

Science Notebook

Glencoe Science

Motion, Forces, and Energy

Consultant

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About the Consultant

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Note-Taking Tips

Your notes are a reminder of what you learned in class. Taking good notes can help you succeed in science. These tips will help you take better notes.

- Be an active listener. Listen for important concepts. Pay attention to words, examples, and/or diagrams your teacher emphasizes.
- Write your notes as clearly and concisely as possible. The following symbols and abbreviations may be helpful in your note-taking.

Word or Phrase	Symbol or Abbreviation
for example	e.g.
such as	i.e.
with	w/
without	w/o

Word or Phrase	Symbol or Abbreviation
and	+
approximately	\approx
therefore	\therefore
versus	vs

- Use a symbol such as a star (★) or an asterisk (*) to emphasize important concepts. Place a question mark (?) next to anything that you do not understand.
- Ask questions and participate in class discussion.
- Draw and label pictures or diagrams to help clarify a concept.

Note-Taking Don'ts

- **Don't** write every word. Concentrate on the main ideas and concepts.
- **Don't** use someone else's notes—they may not make sense.
- **Don't** doodle. It distracts you from listening actively.
- **Don't** lose focus or you will become lost in your note-taking.

Using Your Science Notebook

This note-taking guide is designed to help you succeed in learning science content. Each chapter includes:

Language-Based Activities
Activities cover the content in your science book including vocabulary, writing, note-taking, and problem solving.

Anticipation Guide/KWL Charts
Think about what you already know before beginning a lesson and identify what you would like to learn from reading.

Science Journal
Write about what you know.

Writing Activities
These activities help you think about what you're learning and make connections to your life.

Vocabulary Development
Vocabulary words help you to better understand your science lessons. Learning the *Academic Glossary* can help you score higher on standardized tests.

Name _____ Date _____

The Nature of Science

Before You Read

Before you read the chapter, respond to these statements.

- Write an **A** if you agree with the statement.
- Write a **D** if you disagree with the statement.

Before You Read	The Nature of Science
	• An important part of science is testing, or experimenting.
	• Technology is useful only in the situation for which it was designed.
	• People began studying weather in the 1800s.
	• Science can answer all of the questions that can be asked.

FOLDABLES
Study Organizer Construct the Foldable as directed at the beginning of this chapter.

Science Journal
How do you think scientists could learn more about a small dinosaur heart?

Section 2 Scientific Enterprise (continued)

Main Idea	Details
Limits of Science I found this information on page _____. Science is _____ by what it can _____. For a question or problem to be studied through _____, there must be variables that can be _____, measured, and _____. Questions that deal with _____ or belief systems cannot be answered by science. Ethics is a system of _____ and _____. _____ behavior in science with scientific fraud. Create _____ specific behaviors that are examples of each _____ for Scientific Fraud.	• good • limited • observed • scientific methods • tested

SYNTHESIZE IT
Describe how fraud in scientific research affects scientists who research in ethical ways.

The Nature of Science 7

Academic Vocabulary

emerge: to come out; to appear

enormous: having great size

environment: the physical, chemical, and biotic factors that surround living things

erode: to wear away

eventual: ultimately resulting

exceed: to go beyond or be greater than

expose: to leave open or without protection; to reveal

extract: to take, get, or pull out

formula: a group of symbols and figures showing the elements in a chemical compound

goal: objective or end that one strives to achieve

hypothesis: a reasonable guess that can be tested and is based on what is known and what is observed

impact: a strong effect

indicate: to be or give a sign of

infer: to arrive at a conclusion or an opinion by reasoning

interval: space or time between events

layer: one thickness over another

likewise: in the same way

locate: to find the position or site of

maintain: to continue; to support

normal: conforming to a type; standard or regular pattern

nuclear: of or relating to the atomic nucleus

Earth Science 297

Name _____ Date _____

Section 1 Science All Around (continued)

Main Idea _____ **Details** _____

Mysteries and Problems
Summarize why it was important for scientists to solve the mystery of the tsunami that struck Japan, on January 27, 1700.
I found this information on page _____

Scientific Methods
Sequence the scientific methods used to solve a scientific problem by completing the graphic organizer below.
I found this information on page _____

1. _____ 7. _____
2. _____ 8. _____
3. _____ 9. _____
4. _____ 10. _____
5. _____ 11. _____
6. _____ 12. _____

Note-Taking Based on the Cornell Two-Column Format
Practice effective note-taking through the use of graphic organizers, outlines, and written summaries.

The Nature of Science 3

Chapter Wrap-Up
This brings the information together for you. Revisiting what you thought at the beginning of the chapter provides another opportunity for you to discuss what you have learned.

Name _____ Date _____

The Nature of Science Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

- Write an **A** if you agree with the statement.
- Write a **D** if you disagree with the statement.

The Nature of Science	After You Read
• An important part of science is testing, or experimenting.	
• Technology is useful only in the situation for which it was designed.	
• People began studying weather in the 1800s.	
• Science can answer all of the questions that can be asked.	

Review
Use this checklist to help you study.

- Review the information you included in your Foldable.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT After reading this chapter, summarize what you have learned about the nature of science.

Review Checklist
This list helps you assess what you have learned and prepare for your chapter tests.

8 The Nature of Science

Name _____ Date _____

Section 1 Science All Around (continued)

Main Idea _____ **Details** _____

Working in the Lab
Define the four types of factors in a science experiment. Identify and describe each of them below.
I found this information on page _____

Independent Variable _____
_____ variables that do not change

Dependent Variable _____
_____ the standard to which results can be compared

Technology
Summarize transferable technology by defining the term. Then provide examples by filling out the graphic organizer below.
I found this information on page _____

Transferable technology is _____

Radar and Sonar
originally developed for _____
are now used to study _____

SYNTHESIZE IT Identify three objects in your home or school that have not been affected by technology.

4 The Nature of Science

Graphic Organizers
A variety of visual organizers help you to analyze and summarize information and remember content.

Motion and Momentum

Before You Read

Preview the chapter and section titles and the section headings. Complete the two columns of the table by listing at least two ideas in each column.

K What I know	W What I want to find out



Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Describe how your motion changed as you moved from your school's entrance to your classroom.

Motion and Momentum

Section 1 What is motion?

Preview the section by reading the What You'll Learn statements. Write three questions that come to mind from reading these statements.

1. _____
2. _____
3. _____

Review Vocabulary

Write a sentence that uses the word *meter* to show its scientific meaning.

meter

New Vocabulary

Define the new vocabulary terms using your book or a dictionary.

speed

average speed

instantaneous speed

velocity

Academic Vocabulary

Use a dictionary to define *displace* in its scientific sense.

displace

Section 1 What is motion? (continued)

Main Idea

Changing Position

I found this information on page _____.

Speed


I found this information on page _____.

Details

Analyze the meaning of relative motion. Complete the sentences.

To determine whether something changes position, you must identify _____. An object changes position if _____.

Contrast distance and displacement. Draw a diagram showing distance and displacement for a person jogging halfway around a lake. Label the distance and displacement.



Complete the equation for calculating speed.

speed (in meters/second) = _____

Compare and contrast average speed and instantaneous speed. Give an example of average speed, instantaneous speed, and one in which instantaneous speed changes.

Average speed: _____

Instantaneous speed: _____

Example: _____

Section 1 What is motion? (continued)

Main Idea

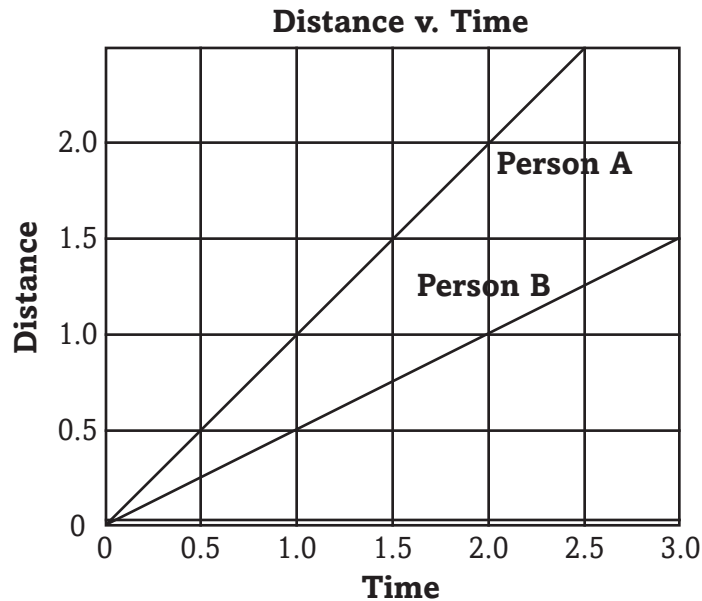
Details

Graphing Motion

I found this information on page _____.

Analyze the distance-time graph. Graph lines to show:

- Person C, whose speed is 2 m/s.
- Person D, who is standing still.



Compare the speed of each person by completing the paragraph.

_____ is plotted on the horizontal axis and _____ is plotted on the vertical axis. A steeper line indicates _____. On this graph, Person A has a speed of _____ and Person B has a speed of _____. If speed were zero, the line would be _____.

CONNECT IT

Think of a time recently when you might have run around a track or traveled in a car or bus. Describe the motion thoroughly. Remember to include how your velocity changed.

Motion and Momentum

Section 2 Acceleration

Predict three things you will learn in this section. Read the section title and subheadings to help you make your predictions.

1. _____
2. _____
3. _____

Review Vocabulary

Define kilogram.

kilogram

New Vocabulary

Use your book to write the scientific definition of acceleration.

acceleration

Academic Vocabulary

Use a dictionary to find the mathematical definition of positive.

positive

Section 2 Acceleration (continued)

Main Idea

Acceleration and Motion

I found this information on page _____.

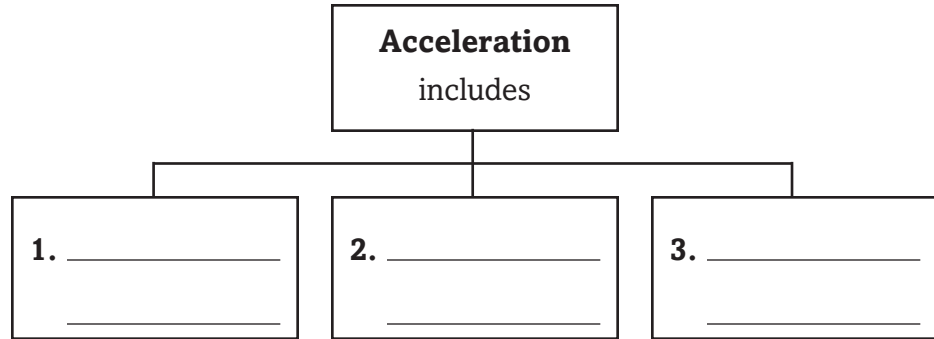
Calculating Acceleration

I found this information on page _____.

