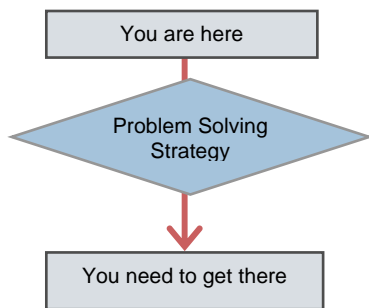


03: Problem Solving in Physics

What is Problem-Solving?



General Problem-Solving Strategy

- Step 1:** Identify what's being given.
- Step 2:** Clarify what's being asked.  
If necessary, rephrase the question.
- Step 3:** Select a strategy, trial & error, search, deductive reasoning, knowledge-based, working backwards
- Step 4:** Solve using the strategy.
- Step 5:** Review the answer.

**Example:**  
Determine the relationship between force of friction and the coefficient of friction

Step	Description	Information
1	Identify what's given	Force of friction and coefficient of friction
2	Identify what's asked	How they relate
3	Strategy: Deductive reasoning	Force of friction is found with the equation: $F_f = \mu F_N$ $\mu$ is the coefficient of friction and is a measure of the roughness of the two surfaces.
4	Apply the strategy	As roughness increases, there is more friction.  If $\mu$ is the measure of the roughness of the surfaces, then as the roughness increases the $\mu$ increases.  $\mu$ and friction are directly related.
5	Review the solution	The mathematic formula matches the reasoning.

Using Symbols with Mnemonics

When writing symbols in physics, use a mnemonic to help you remember what the symbol is representing.  
  
e.g. For mass of proton, use " $m_p$ " and for velocity of car and truck use " $v_c$ " and " $v_t$ " rather than " $v_1$ " and " $v_2$ "

KUDOS Method

Use the **KUDOS method** for solving **word problems**.

- K** = Known
- U** = Unknown
- D** = Definition
- O** = Output
- S** = Substantiation

Tips for KUDOS Steps

- **K (Known)**
  - Use units to identify information.
  - Write information symbolically.
  - Look for implied information.
  - Write out chemical equations.
- **U (Unknown)**
  - What information is the problem asking for?
  - Write the information symbolically.
- **D (Definition)**
  - Find equalities to convert
  - Choose & re-arrange equations
  - Look for missing information in other places.
  - If you cannot find enough information, re-evaluate your plan
- **O (Output)**
  - Plug in values to the equations (use constants as needed)
  - Check unit cancellation & perform the calculation
- **S (Substantiation)**
  - Check validity of your answer
  - Check units
  - Check significant figures

**Example:**  
What is the change in velocity if the initial velocity is 23 m/s and the final velocity is 15 m/s?

Step	Source Information	Write down
K	Initial velocity	$v_0 = 23 \text{ m/s}$
	Final velocity	$v_1 = 15 \text{ m/s}$
U	What is the change in velocity	$\Delta v = ? \text{ m/s}$
D	Change in equation	$\Delta v = v_1 - v_0$
O	Output of the equation	$\Delta v = v_1 - v_0$ $\Delta v = 15 \text{ m/s} - 23 \text{ m/s}$ $\Delta v = -8 \text{ m/s}$
S	Substantiation	-8 m/s is reasonable for velocity "m/s" is the velocity unit given in the problem. 0 decimal places given $\rightarrow$ 0 in answer

Exam-Prep Tips

- Stay ahead of the game.
- Make a cheat-sheet for studying.
- Know the format of the test and information that's fair game
- Make a mock exam.
- Attend the review session.
- Get help early.

Exam-Taking Tips

- General:**
- Arrive early and prepared.
  - Listen & read instructions carefully.
  - Do a memory dump first.
  - Skim the test and form a plan, including how to budget time.
  - Answer questions sequentially.
  - Apply the guessing rule.
- Multiple-choice tips:**
- Scan all the choices.
  - Avoid word confusion.
- Essay tips:**
- Understand the question.
  - Answer the whole question and only the question.
  - Watch your time.
- Free-response tips:**
- Show partial work
  - Don't forget unit.
  - Don't be fooled by blank space.

How to Use This Cheat Sheet: These are the keys related this topic. Try to read through it carefully twice then write it out on a blank sheet of paper. Review it again before the exam