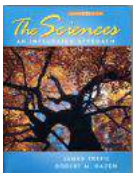
Applying Mind-Mapping Techniques to Reading Your Textbook

The trick about reading is that it is about *groups* of words: your understanding of individual words and details comes from your understanding of the whole. This is particularly true of reading new material in a textbook. You can greatly improve your understanding and retention of this kind of material through the use mind-mapping techniques to overview a textbook chapter.

This short example (notes from Trefil and Hazen, *The Sciences: An Integrated Approach*, 2004, Chapter 2) applies mind-mapping to develop a sense of the whole of a textbook chapter before you read it in detail.

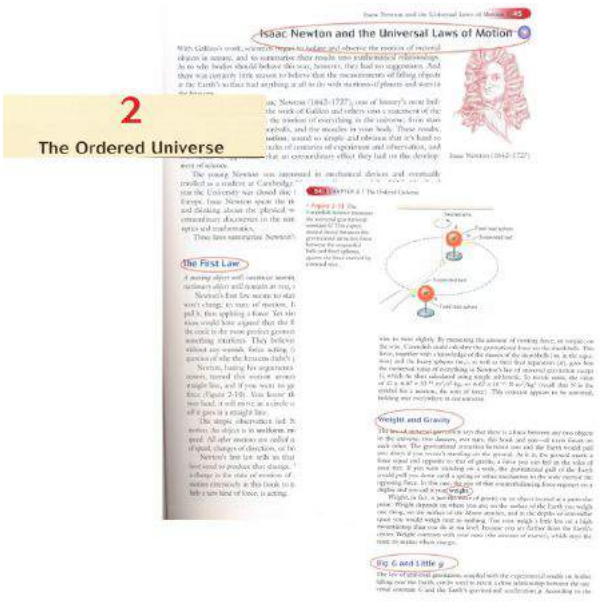
1 Determine Length and Features of Chapter



Chapter 2,
pp. 27 - 57

The first thing to do is to understand how big your problem is. Find the start and the end of the chapter. How many pages is it? Does it have tables and examples? Does it have a summary? Review questions at the end? Tables of Data?

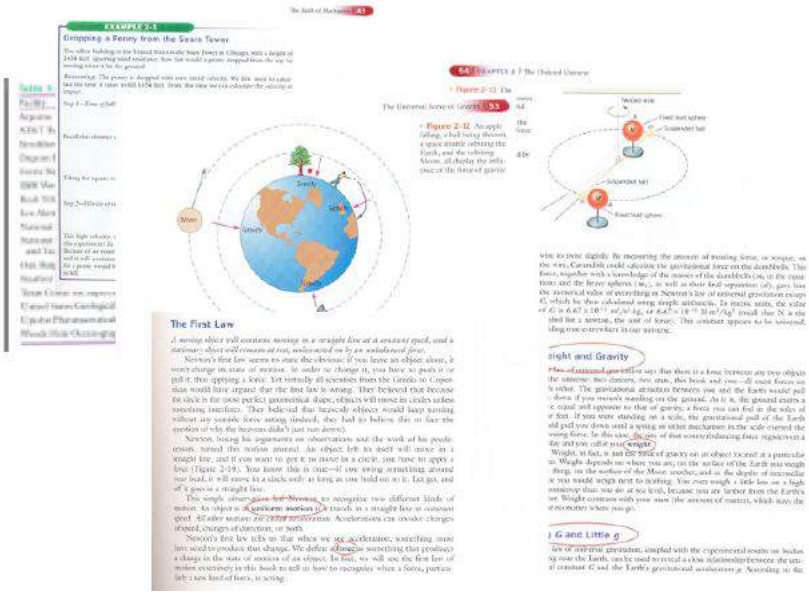
This is also important for motivation. Have you ever ridden your bicycle up a long hill on a curve where you can't see the top? What happens? You're very likely to end up walking your bike, simply because the climb seems endless when you can't see the top.