I found this information on page _____.

Details

Distinguish the three ways that an object can accelerate. Complete the concept map.



Complete the mathematical equation to calculate acceleration for objects moving in a straight line.

Acceleration Equation

$$\text{acceleration} = \frac{\text{_____ (in m/s)} - \text{_____ (in m/s)}}{\text{time (in s)}} \text{ (in m/s}^2\text{)}$$

Analyze the equation above to rewrite it using symbols.

$$a = \text{_____}$$

Compare and contrast positive and negative acceleration by completing the chart.

Types of Acceleration		
	Positive	Negative
Change in speed		
Relationship of initial speed to final speed	Initial speed is less than final speed.	

Section 2 Acceleration (continued)

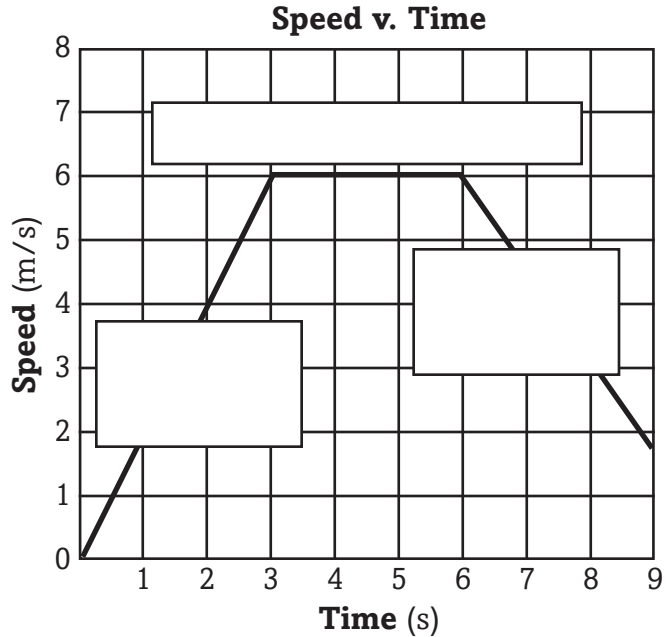
Main Idea

Calculating Acceleration

I found this information on page _____.

Details

Analyze the acceleration graph below. Label the parts of the graph showing zero acceleration, positive acceleration, and negative acceleration.



Summarize how you can identify each type of acceleration on an acceleration graph. Complete the sentences.

A line for positive acceleration slopes _____.

A line for negative acceleration slopes _____.

A line for zero acceleration _____.

SYNTHESIZE IT

A jogger runs around a circular track. She starts at a speed of 2 m/s, then speeds up to 6 m/s. She runs at that speed for 20 minutes, and then comes to a stop. Describe her acceleration. Is it ever zero?

Motion and Momentum

Section 3 Momentum

Scan the headings, bold words, and illustrations in Section 3.
Write two facts you discovered about momentum as you scanned the section.

1. _____

2. _____

Review Vocabulary

Use the term triple-beam balance in a sentence.

triple-beam balance

New Vocabulary

Define the scientific meanings of the new vocabulary terms using your book or a dictionary.

mass

inertia

momentum

law of conservation of momentum

Academic Vocabulary

Use a dictionary to define predict.

predict

Section 3 Momentum (continued)

Main Idea

Mass and Inertia

I found this information on page _____.

Momentum

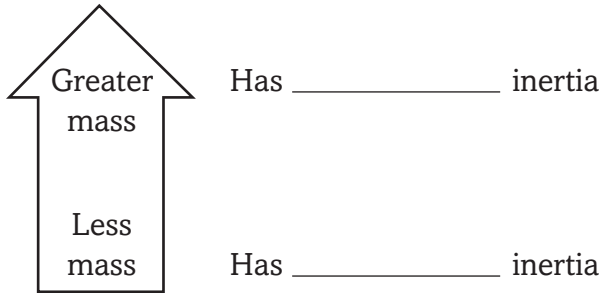
I found this information on page _____.

Conservation of Momentum

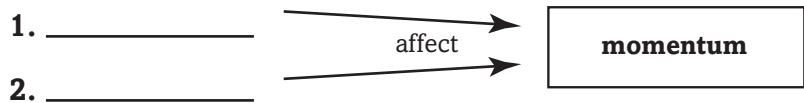
I found this information on page _____.

Details

Label the arrow below to show the relationship between mass and inertia.



List two factors that affect an object's momentum.



Summarize the calculation of momentum in words on the lines below.

Complete the equation used to calculate momentum.

momentum = _____ (in kg) × _____ (in m/s)
(in kg • m/s)

Analyze the equation above and rewrite it using symbols. Use the letter *p* to represent momentum.

Summarize the law of conservation of momentum in your own words. Two balls that collide are an example.

Section 3 Momentum (continued)

Main Idea

Details

Using Momentum Conservation

I found this information on page _____.

Model the law of conservation of momentum when a moving object of small mass collides with an object of greater mass that is initially at rest. In the first row, model what happens if the two objects stick together. In the second, model what happens if the two bounce away from each other.

- Use arrows to show the size and direction of each object’s momentum.
- Label each object with its mass, speed, and direction.

	Before Impact	After Impact
Stick together		
Bounce off		

CONNECT IT

At a science fair, contestants can win a prize if they can roll a ball with a specific momentum chosen by the presenter. The contestants have a choice of two balls. One has greater mass than the other. Which would you choose, and why?

Tie It Together

Work with a partner to perform the experiment below to explore changes in momentum.

Materials

- | | |
|-----------------------------------|----------------------------|
| <i>wooden block</i> | <i>stopwatch</i> |
| <i>ball that will roll easily</i> | <i>tape</i> |
| <i>meterstick</i> | <i>triple-beam balance</i> |

- Find and record the mass of the block and ball, using the balance.

Block: _____

Ball: _____

- Mark a line on the floor with tape. Place the block on the line. Measure a distance of 5 m from the line and mark a second line.
- Practice rolling the ball until you can roll it from the 5-m line to the block.
- Roll the ball from the 5-m line to the block. Use the stopwatch to time the roll. Then measure how far the block moved from the line when the ball hit it. Use a chart like the one below to record your data.
- Repeat step 4 four more times, varying the speed with which you roll the ball. Record the time and distance for each trial.
- Use your data to calculate the speed for each trial. Then use that information and the mass of the ball to calculate the momentum of the ball in each trial.
- Analyze your data. What relationship do you see between the momentum of the ball and the distance the block moved? Why do you think this relationship exists?

Data Table

Trial	Time	Speed	Momentum	Distance Block Moved
1				
2				
3				
4				
5				

Motion and Momentum Chapter Wrap-Up

Review the ideas you listed in the chart at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the chart by filling in the third column.

K What I know	W What I want to find out	L What I learned

Review

Use this checklist to help you study.

- Review the information you included in your Foldable.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three things that you have learned about motion and momentum.

Force and Newton's Laws

Before You Read

Preview the chapter and section titles and the section headings. List at least two ideas for each section in each column.

K What I know	W What I want to find out



Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Describe three examples of pushing or pulling an object. How did the object move?

Force and Newton's Laws

Section 1 Newton's First Law

Predict three topics that will be discussed in Section 1 as you scan the headings.

1. _____
2. _____
3. _____

Review Vocabulary

velocity

Define velocity.

New Vocabulary

Write the correct vocabulary term next to each definition.

force that opposes sliding between two touching surfaces

two or more forces that act on an object and do not cancel each other

combination of all of the forces acting on an object

two or more forces whose effects cancel each other

states that if the net force acting on an object is zero, the object will remain at rest or, if it is moving, continue to move in a straight line with constant speed

a push or pull

Academic Vocabulary

constant

Use a dictionary to define constant in its scientific sense.

Section 1 Newton's First Law (continued)

Main Idea

Force

I found this information on page _____.

I found this information on page _____.

Details

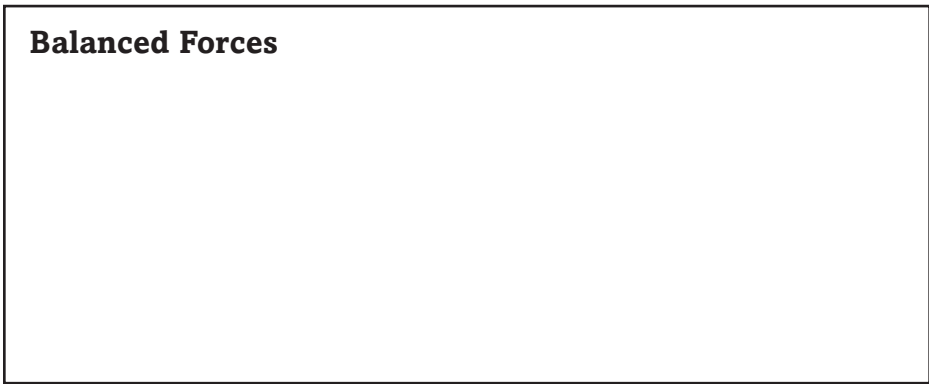
Analyze how forces combine to form a net force.

If forces act in the same direction _____.

If forces act in opposite directions _____.

Create two drawings to show how an object is affected by balanced and unbalanced forces. Use arrows and labels to show the forces and motion. Below each drawing, explain the effect of the forces.

Balanced Forces



Unbalanced Forces



Section 1 Newton's First Law (continued)

Main Idea

Newton's First Law of Motion

I found this information on page _____.

