Decision steps

Fleet, J., Goodchild, F. and Zajchowski, R., "Learning for Success," 2006

Why use the decision steps strategy?

The decision steps strategy can help you **focus on the process** of solving problems, rather than on the mechanics of formula and calculations. This focus can help you understand math concepts better because it helps you pay attention to, and spell out, the mental steps you take when you solve a problem. You'll look at the "**how**" and "**why**" of a problem, not only the "what." This depth of understanding is important for long-term memory, for taking exams, and for building knowledge for future courses.

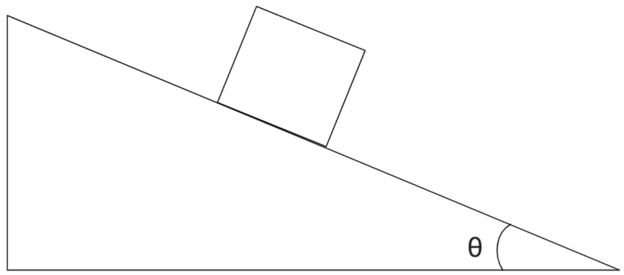
How to use decision steps

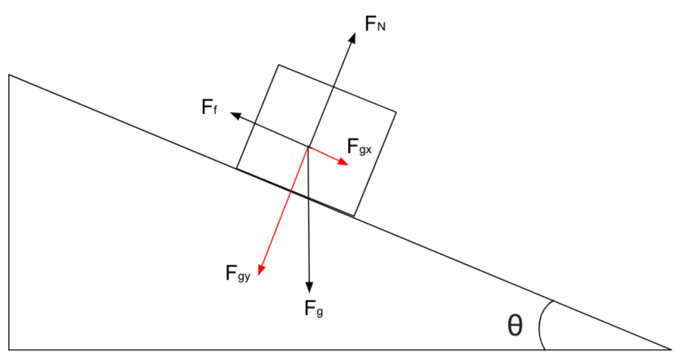
Identify the key decisions that determine what calculations to perform. In lecture, try to identify and record the decision steps the professor uses but may not write down or post.

- **Analyze solved examples**, using brief statements that focus on steps you find difficult:
  - What was done in this step?
  - How was it done; what formula or guideline was followed?
  - Why was it done?
  - Any spots or traps to watch out for?
- **Test run the decision steps on a similar problem**, and **revise** until the steps are complete and accurate.

Decision steps example: PHYS 117 problem

A 25kg box is on an incline plane at an angle of 25°. The box accelerates down the slope at $2m/s^2$. What is the coefficient of friction?



Steps	Solved Example
STEP 1 Before we start solving the question, we want to **read through the question carefully** and **write out our givens**. This will make it clear what variables you know and what you are solving for to help you chose the best equations to use.	**Givens** m=25kg θ=25° $a=2m/s^2$ **Unknown** μ=?
STEP 2 Draw a **free body diagram**. This illustrates what forces are acting on the object and will help you determine what forces are in the x and y direction when you are solving equations.	
STEP 3 **Solve** the problem. • Using your givens, think about what equations you want to use. • Break down the steps and write out all your work. • Find Fnet in the y direction and x direction.	

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Find Fnet in the y direction.	$F_{nety} = ma$
The box is not moving into the incline plane or off the plane, so there is no acceleration in the y-direction.	$F_{nety} = 0$
Substitute Fnety for the forces acting in the y direction.	$F_N - F_{gy} = 0$ $F_N = F_{gy}$ $F_N = mgcos\theta$ $F_N = (25kg)(9.81m/s^2)cos25°$ $F_N = 243N$
Find Fgx.	$F_{gx} = F_g sin\theta$ $F_{gx} = mgsin\theta$ $F_{gx} = (25kg)(9.81m/s^2)(sin25)$ $F_{gx} = 103.65N$
Find Fnet in the x direction. The box is accelerating down the incline plane at $2m/s^2$.	$F_{netx} = ma$
Substitute Fnetx for the forces acting in the x direction.	$F_{gx} - F_f = ma$ $F_f = F_{gx} - ma$ $F_f = (103.65N) - (25kg)(2m/s^2)$ $F_f = 53.65N$
Find μ.	$F_f = \mu F_N$ $\mu = \frac{F_f}{F_N}$ $\mu = \frac{53.65N}{243N}$ $\mu = 0.22$