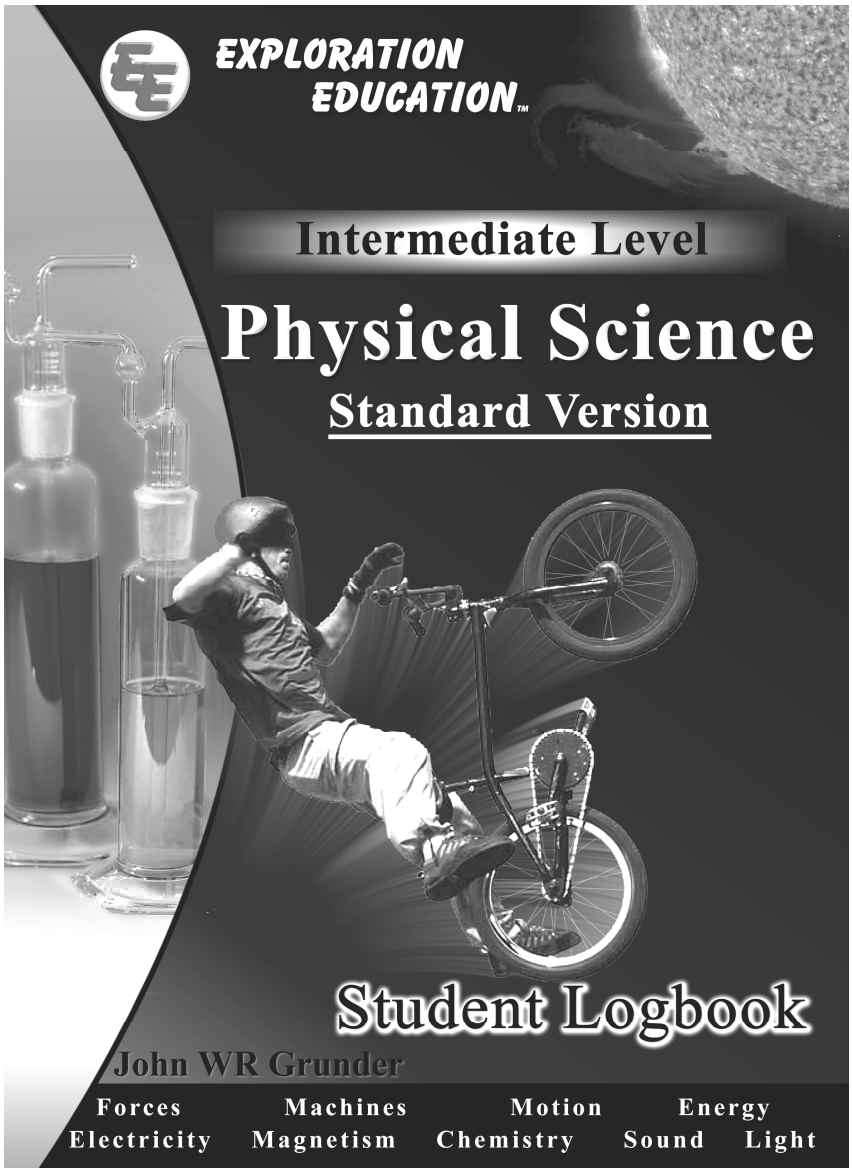
PLEASE NOTE: The following show a few example pages from the student logbook. They include a page from the forces unit and the chemistry unit. We also included one example page from the index/glossary found in the back of the student logbook.



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03-11 4TH

SECTION I

Forces & Motion

Chapters 1 - 5

Vocabulary

- *Force*
- *Friction*
- *Scientific Method*
- *Observation*
- *Hypothesis*
- *Theory*
- *Elastic Force*
- *Lubricant*
- *Fluids*
- *Gravity*
- *Mass*
- *Galileo*
- *Centripetal*
- *Pressure*
- *Buoyancy*
- *Inertia*
- *Speed*
- *Acceleration*
- *Action/reaction*
- *Velocity*

Overview

We interact with our world every day and much of that interaction involves forces. In this section you will learn what the different types of forces are, how they affect us, and how they can be used.

After completing this section the student should be able to:

- **Utilize critical thinking skills using the scientific method as they conduct experiments.**
- **Demonstrate effective technical writing skills as they develop a hypothesis and theory during the experimentation process.**
- **Explain what different types of forces are and their effects on our world.**
- **Explain how speed, acceleration, and velocity are related yet different.**
- **Explain who Isaac Newton was and Newton's three laws of motion.**
- **Demonstrate an understanding of the scientific principles and vocabulary taught in this section.**

Chapter 3.3 Speed and Velocity

Lesson

Read this chapter and answer the questions on EE's computer program, then record your answers below.

1. **Which of the following statements best describes what a reference point is?**
   a. moving object
   b. moving object that is used to describe a non-moving object
   c. non-moving object that is used to describe a moving object
   d. non-moving object

2. **Which of the following is true about speed?**
   a. To measure speed you need a reference point
   b. Speed is always fast.
   c. Speed = distance traveled divided by the time it took.

3. **Which is the best definition of velocity?**
   a. Velocity is the speed of an object.
   b. Velocity is the speed of an object in a certain direction for a certain amount of time multiplied by the distance.
   c. Velocity is the speed of an object in a certain direction.

Experiment

Go through this chapter's experiment instructions on EE's computer program, then conduct the experiment yourself, filling in the appropriate spaces below.