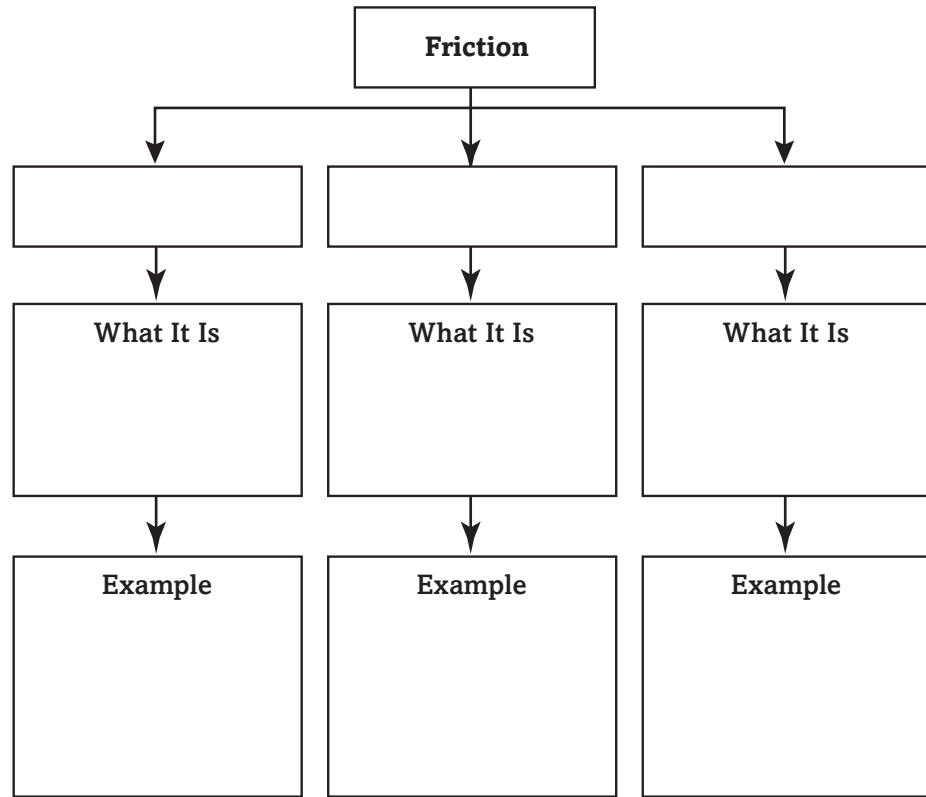
Friction

I found this information on page _____.

Details

Summarize Newton's first law of motion *in your own words*.

Compare the three types of friction. Complete the concept map.



SYNTHESIZE IT

A carpenter uses sandpaper to smooth a rough piece of wood. State what type of friction the carpenter is using.

Force and Newton's Laws

Section 2 Newton's Second Law

Read the What You'll Learn statements. Write two questions that come to mind as you read the statements.

1. _____
2. _____

Review Vocabulary

Define acceleration to show its scientific meaning.

acceleration

New Vocabulary

Use your book to define each term.

Newton's second law of motion

weight

center of mass

Academic Vocabulary

Use a dictionary to define require to show its scientific meaning.

require

Section 2 Newton's Second Law (continued)

Main Idea

Force and Acceleration

I found this information on page _____.

Gravity

I found this information on page _____.

Using Newton's Second Law

I found this information on page _____.

Details

Summarize Newton's second law of motion *in your own words*. Then complete the equation used to calculate acceleration.

acceleration (in meters/second²) = $\frac{\text{_____ in newtons}}{\text{_____ in kilograms}}$

Complete the chart to show how mass and distance affect gravitational force.

If . . .	Then gravity . . .
mass is larger	
mass is smaller	
distance increases	
distance decreases	

Distinguish between weight and mass by explaining what would happen to the weight and mass of an object if it were taken from Earth to Mars.

On Mars, the weight would _____ because _____
 _____ . The mass would _____ because _____
 _____ .

Contrast speeding up, slowing down, and turning as forms of acceleration. Identify the direction of the force in each case.

Acceleration	Direction of Force
speeding up	→ _____
slowing down	→ _____
turning	→ _____

Section 2 Newton's Second Law (continued)

Main Idea

Circular Motion

I found this information on page _____.

Air Resistance

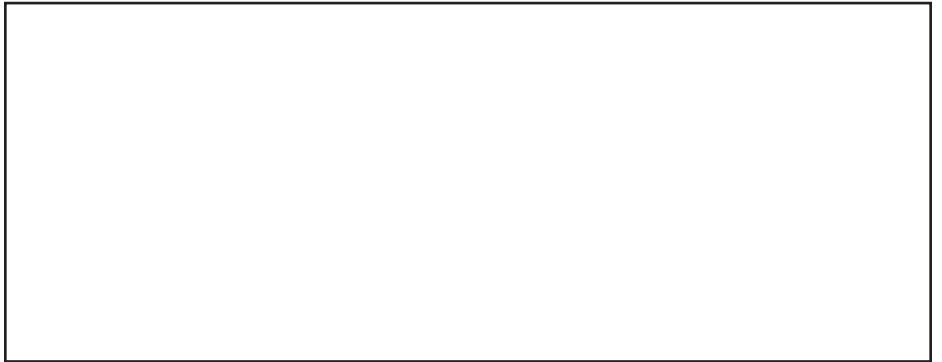
I found this information on page _____.

Center of Mass

I found this information on page _____.

Details

Model how a satellite stays in orbit around Earth. Label the direction of centripetal force and the direction of the satellite's motion.



Summarize the two factors that affect the air resistance on a falling object.

1. _____
2. _____

Label the center of mass of common objects. In the space below, draw a wrench, a ball, and a book. Place a dot to represent where you predict the center of mass of each object will be found.



CONNECT IT

The gravitational force on the Moon is one-sixth the gravitational force on Earth. Hypothesize what it would be like to jump or play ball on the Moon.

Force and Newton's Laws

Section 3 Newton's Third Law

Scan the list below to preview Section 3 of your book.

- Read all section titles.
- Read all bold words.
- Look at all of the pictures.
- Think about what you already know about forces and gravity.

Write two facts you discovered about Newton's third law of motion as you scanned the section.

1. _____
2. _____

Review Vocabulary

force

Define force to show its scientific meaning.

New Vocabulary

Newton's third law of motion

Use your book to define Newton's third law of motion.

Academic Vocabulary

react

Use a dictionary to define react in its scientific sense.

Section 3 Newton's Third Law (continued)

Main Idea

Action and Reaction

I found this information on page _____.

Details

Summarize Newton's third law *in your own words*.

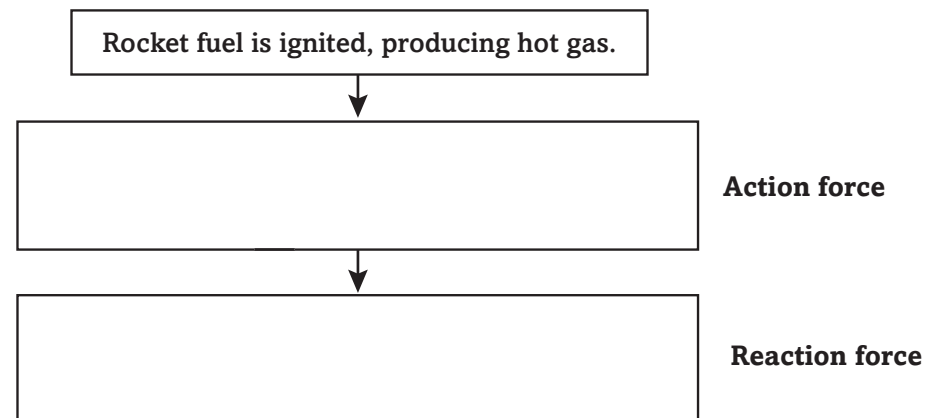
Model how action *and* reaction forces *act in pairs*.

- Draw a situation in which a force pair acts.
- Use arrows to label the action and reaction forces.

Analyze how the forces act and how the motions of the objects change.

I found this information on page _____.

Sequence the events in a rocket launch that show Newton's third law. Complete the flow chart.



Section 3 Newton's Third Law (continued)

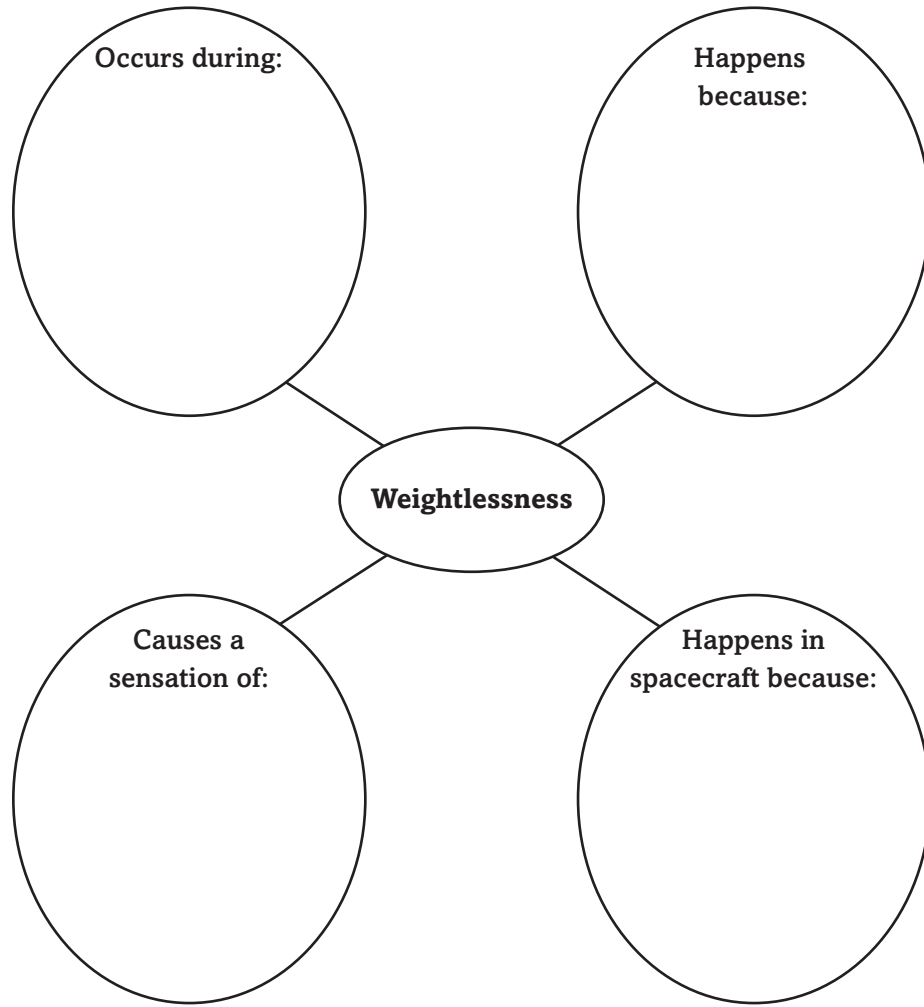
Main Idea

Weightlessness

I found this information on page _____.

Details

Organize information about weightlessness. Complete the concept web.



SUMMARIZE IT

Explain why action and reaction forces do not cancel each other's effects. Give an example.