2 Note Chapter Title and Subtitles

Now that you're looking at the chapter, begin a mind map, noting the chapter titles and subtitles -- the overall organization of the chapter. Your mind-map might look something like this:

As you have looked through the chapter to find the titles and subtitles, you will have noticed other features of the chapter: Diagrams, Tables, Formulae, items in the margins, words that are in **bold** or *italics*.



3

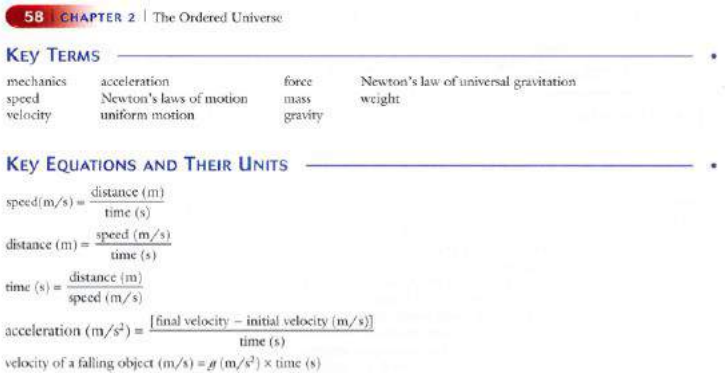
Study each Diagram, Illustration, Map, Table; Note Emphasized Words: **Bold** ***Italic***; Words in Margins

The important thing here is to make sure you understand each table, example or illustration before you begin the actual reading of the chapter. You don't want to lose your way trying to figure out a complicated table and lose the gist while you read the chapter.

The items that are emphasized in the text are the things that the author thinks are important. Even if you don't understand them completely now, note them anyway, for they are what you are reading the chapter to learn.

When you get to the end of the chapter, note any **Key Words** or concepts that are often listed there.

4 Note any Key Terms or Concepts at end of Chapter



58 CHAPTER 2 | The Ordered Universe

KEY TERMS

mechanics	acceleration	force	Newton's law of universal gravitation
speed	Newton's laws of motion	mass	weight
velocity	uniform motion	gravity	

KEY EQUATIONS AND THEIR UNITS

$$\text{speed (m/s)} = \frac{\text{distance (m)}}{\text{time (s)}}$$

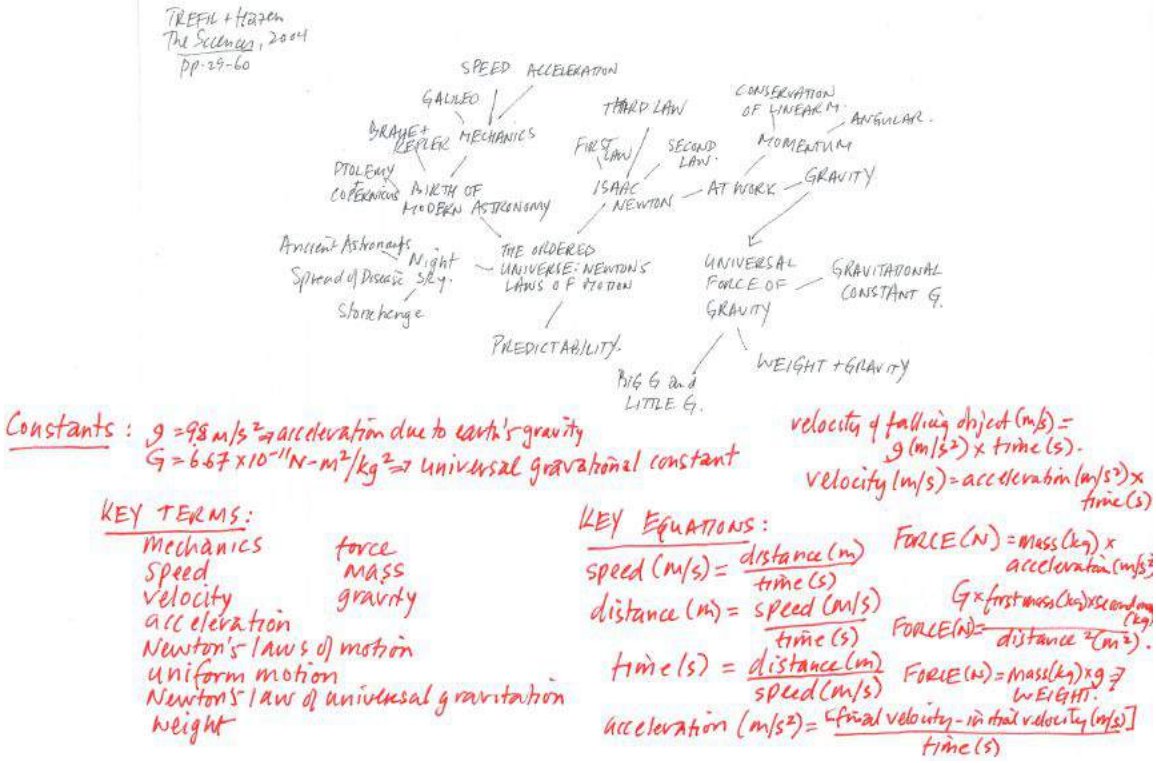
$$\text{distance (m)} = \frac{\text{speed (m/s)}}{\text{time (s)}}$$

