# Lecture 9: Static Special Cases

## In-Class Quizzes on Monday

- Two Quizzes: Motion and Forces
  - Formatted just like the practice quizzes in the Week 3 module.
  - Not just calculations; could be assumptions, sensemaking, explanations, etc.
- One sheet (front and back) of notes allowed.
- Scientific calculators only (no graphing calculators).
  - There will be some some numerical calculation, but it is not a major emphasis.
- For simplicity, $g \approx 10$ m/s$^2$.

## Other Announcements

- Working on another back-up lecture location.
  - Main classroom will still be WNGR 212.
    - Hopefully here for quizzes, but maybe BEXL 103 if it is still too warm– (won't know until Monday).
  - May have to change "official" classroom to reserve a back-up room for the term.
- Don't forget the Address Assessment portion of your lab reports.
  - This will make your lab feedback more effective by helping your TA see how you are trying to improve.
- Let us know how if you have issues with the feedback you receive on assignments.
  - Is it clear? Is it enough? How is the tone? Other thoughts?

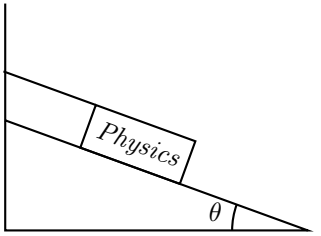
## L9-1: Textbook on a Tilted Table

A physics textbook is on a tilted, frictionless table, supported by a string.

(A) Sketch a free-body diagram for the system.

(B) What coordinate system do you think will make analyzing this situation easiest?

(C) Should the net force on the book be *zero* or *not zero*?




(D) Write an expression for the magnitude of each force acting on the system in terms of the gravitational force $F^g$.

**Special-Case Analysis**

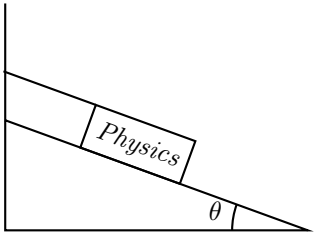
After you solve for a quantity:

- Choose a case that is special, not arbitrary.
- Figure out what your quantity **should** be in the case you chose.
- Identify the value of one or more other quantities that corresponds to your **case**.
- Evaluate your answer in the special case.
- Check whether or not your symbolic answer for the case matches what you expected the answer should be.

## L9-2: Tilted Table Sensemaking

A physics textbook is on a tilted, frictionless table, supported by a string.

- Suppose the table is slanted so that it becomes *steeper*. What happens to the magnitudes of the normal force and the tension force?




- Consider the following special cases:
  - What if the table were horizontal?
  - What if the table were vertical?

  For each of these cases, answer the following questions:
  - How big **should** each force be?
  - What angle corresponds to this **case**?
  - Does our symbolic answer for the case match what the answer should be?

## Main Ideas

- Tension and normal force don't have models with which to be directly calculated, so we need to find them via Newton's 2nd law.
- Picking a special case for which the answer is clear by physical reasoning can be a powerful tool for checking symbolic solutions.