Tie It Together

Think of an activity that you enjoy in your daily life. Describe how each of Newton's laws applies to your chosen activity. Then, draw a diagram to show how you use force in the activity.

Newton's First Law of Motion: _____

Newton's Second Law of Motion: _____

Newton's Third Law of Motion: _____

Diagram:



Force and Newton's Laws

Chapter Wrap-Up

Review the ideas you listed in the chart at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the chart by filling in the third column.

K What I know	W What I want to find out	L What I learned

Review

Use this checklist to help you study.

- Review the information you included in your Foldable.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three things you have learned about forces and Newton's laws.

Forces and Fluids

Before You Read

Before you read the chapter, respond to these statements.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

Before You Read	Forces and Fluids
	<ul style="list-style-type: none"> • Snowshoes allow you to decrease your pressure on the surface of snow.
	<ul style="list-style-type: none"> • The buoyant force pushes an object in a fluid downward.
	<ul style="list-style-type: none"> • A fluid can transmit force.
	<ul style="list-style-type: none"> • Wind blowing across a roof is at lower pressure than the air inside the house.



Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Compare and contrast five objects that float with five objects that sink.

Forces and Fluids

Section 1 Pressure

Scan the headings in Section 1 of your book. Predict three topics that will be discussed.

1. _____
2. _____
3. _____

Review Vocabulary

Define weight using your book or a dictionary.

weight

New Vocabulary

Use your book or a dictionary to define the vocabulary terms. Then use each term in a sentence that shows its scientific meaning.

pressure

fluid

barometer

Academic Vocabulary

Use a dictionary to define definite to show its scientific meaning.

definite

Section 1 Pressure (continued)

Main Idea

What is pressure?

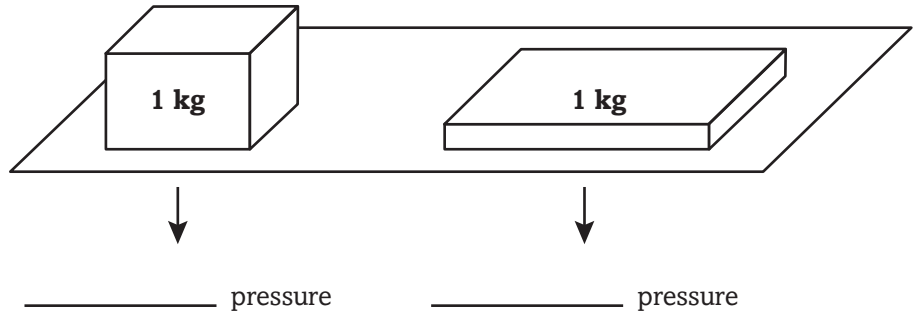
I found this information on page _____.

I found this information on page _____.

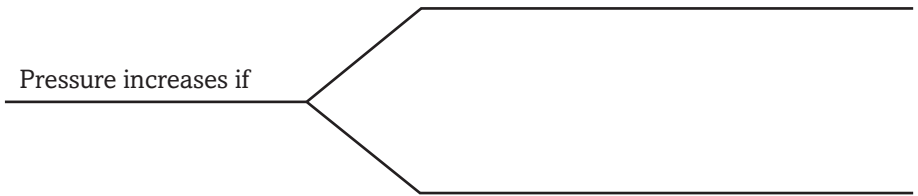
I found this information on page _____.

Details

Compare the pressure exerted by equal weights spread over different surface areas. Label the two diagrams to indicate which object applies more pressure, and which applies less.



Summarize the effects of force and area of contact on pressure by completing the diagram.



Define how to calculate pressure. Complete the formula and the chart below.

$$P = \frac{\square}{\square}$$

Calculating Pressure		
Abbreviation	Stands for	Measured in
<i>P</i>	pressure	
<i>F</i>		
<i>A</i>		

Section 1 Pressure (continued)

Main Idea

Fluids

I found this information on page _____.

Pressure in a Fluid

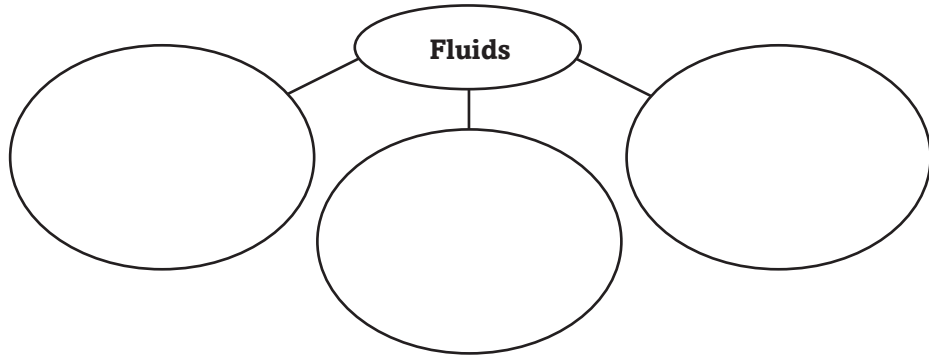
I found this information on page _____.

Atmospheric Pressure

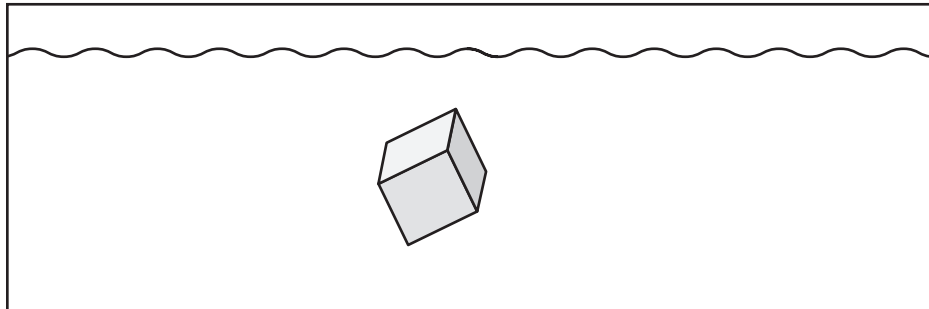
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Details

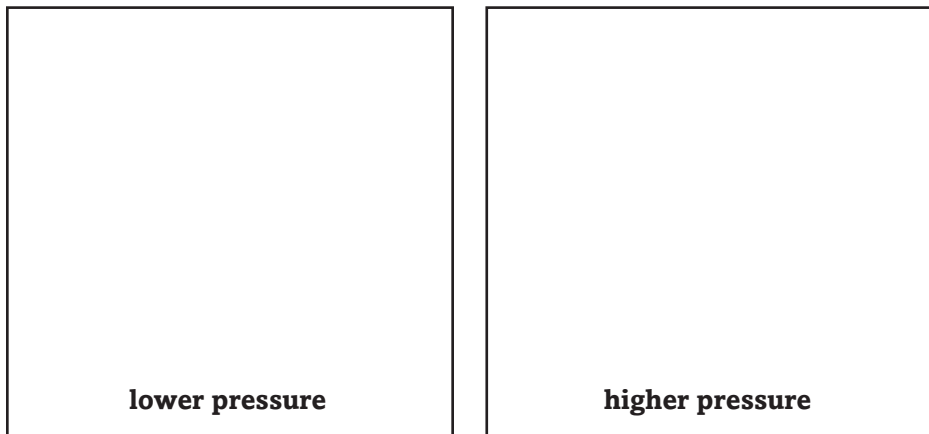
Organize information about the 3 different kinds of fluid. Identify and provide an example of each.



Model how pressure is exerted on an object suspended in a fluid. Draw arrows to indicate the directions in which pressure is exerted on the cube in the diagram.



Compare different atmospheric pressures. Sketch two identical barometers. Show one barometer indicating higher atmospheric pressure than the other.



Forces and Fluids

Section 2 Why do objects float?

Skim Section 2 of your book. Write three questions that come to mind. Look for answers to your questions as you read the section.

1. _____
2. _____
3. _____

Review Vocabulary

Newton's second law of motion

Define Newton's second law of motion *using your book or a dictionary.*

New Vocabulary

Read the definitions below. Write the correct vocabulary term on the blank to the left of each definition.

states that the buoyant force on an object is equal to the weight of the fluid displaced by the object

upward force exerted by a fluid on any object in the fluid

physical property of matter that can be found by dividing an object's mass by its volume

Academic Vocabulary

displace

Use a dictionary to define displace to show its scientific meaning.

Section 2 Why do objects float? (continued)

Main Idea

The Buoyant Force

I found this information on page _____.

What causes the buoyant force? and Sinking and Floating

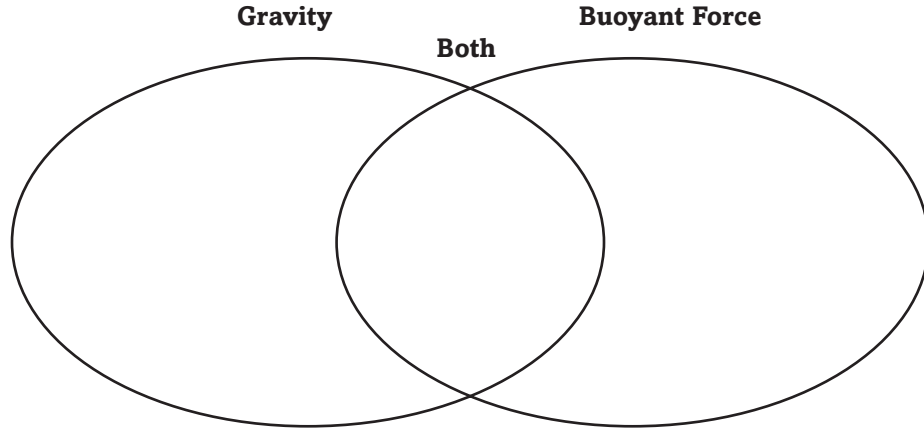
I found this information on page _____.

