

Chapter 20

Strategies for Solving Problems

In contrast to vague study suggestions like "do your homework daily, don't cram for exams, be good, ...blah blah blah", this chapter contains ideas that really work. They will help you immediately, and will continue paying dividends for a long time.

Read Section 20.1 first; it is the foundation for everything that follows. Then use the remaining sections, which are described at the end of 20.1, in any order.

20.1 Essential Strategies for Solving Problems

The Most Important Strategy — Searching for Insight

A friend who is a skilled welder got this wise advice from his first teacher: every time you do a welding job, do it better than the time before. This is also a good way to learn thinking skills: every time you finish a problem, ask yourself "What can I learn from this problem that will help me do better in the future?".

Don't define your amount-of-studying by the time you spend or the number of problems you do, but by **how much you learn**. If you do a problem in 10 minutes and use 2 minutes to analyze what you've done, you'll probably learn more (that will help you do future problems) in the 2 minutes of analysis than in the first 10 minutes. Does that sound like a good deal?

Principles and Practice

Section 1.0 describes the teamwork of principles-and-practice. Working together as partners, they are more effective than either one could be working alone.

Think about how a basketball player learns to play with skill and confidence. First he (or she) learns the fundamentals: how to dribble, pass, shoot, play defense, and cooperate with other players on the team. Then he uses practice to master these skills, to make them natural and instinctive. By facing challenges during practice, he learns to respond appropriately in a variety of situations, so he can quickly cope with whatever happens during the game "when it counts".

This is also the way to become a good problem solver. Learn the fundamentals (specific tools and general thinking strategies), then "make them your own" through practice. The principles of problem solving don't explain how to do everything, but they do provide a solid foundation that makes it easier for you to learn — from your own experience — how to cope with a wide variety of challenging problems.

You can make Rapid Progress

There are two basic strategies for learning quickly: **work hard** and **work smart**.

Usually, the more you study, the more you will learn. Working hard pays off. And so does working smart. As emphasized in Section 1.0, using "power tools" will make your study time more efficient and more fun.

The purpose of Chapter 20 is to help you develop your own **learning strategies**, your own ways of **learning how to learn**.

Much of your skill improvement will come one step at a time. Each step you take prepares you for the next step as you make slow, steady progress.

But you can also travel in leaps. This is possible because many physics skills are interdependent, which is bad news (if you're missing an important tool, everything you do suffers from this weakness) and good news (key insights can, as described in Section 1.0's skiing story, let you make rapid progress).

If you are persistent in searching for insights, your steps and leaps will produce a wonderful transformation. You will find, increasingly often, that goals which earlier seemed impossible are becoming things you can now do with ease.

20.2 Memory is an Essential Problem-Solving Tool

Good problem solving requires an "active memory" that gives you quick, reliable access to each tool when it is needed. **A good memory isn't sufficient** to make you an expert problem solver (you also need creativity and logic), **but it is necessary**.

You can improve your memory by using these principles: original awareness with intention to remember, organization, and review.

The rest of Chapter 20 is not available in a PDF file, but...

An expanded-and-revised version of "The Most Important Strategy: Learning from Experience" (in Section 20.1) is in a web-page about Motivations and Strategies for Learning. Sections 20.2 to 20.6 are now in a web-page about Study Skills for Effective Learning. Section 20.7, revised and improved, is in An Introduction to Scientific Method.

- 20.1 — Essential Problem-Solving Strategies
- 20.2 — Memory as a Problem-Solving Tool
- 20.3 — Confidence, Concentration, and Fun
- 20.4 — Active Study: Reading and Listening
- 20.5 — Exam Preparation and Performance
- 20.6 — Using Your Time Effectively
- 20.7 — Creative & Critical Thinking
and Scientific Method