Observation When an object moves in a certain direction at a constant speed, we can measure its velocity (speed in a certain direction).

Hypothesis (best guess) If you point your Racer in the direction the sun rises and run it for 20 feet, what do you think its velocity will be? Make your best guess on how many miles/hour (speed) your Racer will go and which direction (if pointing toward the rising sun).

_____

_____

Continued on next page

Chapter 3.3 continued

Experiment How long did it take?

Results: _____ seconds

A. Now you will figure out the speed and velocity of your car. Put the time (in seconds) into the formula below to figure out the speed of your car. Note: the .068 figure is needed to convert feet per second into miles per hour.

$$\frac{.68 \times \text{\# of feet (20)}}{\text{Time it took in seconds}} = \frac{13.6}{\_\_\_\_\_ \text{ seconds}} = \_\_\_\_\_ \text{miles/hour}$$

B. Now, state the velocity of your car scientifically. For example, "The Racer was traveling due south at 1.2 miles/hour. *(Where does the sun rise? North, East, South or West? If you pointed your car toward where the sun rises, then that will help determine which direction it was going.)*

_____

_____

Theory What would your theory be about all moving objects? Do all moving objects have a velocity? (This should be a simple statement.)

_____

_____

_____

_____

_____

_____

SECTION V

Chemistry

Chapters 19 - 22

Overview

Chemistry involves anything we can see, touch, or smell. In this section you will learn what matter is and how we can measure and classify it. You will also learn about elements and the periodic table, chemical bonds, and heat transfer.

After completing this section the student should be able to:

- **Demonstrate an understanding of what matter is, how it is classified, and how it can be measured.**
- **Explain what elements are and the purpose of the periodic table.**
- **Know the makeup of atoms and molecules.**
- **Demonstrate an understanding of the scientific principles and vocabulary taught in this section.**

Vocabulary

- ***Matter***
- ***Chemistry***
- ***Classify***
- ***Mass***
- ***Elements***
- ***Periodic table***
- ***Atom***
- ***Conduction***
- ***Convection***
- ***Physical properties***
- ***Chemical properties***
- ***Metals***
- ***Alloy***
- ***Molecular bonds***

Chapter 20.1 Mass

Lesson

Read this chapter and answer the questions on EE's computer program, then record your answers below.

1. **Which of the following statements are true?**
   a. Different objects have different masses.
   b. Some rocks can float.
   c. Miners panned for gold because of its light mass – it floated to the top.

2. **Which of the following are true?**
   a. A balance scale is not very accurate.
   b. A balance scale can be very accurate.
   c. A balance scale can be used to find the mass of different objects.

Activity

Go through this chapter's activity instructions on EE's computer program, then conduct the activity yourself, filling in the appropriate spaces below.

Activity

In this activity you will find the mass of several different objects.

Object	=	Mass (in grams)
Penny	=	_____ g
Large Leaf	=	_____ g
Paper clip (from experiment bag -- don't lose this, you will need it later)	=	_____ g
Large Balloon (from experiment bag -- don't lose this, you will need it later)	=	_____ g

A. If all these objects were folded and squished up they would be about the same size. They would take up about the same amount of space. So how can you explain the difference in their mass? _____

_____

_____

_____

R - 1.2 Index with definitions (glossary)

Force 1.2, 1.3
Something that changes the motion and/or shape of an object. Forces can create movement and they can also change or stop movement

Frequency (light) 32.3
A light wave's frequency determines its color

Frequency (sound) 29.1
A sound wave's frequency determines the sound's pitch

Friction 2.2
A force that resists motion and produces heat

Fulcrum 7.2
A fulcrum point is the pivot point on a lever

Fuse 14.1
A device that opens a circuit if the wires become to hot.

Fusion (nuclear) 26.1
When a nucleus from one atom combines with a nucleus from another

Galileo 3.1
Galileo Galilei (1564-1642) conducted many experiments dealing with the earth's gravitational pull. Many of his experiments were done on the famous Leaning Tower of Pisa. Like many scientists with new ideas, his peers did not accept his discoveries and considered him a heretic

Gear ratio 8.2
The ratio of the speed of rotation of the powered gear to the final driven gear

Generator 17.2
A device that uses electromagnets to turn motion into electricity

Gram 5.2
A metric unit of weight equaling approximately .035 ounces

Gravity 2.1
A force that pulls all things toward each other.

Heat energy 9.1
Energy that is in moving molecules. The faster the molecules in a substance move the more heat they generate

Hertz (Hz) 29.1
Unit used to measure the pitch or frequency of a sound

Horsepower 6.3
Horsepower simply refers to the number of horses it would take to do the same amount of work as the machine

Hydroelectric power plant 14.2
An energy plant that uses water in producing electricity

Hypothesis 1.1
A scientist's "best guess" of why something is happening

Inclined planes 7.3
A simple machine that has an inclined surface, like a ramp

Inertia 3.1
The tendency of objects to resist a change in motion

Infrared light 35.2
Light waves that are longer than the red light waves that we can see.

Instrument (musical) 31.1
Three catagories of instruments: Percussion, Wind, and stringed

Insulator 11.3
A substance that electrons cannot pass through easily

Iron 15.1
The element Fe. A metal. Magnets will attract it.

Kilogram 6.1
One thousand grams

Kinetic energy 9.1
The energy of motion

Laser 35.3
A device that only produces one wave-length of light.