Changing the Buoyant Force

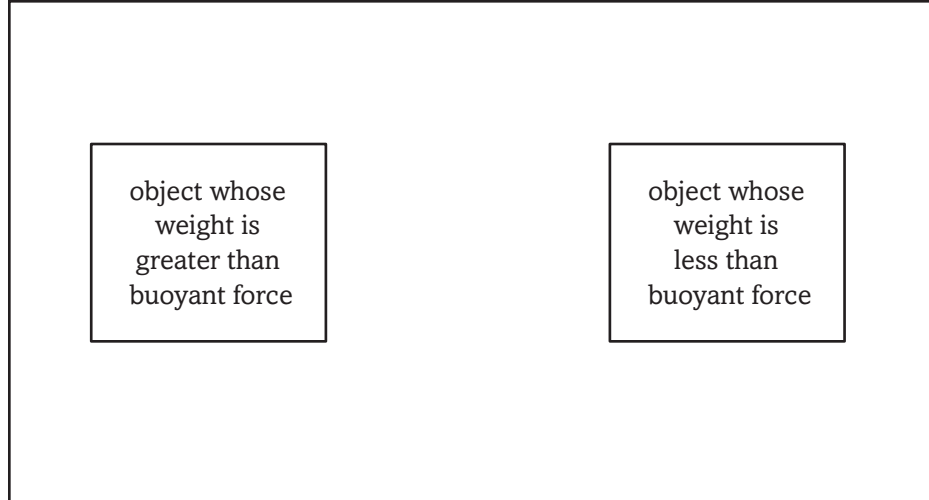
I found this information on page _____.

Details

Compare buoyant force and gravity by completing the Venn diagram with at least three facts.



Model the effects of gravity and the buoyant force by labeling the diagram below with arrows indicating the direction of the buoyant force, gravity, and net forces.



Summarize the relationship between buoyant force and shape.

Section 2 Why do objects float? (continued)

Main Idea

Archimedes' Principle

I found this information on page _____.

I found this information on page _____.

Boats

I found this information on page _____.

Details

Complete the formulas for calculating the mass and the density of a fluid or an object.

To find the mass of a fluid or an object, _____
_____:

$$m = \square \times \square$$

To find the density of a fluid or an object, _____
_____:

$$D = \frac{\square}{\square}$$

Summarize the relationship between the density of an object and its ability to sink or float by completing the chart.

Relationship Between Density and Buoyancy	
If the density of an object is	Then it will
Greater than water	
Less than water	

Model how an aluminum boat will float while a solid aluminum cube of the same mass will sink. Label the two objects in your diagram as denser than water or less dense than water.

CONNECT IT

A dry sponge may float on the surface of the water, but then eventually sink. Explain why this is true.

Forces and Fluids

Section 3 Doing Work with Fluids

Scan the What You'll Learn statements for Section 3 of your book. Identify three topics that will be discussed.

1. _____
2. _____
3. _____

Review Vocabulary

Define work using your book or a dictionary.

work

New Vocabulary

Use your book or a dictionary to define the vocabulary terms.

Pascal's principle

hydraulic system

Bernoulli's principle

Academic Vocabulary

Use a dictionary to define input to show its scientific meaning.

input

Section 3 Doing Work with Fluids (continued)

Main Idea

Using Fluid Forces

I found this information on page _____.

Pascal's Principle and Hydraulic Systems

I found this information on page _____.

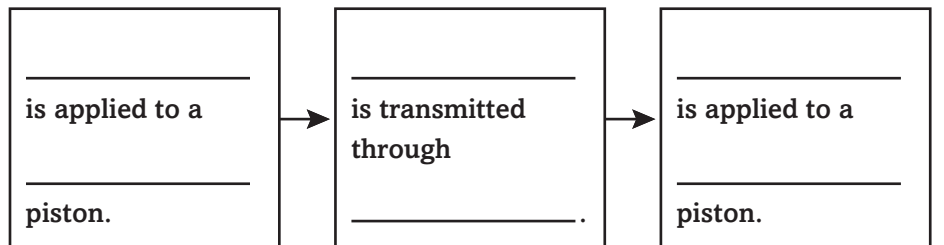
Pressure in a Moving Fluid and Bernoulli's Principle

I found this information on page _____.

Details

Model the way that pushing on a fluid increases the pressure within it. Draw a piston pressing on fluid in a container. Label the piston and the fluid, and use an arrow to indicate the direction of force.

Sequence the steps by which force is increased through a hydraulic system. Then complete the statement.



The _____ the fluid exerts on the large piston is _____.

Summarize how Bernoulli's principle applies to the effects of wind on buildings.

Section 3 Doing Work with Fluids (continued)

Main Idea

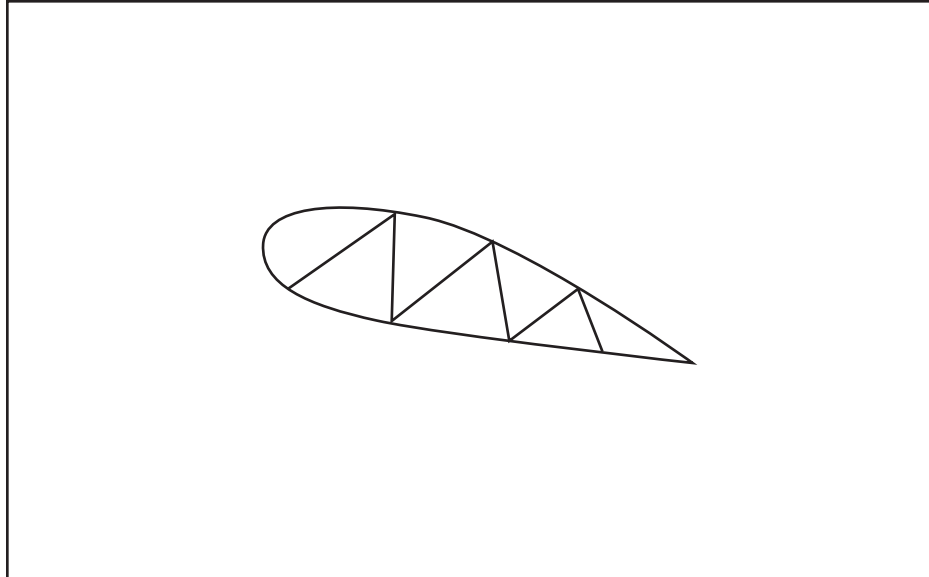
Wings and Flight

I found this information on page _____.

I found this information on page _____.

Details

Complete the diagram to model how the shape of a wing creates lift. Use arrows to indicate the airflow above and below the wing, the action force, and the reaction force.



Organize information about the functions of different shapes of birds' wings by completing the chart.

Birds' Wings		
Type of Bird	Shape of Wing	Function of Wing
Seabirds		Gliding long distances
Forest and field birds		
Swallows, swifts, and falcons		

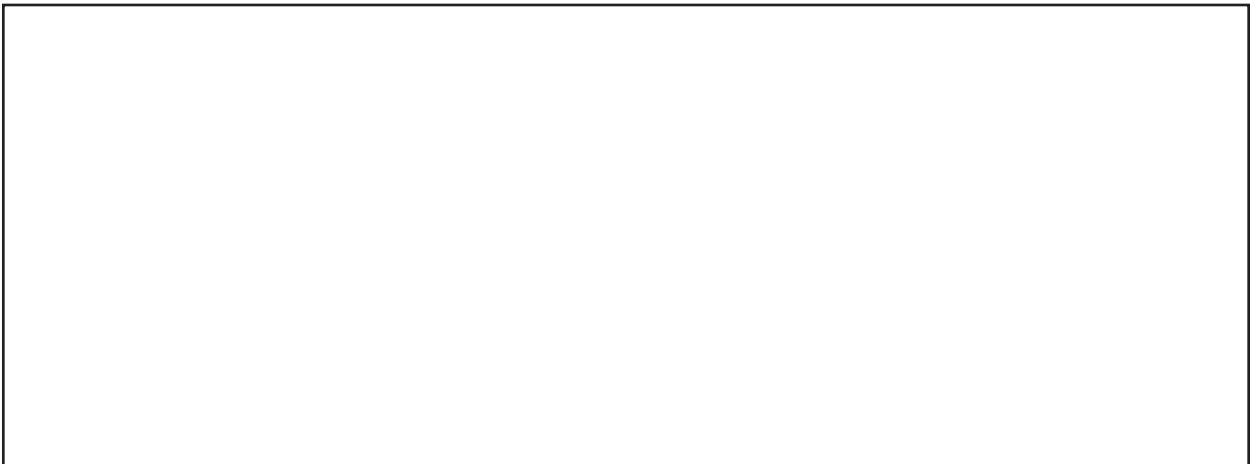
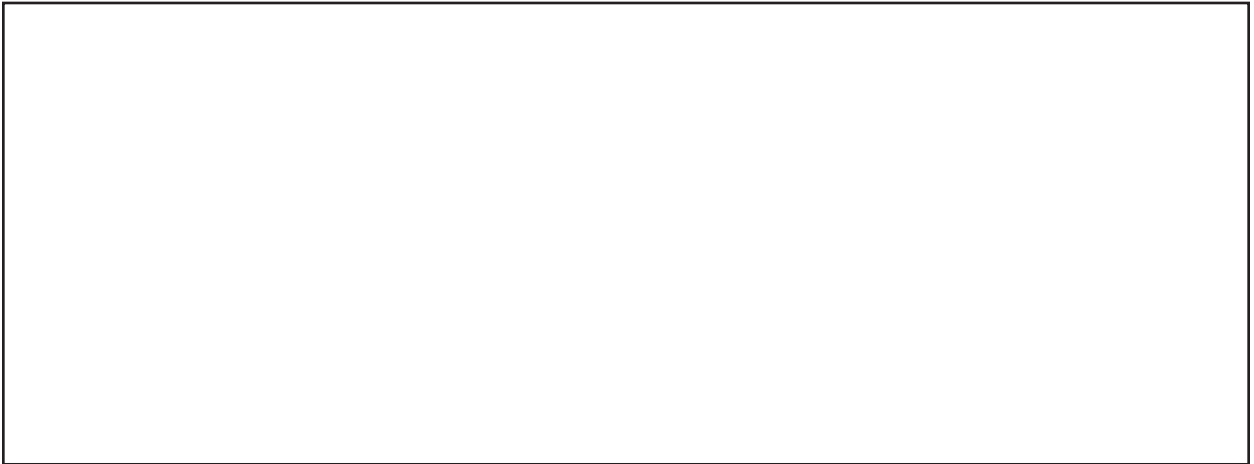
CONNECT IT

Discuss why you think early airplanes were designed with multiple wings.

Tie It Together

Measure It

Apply what you have learned about the shape and function of birds' wings. Sketch and label three airplanes: one designed for "aerobatics" (aerial acrobatics); one for supersonic flight; and an engineless glider.



Forces and Fluids chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

Forces and Fluids	After You Read
• Snowshoes allow you to decrease your pressure on the surface of snow.	
• The buoyant force pushes an object in a fluid downward.	
• A fluid can transmit force.	
• Wind blowing across a roof is at lower pressure than the air inside the house.	

Review

Use this checklist to help you study.

- Review the information you included in your Foldable.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three main ideas from the chapter.