$$\text{time (s)} = \frac{\text{distance (m)}}{\text{speed (m/s)}}$$

$$\text{acceleration (m/s}^2\text{)} = \frac{[\text{final velocity} - \text{initial velocity (m/s)}]}{\text{time (s)}}$$

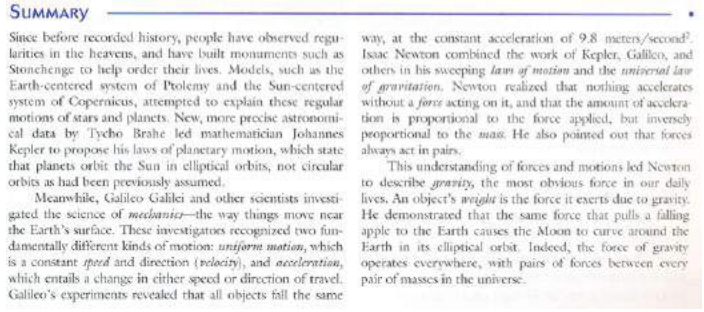
$$\text{velocity of a falling object (m/s)} = g\ (\text{m/s}^2) \times \text{time (s)}$$

At this point, your mind-map might look something like this:



Now it's time to begin actual reading of the chapter, **But**, the place you should start is with the Summary or Conclusion, for it tells you, in broad terms, what the chapter says and what the key thoughts are.

5 Read and Note Summary or Conclusion



SUMMARY

Since before recorded history, people have observed regularities in the heavens, and have built monuments such as Stonehenge to help order their lives. Models, such as the Earth-centered system of Ptolemy and the Sun-centered system of Copernicus, attempted to explain these regular motions of stars and planets. New, more precise astronomical data by Tycho Brahe led mathematician Johannes Kepler to propose his laws of planetary motion, which state that planets orbit the Sun in elliptical orbits, not circular orbits as had been previously assumed.

Meanwhile, Galileo Galilei and other scientists investigated the science of *mechanics*—the way things move near the Earth's surface. These investigatoes recognized two fundamentally different kinds of motion: *uniform motion*, which is a constant *speed* and direction (*velocity*), and *acceleration*, which entails a change in either speed or direction of travel. Galileo's experiments revealed that all objects fall the same way, at the constant acceleration of 9.8 meters/second². Isaac Newton combined the work of Kepler, Galileo, and others in his sweeping *laws of motion* and the *universal law of gravitation*. Newton realized that nothing accelerates without a *force* acting on it, and that the amount of acceleration is proportional to the force applied, but inversely proportional to the *mass*. He also pointed out that forces always act in pairs.

