- What happens if you change the amounts of time the two elevators take?
- What happens if you change the timing for taking on passengers?
- What isn’t realistic in the problem? How could you change that, and what happens?

# First Day: Full Class Reflection

**Questions for reflection:**

- What representations did you or others use? What was/wasn't useful about them?
- How did doing the initial question help with the later ones?
- Which variations were interesting and why?

# Modeling(-ish) Throughout the Course

- **Menu Math** from Nat Banting et al.

Example: Fractions by Josh Giesbrecht

Decision-making to satisfy constraints

**Fractions Menu Task**:

Build as *few* fractions as possible to satisfy each constraint at least once.

| | | | |
|---|---|---|---|
| A. | Is less than 1 | B. | Has a prime denominator |
| C. | Has a denominator greater than 10 | D. | Has a composite numerator |
| E. | Is fully simplified | F. | Is greater than $\frac{2}{3}$ |
| G. | Can be rewritten as a terminating decimal | H. | Has a numerator greater than 20 |
| I. | Has a numerator greater than its denominator | J. | Is equivalent to $\frac{1}{2}$ |

*Which constraints pair nicely?*
*Which constraints cannot be paired?*
*Is it possible to solve in 2, 3, or 4 fractions?*

Describe how and why you built each fraction.
Be sure to identify which fractions satisfy which constraints.

# Modeling(-ish) Throughout the Course

- **Menu Math** from Nat Banting et al.

Decision-making to satisfy constraints

- **Reflection on application problems** (“What isn’t realistic about this problem?”)

Assessing assumptions

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Assessing assumptions

- **Adjusting to increase complexity**

Iterating, building a mathematical formulation

3. Carl can stuff 6 envelopes per minute.
    a. Find a linear function that represents the total number of envelopes Carl can stuff after t hours, assuming he doesn't take any breaks.
    b. What might you change to add in reasonable breaks?

# Modeling(-ish) Throughout the Course

- **Menu Math** (Nat Banting and others)

Decision-making to satisfy constraints

- **Reflection on application problems** (“What isn’t realistic about this problem?”)

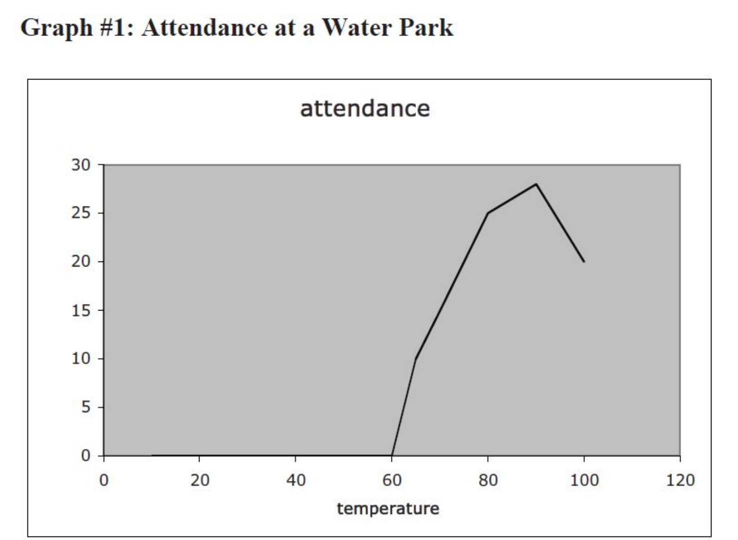
Assessing assumptions

- **Adjusting to increase complexity**

Iterating, building a mathematical formulation

- **Graphing Stories** (Adam Poetzel and others)

Interpretation/reporting of results



# Did It Work?

…maybe?

- Some good & interesting student thinking on reflection, interpretation, and Menu Math questions
- Didn’t do this as consistently as I hoped
- Attendance often low