Work and Simple Machines

Before You Read

Preview the chapter and section titles and the section headings. Complete the first two columns of the chart by listing at least two ideas for each section in each column.

K What I know	W What I want to find out



Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Describe three machines you used today and how they made doing a task easier.

Work and Simple Machines

Section 1 Work and Power

Review the objectives for Section 1. Write three questions that come to mind from reading these statements. Look for answers to each question as you read the section.

1. _____

2. _____

3. _____

Review Vocabulary

Define force to show its scientific meaning.

force

New Vocabulary

Use each key term in a scientific sentence.

work

power

Academic Vocabulary

Use a dictionary to define version. Use version in an original sentence to show its scientific meaning.

version

Section 1 Work and Power (continued)

Main Idea

What is work?

I found this information on page _____.

I found this information on page _____.

Details

Summarize what must occur for work to be done.

Model the relationship between an applied force and work by sketching two drawings in the boxes provided. In the top box, show a situation in which work is done. In the bottom box, show a situation in which no work is done.

- Use arrows to show the direction of the applied force and any motion that results.
- Write a caption explaining each illustration.

Work is done.
Caption:

Work is not done.
Caption:

Section 1 Work and Power (continued)

Main Idea

Details

Calculating Work

I found this information on page _____.

Complete the mathematical equation describing how work is calculated. Complete the same equation below it, using the units in which each measurement is recorded. Then write the same equation below that, using the correct symbols.

work = _____ × _____

joules = _____ × _____

_____ = _____

What is power?

I found this information on page _____.

Define the term power. Complete the mathematical equation describing how power is calculated in word and symbol form.

Power is _____.

power = $\frac{\text{_____}}{\text{_____}}$ $P = \frac{\text{_____}}{\text{_____}}$

Identify the unit in which power is measured.

I found this information on page _____.

Summarize the way in which work, energy, and power are related by filling in the blanks below.

When you do _____ on an object, you _____ the energy of that object. Energy is _____ from yourself to _____. Power is equal to the amount of _____ transferred over a certain _____.

CONNECT IT

Consider an active sport. Describe the work that is done by people as they play the sport.

Work and Simple Machines

Section 2 Using Machines

Predict three things that might be discussed in Section 2 after reading the headings in this section.

1. _____

2. _____

3. _____

Review Vocabulary

Define friction to show its scientific meaning.

friction

New Vocabulary

Write the correct vocabulary word next to each definition.

output work divided by input work

force exerted on a machine

number of times that a machine increases the input force; equal to the output force divided by the input force

force exerted by a machine

Academic Vocabulary

Use a dictionary to define device to show its scientific meaning.

device

Section 2 Using Machines (continued)

Main Idea

Details

What is a machine? and Mechanical Advantage

I found this information on page _____.

Organize information by listing the three ways a machine can make work easier.

A machine makes work easier by changing

1. _____.
2. _____.
3. _____.

Summarize mechanical advantage. Then write the formula for calculating it.

Mechanical advantage is _____.

The equation for calculating mechanical advantage is

mechanical advantage = _____

I found this information on page _____.

Analyze the diagrams in your book that show the three ways machines make work easier. Complete the chart by describing the effect of the machine on the output force.

What Machine Does	How Force Is Changed
Increases force	
Increases distance	
Changes direction of force	

Section 2 Using Machines (continued)

Main Idea

Efficiency

I found this information on page _____.

I found this information on page _____.

I found this information on page _____.

Details

Summarize the relationship between efficiency and friction by completing the paragraph.

The _____ of a machine is the ratio of the _____ work to the _____ work. _____ is a force that _____ the motion of one object sliding over another. This _____ a machine's _____.

Complete the mathematical equation that describes how efficiency is calculated.

efficiency (in percent) = $\frac{\text{_____}}{\text{_____}} \times 100\%$

Model how oil reduces the friction between two surfaces. Sketch a cross-section view of two horizontal surfaces sliding past each other. Indicate contact points on the upper and lower surfaces and a layer of oil between them.



CONNECT IT

Think of some machines that you use. List the machines and the parts that may be affected by friction.

Work and Simple Machines

Section 3 Simple Machines

Scan Use the checklist below to preview Section 3 of your book.

- Read all section titles.
- Read all bold words.
- Read all charts and graphs.
- Look at all the pictures, and read their captions.
- Think about what you already know about machines.

Write two facts you discovered about simple machines.

1. _____
2. _____

Review Vocabulary

compound

Define the term *compound* to show its scientific meaning.

New Vocabulary

Write the correct vocabulary word next to each definition.

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

- a grooved wheel with a rope or cable wrapped around the groove
- machine that does work only with one movement
- an inclined plane that moves
- a flat, sloped surface, or ramp
- an inclined plane wrapped around a cylinder or post
- machine made up of two or more simple machines
- two circular objects of different sizes that rotate together
- a rigid rod or plank that pivots about a point called the fulcrum

Academic Vocabulary

section

Define section. Use section in an original sentence to show its scientific meaning.

Section 3 Simple Machines (continued)

Main Idea

What is a simple machine?

I found this information on page _____.

Inclined Plane

I found this information on page _____.

Lever

I found this information on page _____.

Details

Contrast simple *and* compound machines by completing the chart.

	Simple Machine	Compound Machine
Description		
Examples		

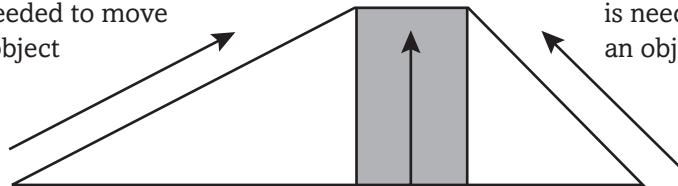
Compare how the amount of force needed to move an object changes with the length of the inclined plane. Complete the phrases below with less, more, and the most.

Longer Inclined Plane:

_____ force is needed to move an object

Shorter Inclined Plane:

_____ force is needed to move an object



Lifting Without an Inclined Plane:

_____ force is needed to move the object

Model how changing the location of a fulcrum in a lever affects its mechanical advantage. Draw two levers of the same length but with fulcrums at different points.

- Label the input force, output force, and fulcrum in your drawings as well as the distances between the fulcrum and each force.
- Show a calculation of the mechanical advantage of each.

Section 3 Simple Machines (continued)

Main Idea

Details

Wheel and Axle

I found this information on page _____.

Pulley

I found this information on page _____.

Analyze the wheel and axle by filling in the blanks below.

If the input force is applied to the axle, the mechanical advantage is _____ one. If the input force is applied to the wheel, the mechanical advantage is almost always _____ one.

Classify the three types of pulleys by completing the chart.

Pulleys		
Type of pulley	Effect on force	Mechanical advantage
Fixed pulley		
Movable pulley		
Pulley system		

CONNECT IT

Analyze what types of wheel and axles are on a bicycle. List and describe them in terms of their mechanical advantage.

Work and Simple Machines

Chapter Wrap-Up

Review the ideas you listed in the chart at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the chart by filling in the third column. How do your ideas about what you know now compare with those you provided at the beginning of the chapter?

K What I know	W What I want to find out	L What I learned

Review

Use this checklist to help you study.

- Review the information you included in your Foldable.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three things that you have learned about work and simple machines.

Energy and Energy Resources

Before You Read

Preview the chapter title, the section titles, and the section headings. List at least two ideas for each section in each column.

K What I know	W What I want to find out



Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Choose three devices that use electricity and identify the function of each device.

Energy and Energy Resources

Section 1 What is energy?

Analyze the objectives for Section 1. Write three questions you have. Look for responses to each question as you read the section.

1. _____

2. _____

3. _____

Review Vocabulary

mass

Define mass to show its scientific meaning.

New Vocabulary

Read each definition below. Write the correct vocabulary term on the blank in the left column.

- _____
- _____
- _____
- _____
- _____
- _____
- _____

energy in the nucleus of an atom

ability to cause change

energy stored in chemical bonds

energy that an object has as a result of its motion

current that comes out of batteries and wall sockets

energy that increases with temperature

energy that is stored because of an object's position

energy carried by light

Academic Vocabulary

enormous

Use a dictionary to define enormous.

Section 1 What is energy? (continued)

Main Idea

The Nature of Energy

I found this information on page _____.

Energy of Motion

I found this information on page _____.

Energy of Position

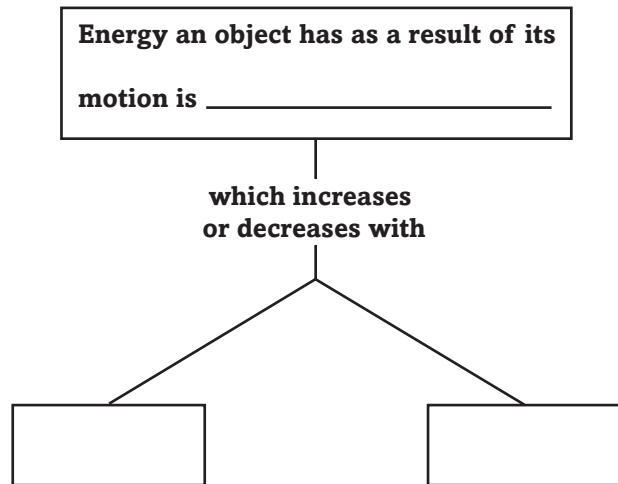
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Details

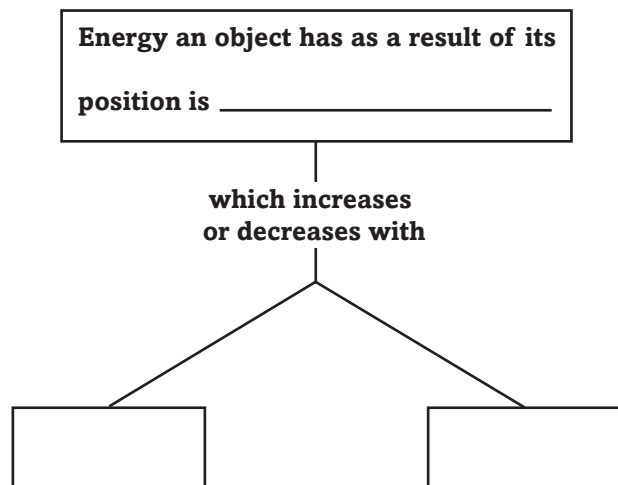
Create a list of three examples of how energy causes changes that you observe in your classroom.

1. _____
2. _____
3. _____

Complete the graphic organizer by using information from your book to describe energy of motion.



Complete the graphic organizer by using information from your book to describe energy of position.



