Chapter 1

Concept Review

1.1 No. He discovered it because he had invented a new technology and was investigating properties of ordinary materials with it.

1.2 A theory is a framework of explanations that explains experimental data and predicts new results.

1.3 Either model is acceptable and has produced results. Often, however, a group of people with diverse talents will produce spectacular results more quickly and more efficiently.

Reviewing Concepts

1. Physics is the study of the basic physical laws that can be applied to all sciences.
2. Mathematics is the international, clear language of science.
3. The experimental physics came first.
4. Onne investigated superconductivity by making better equipment and lowering the temperature of gases. The others looked at the results of experiments and tried to explain how materials could become superconductors.

5. Aristotle's four elements were Earth, Water, Air, and Fire. They each had a natural place. It took "violent motion" to move them from their place, and their "natural motion" was to their proper place.

Applying Concepts

1. Atomic bomb, electricity, CDs, computers
2. Superconducting wires could carry electricity without energy loss; make nuclear fusion possible; allow higher-speed trains; detect oil; pinpoint diseased body tissue; allow faster, more powerful computers.
3. Astronomer: person who studies the material universe beyond Earth's atmosphere
   Geophysicist: person who studies the physics of Earth
   Biophysicist: person who studies the biological structures of physics
   Astrophysicist: person who studies the branch of astronomy that deals with the physical properties of celestial objects.
4. Motion - better design for water skis
   Light - mixing coloured spotlights
   Magnetism - nuclear fusion
   Sound - better stereos; ultrasonics
   Electricity - electric motors
   Nuclear physics - diagnostic instruments
5. Many light objects are affected by air resistance.
6. There is no definite order of specific steps -- in fact, there are almost as many approaches as there are experiments. However, whatever approach is used, it always includes close observation, controlled experimentation, summarizing, checking, rechecking, re-rechecking . . .
7. The more questions physicists answer, the more they will have.
8. No theory is considered absolute and free from criticism. Scientists are always trying to improve any theory. New knowledge may cause theories to be modified.
9. The Earth part of the wood wants to move to its natural place below Water (the stream) and make the boat sink. The Fire part wants to rise to its natural place and cause the boat to float above Air. The combination in the wood allows the boat to float.