This understanding of forces and motions led Newton to describe *gravity*, the most obvious force in our daily lives. An object's *weight* is the force it exerts due to gravity. He demonstrated that the same force that pulls a falling apple to the Earth causes the Moon to curve around the Earth in its elliptical orbit. Indeed, the force of gravity operates everywhere, with pairs of forces between every pair of masses in the universe.

When you add your notes from the summary or conclusion to your mind-map, you have completed the framework for your detailed reading of the chapter.

Your final step is to read the chapter in detail and note significant details. Since you already know what the chapter is about and how it is structured, it will be clear to you which details are important. You may want to use any review questions at the end of the chapter: even though they are called "review", read them first and use them to direct your reading.

6 Read and Note Details

REVIEW QUESTIONS

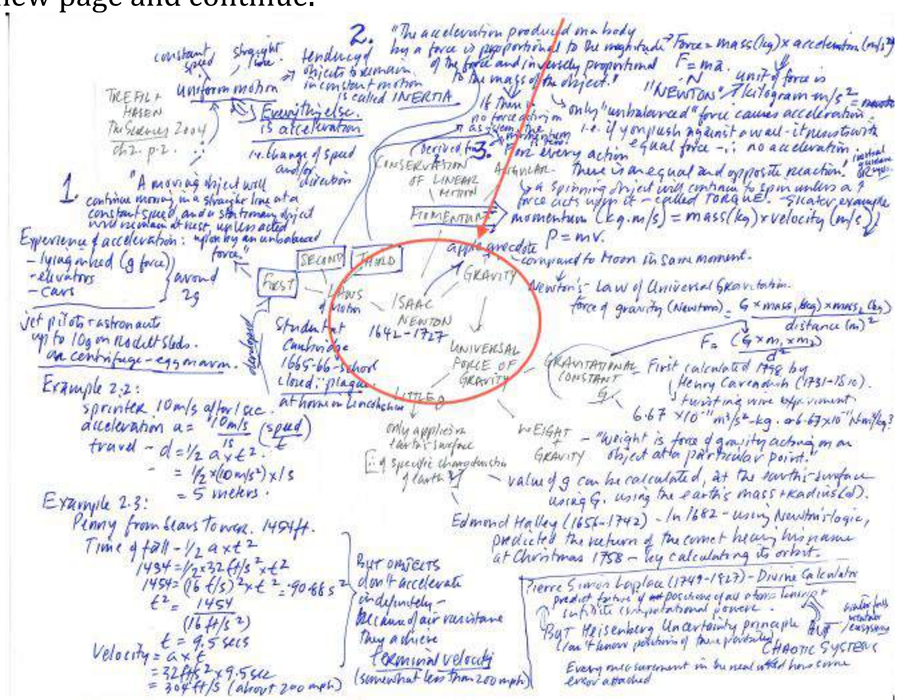
1. In what ways did Stonehenge serve as a calendar? How did Stonehenge allow ancient people to make predictions?
2. Why do scientists argue that Stonehenge was not built by ancient astronauts?
3. What were Tycho Brahe's principal contributions to science? How did he try to resolve the question of the structure of the universe?
4. What was Kepler's role in interpreting Tycho Brahe's data?
5. How did Galileo apply the scientific method to his study of falling objects?
6. A hockey player hits a puck at one end of an empty skating rink. The puck travels across the ice in a straight line until it is stopped by the goal at the other end. Explain how each of Newton's laws of motion applies to this situation.
7. According to Newton, what are the two kinds of motion in the universe? How did this view differ from those of previous scholars?
8. Why is gravity called a universal force?
9. What is the difference between the constants *g* and *G*?
10. What similarities did Newton see between the Moon and an apple?
11. What is the difference between weight and mass?

While it may seem, at first sight, that going through these six steps is a complicated way to read a chapter, when you try it you will find that it's actually faster, and certainly more purposeful than what you are doing now.

You will also find that you have notes that help you remember what you have read, since they have shape and direction, as well as text information.

In the end, your notes on the chapter might look something like this:

If you find you run out of space on your page, simply take that part of the mind-map to a new page and continue.



Overview Approach to Textbook Reading