Section 1 What is energy? (continued)

Main Idea

Details

Forms of Energy

I found this information on page _____.

Synthesize your knowledge of each form of energy by providing examples of them.

Form of Energy	Example
Thermal	
Chemical	
Radiant	
Electrical	
Nuclear	

CONNECT IT

Choose any three forms of energy discussed in this lesson.

Explain how each form of energy is important in your daily life.

Energy and Energy Resources

Section 2 Energy Transformations

Preview *Section 2 of your book using the checklist.*

- Read all section headings.
- Read all bold words.
- Look at all of the pictures and read their labels.
- Think about what you already know about how energy changes form.

Write three facts you discovered about energy transformations as you scanned the section.

1. _____
2. _____
3. _____

Review Vocabulary

transformation

Define *the vocabulary terms using your book.*

New Vocabulary

law of conservation of energy

generator

turbine

Academic Vocabulary

convert

Use a dictionary to define *convert.*

Section 2 Energy Transformations (continued)

Main Idea

The Law of Conservation of Energy

I found this information on page _____.

Changing Kinetic and Potential Energy

I found this information on page _____.

Energy Changes Form

I found this information on page _____.

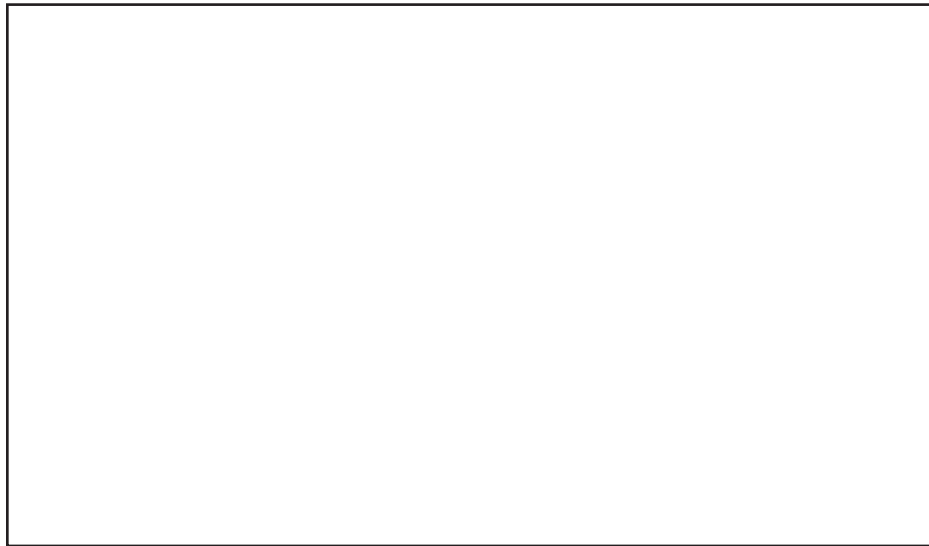
Details

State *the* law of conservation of energy.

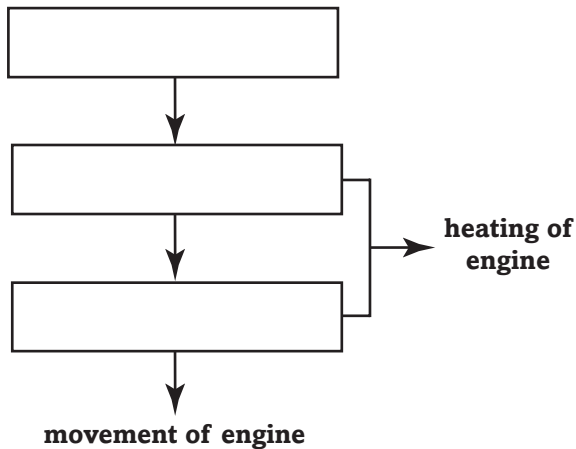
The law of conservation of energy states that _____

Model *the* potential *and* kinetic energy transformations *that* take place as a person tosses a ball into the air and then catches it.

- Label the points at which the ball has the greatest potential energy and the greatest kinetic energy.



Analyze *the* energy flow in a gasoline-powered engine and complete the diagram below.



Section 2 Energy Transformations (continued)

Main Idea

Generating Electrical Energy

I found this information on page _____.

Details

Compare and contrast energy transformations that occur when electrical energy is generated in coal power plants with energy transformations that occur when energy is used to help you hear. Sequence steps in each process side-by-side.

Coal Power Plants	Energy in Hearing

Contrast a turbine with a generator.

Turbine	
Generator	

SYNTHESIZE IT

Identify some points in the energy flow through a power plant that might produce unwanted forms of energy and make the plant less efficient.

Energy and Energy Resources

Section 3 Sources of Energy

Predict what you will learn in this section. Read the title. Then write two topics that might be discussed.

1. _____
2. _____

Review Vocabulary

Write a sentence using the word *resource* that shows its scientific meaning.

resource

New Vocabulary

Define the key terms using your book or a dictionary.

nonrenewable resource

renewable resource

alternative resource

inexhaustible resource

photovoltaic

Academic Vocabulary

Use a dictionary to define *percent*.

percent

Section 3 Sources of Energy (continued)

Main Idea

Energy Resources

I found this information on page _____.

Fossil Fuels, Nuclear Energy, and Hydroelectricity

I found this information on page _____.

Details

Identify two types of energy from the natural world that Earth's surface receives.

1. _____

2. _____

Compare energy resources by completing the table.

Energy Resources			
	Fossil Fuels	Nuclear	Hydroelectric
Source of energy			
Renewable			
Advantages			
Disadvantages			

Section 3 Sources of Energy (continued)

Main Idea

Alternative Sources of Energy

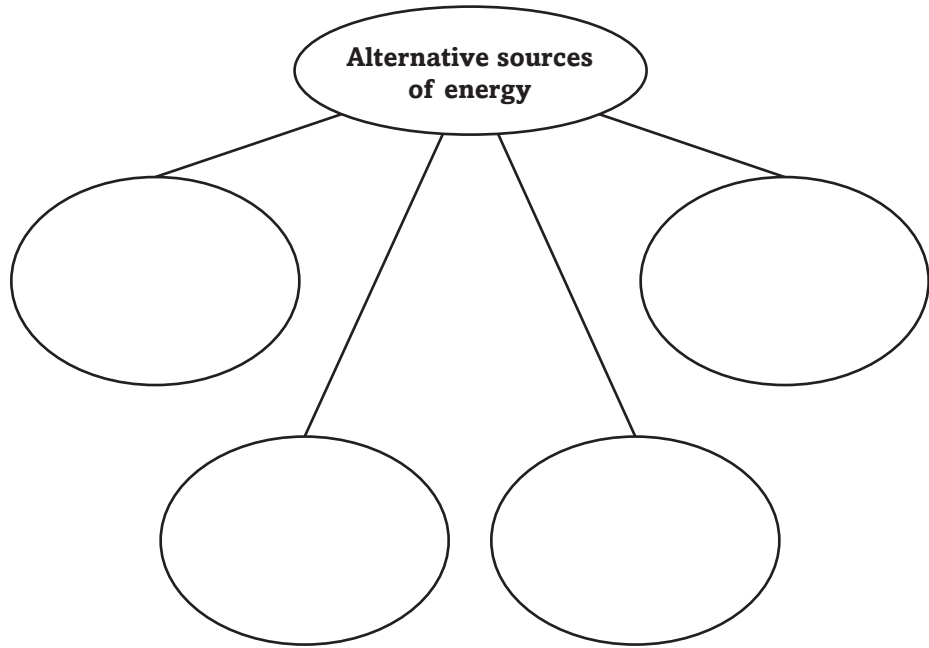
I found this information on page _____.

Conserving Energy

I found this information on page _____.

Details

Complete the concept map by listing four alternative sources of energy.



Identify two reasons to conserve fossil fuels.

- 1. _____

- 2. _____

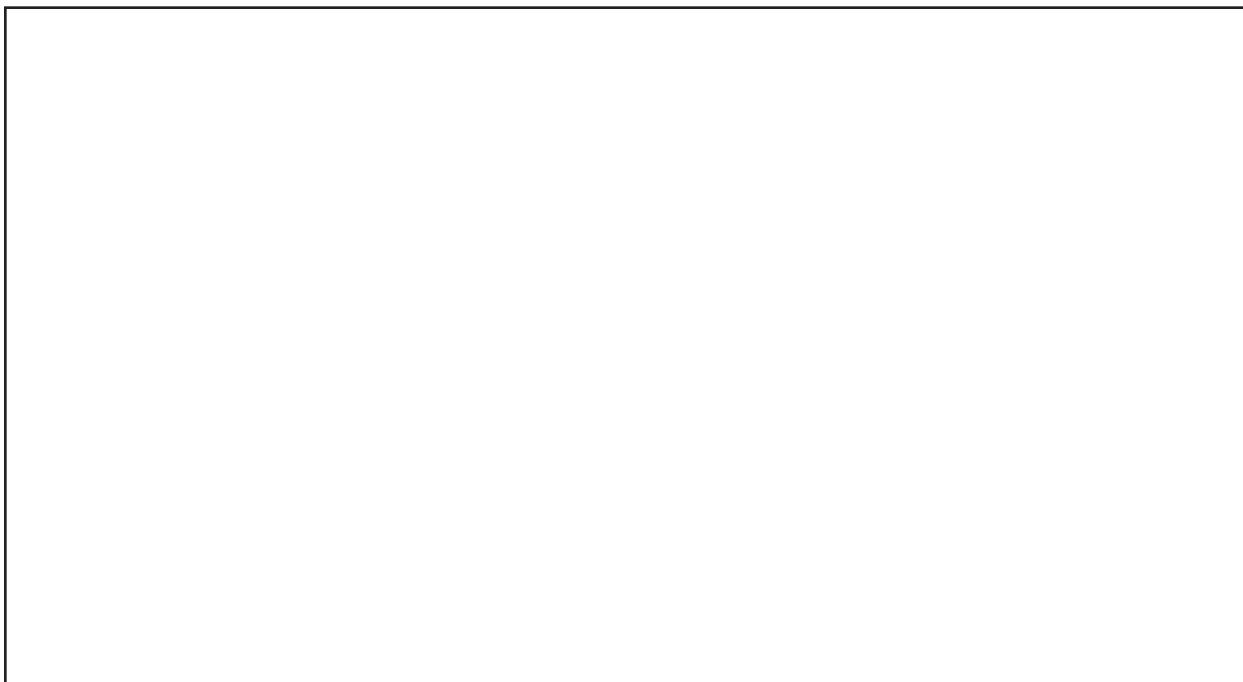
CONNECT IT

List three specific things you can do to conserve fossil fuels.

Tie It All Together

Energy and Energy Resources

Make a concept map that includes all of the ways energy can be generated that are mentioned in this chapter.



Now imagine you are an energy expert on a planning council for a new town to be built on an island. Evaluate resources and/or methods you will suggest that the new town use. Justify your choices and provide possible challenges to the project.

Energy and Energy Resources

Chapter Wrap-Up

Review the ideas that you listed in the chart at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the chart by filling in the third column.

K What I know	W What I want to find out	L What I learned

Review

Use this checklist to help you study.

- Review the information you included in your Foldable.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

Summarize three main points of the chapter in a paragraph or by using a concept map.

Thermal Energy

Before You Read

Think about the term thermal energy. List as many words as you can think of that use therm- as part of their root word.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____



Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Describe five things that you do to make yourself feel warmer or cooler.

Thermal Energy

Section 1 Temperature and Thermal Energy

Skim through Section 1 of your text. Write three topics that might be discussed in this section.

1. _____
2. _____
3. _____

Review Vocabulary

Define the following key terms using your book or a dictionary.

kinetic energy

New Vocabulary

temperature

thermal energy

Academic Vocabulary

random

What is temperature?

I found this information on page _____.

Complete the statements about temperature.

Molecules are always _____. Energy of motion is called _____. Molecules have more _____ when they are moving _____. Temperature is _____.

Section 1 Temperature and Thermal Energy (continued)

Main Idea

What is Temperature?

I found this information on page _____.

Measuring Temperature

I found this information on page _____.

I found this information on page _____.

Details

Sequence *the steps to show how temperature changes cause most objects to expand or contract. The first step has been done for you.*

Object Is Heated	Object Is Cooled
___ molecules move apart	___ molecules move closer together
___ molecules moves faster	___ molecules moves slower
<u>1</u> object becomes warmer	<u>1</u> object becomes cooler
___ object expands	___ object shrinks, or contracts

Compare *the three temperature scales in the chart below.*

Characteristics of Each Scale	Fahrenheit	Celsius	Kelvin
Temperature at which water freezes			
Temperature at which water boils			
Number of degrees between water's freezing and boiling points			

Organize *the formulas from your book into the conversion chart.*

	Fahrenheit to Celsius	Celsius to Fahrenheit	Celsius to Kelvin
Formula			
Break it down			

COMPARE IT

Knowing that metals expand when heated, explain how you can apply this knowledge to a metal jar lid that is screwed on too tightly.

Section 1 Temperature and Thermal Energy (continued)

Main Idea

Thermal Energy

I found this information on page _____.

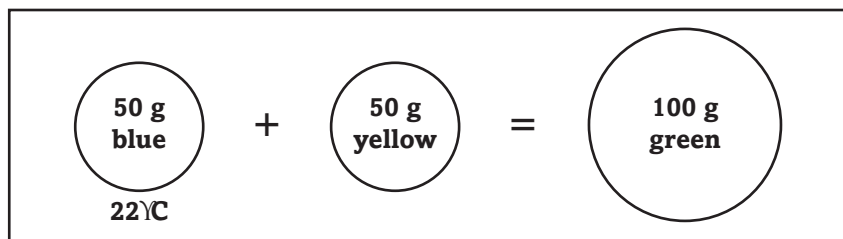
I found this information on page _____.

Details

Compare *the potential energy of molecules with the potential energy of a ball. Complete the statements that have been started for you.*

Potential Energy Statements	Ball Analogy Statement
1. molecules in a material exert attractive forces on each other	Gravity exerts an _____ _____
2. molecules in a material have potential energy	A ball _____ has potential energy.
3. as molecules move closer together or farther apart, potential energy changes	As a ball moves closer to or farther from Earth's surface, _____

Synthesize *Suppose you have two balls of colored dough, each at 22°C. One ball is blue, the other is yellow. When the two balls are mixed together, their total mass is 100g of green dough. Mark the statements that are true about this thermal energy analogy. Correct any false statements so they become true.*



- _____ The mass of the green dough is twice the mass of the blue dough.
- _____ The mass of the green dough is equal to the sum of the mass of the yellow and the blue dough.
- _____ The thermal energy of the green dough is equal to twice the sum of thermal energy of the yellow and the blue dough.

Thermal Energy

Section 2 Heat

Skim through Section 2 of your text. Write three facts you discovered about heat.

1. _____

2. _____

3. _____

Review Vocabulary

Use the term *electromagnetic wave* in a scientific sentence.

electromagnetic wave

New Vocabulary

Write the correct vocabulary word next to each definition.

transfer of thermal energy by the movement of particles in a gas or liquid

transfer of thermal energy by direct contact by collisions between particles

thermal energy that is transferred from a substance at higher temperature to a substance at a lower temperature

material that transfers heat easily

amount of heat needed to raise the temperature of 1 kg of a substance by 1°C

transfer of energy by electromagnetic waves

Academic Vocabulary

Define *occur* using a dictionary.

occur

Section 2 Heat (continued)

Main Idea

Heat and Thermal Energy

I found this information on page _____.

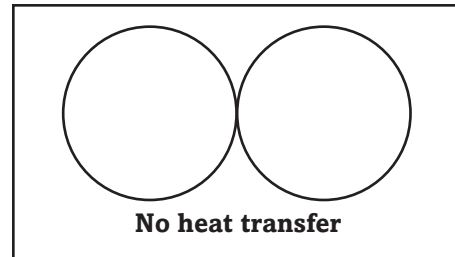
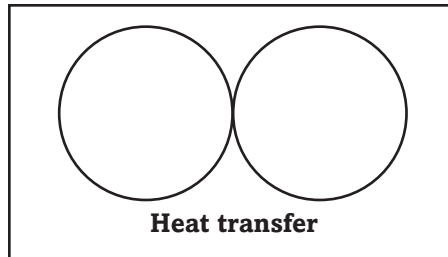
**Conduction
Radiation
Convection**

I found this information on page _____.

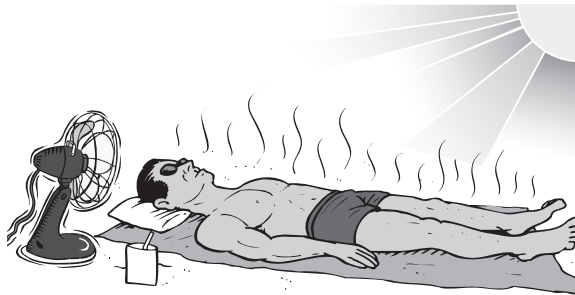
Details

Label the two drawings to illustrate the statement: *Heat is transferred when objects that differ in temperature are brought into contact.*

- Label the temperature of each object
- Draw an arrow showing the direction of heat transfer.



Analyze the drawing below to help classify each type of energy transfer as conduction, convection, or radiation.



The Sun's rays heat the sand particles by _____.

Body heat transferred to the air by _____.

Cool air pushes in to replace warm, air flow by natural _____.

Heat transferred from sand to towel to body by _____.

Heat from the Sun warms iced tea by _____.

Fan pushes air molecules by forced _____.

Warmer molecules move more quickly, transferring heat throughout the iced tea by _____.

Section 2 Heat (continued)

Main Idea

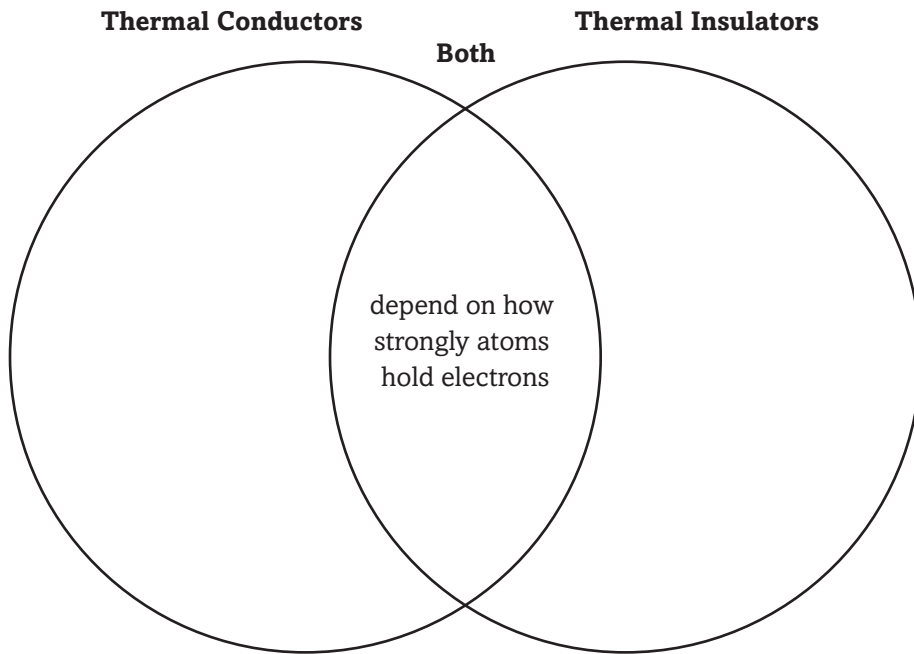
Thermal Conductors and Thermal Insulators

I found this information on page _____.

Details

Compare and contrast thermal conductors *and* thermal insulators *by writing the words and phrases in the Venn diagram.*

- does not conduct heat easily
- conducts heat easily
- gold and copper
- air
- material contains some loosely held electrons
- materials do not contain loosely held electrons



CONNECT IT

Analyze sources of thermal pollution and their effects on organisms and the environment. Design a possible plan to reduce thermal pollution.

Thermal Energy

Section 3 Engines and Refrigerators

Read the What You'll Learn objectives of Section 3. Write four questions that come to mind from reading these statements.

1. _____

2. _____

3. _____

4. _____

Review Vocabulary

Define the terms using your book or a dictionary.

work

New Vocabulary

heat engine

internal combustion engine

Academic Vocabulary

Use a dictionary to define *internal* in its scientific sense.

internal

Section 3 Engines and Refrigerators (continued)

Main Idea

Heat Engines

I found this information on page _____.

I found this information on page _____.

Details

Identify the six different forms of energy and give an example of each.

Types of Energy	

Sequence the steps of a four-stroke cycle engine in the chart.

Steps in the Four-Stroke Cycle	
Intake stroke	The piston moves downward.
Compression stroke	
Power stroke	
Exhaust stroke	

Section 3 Engines and Refrigerators (continued)

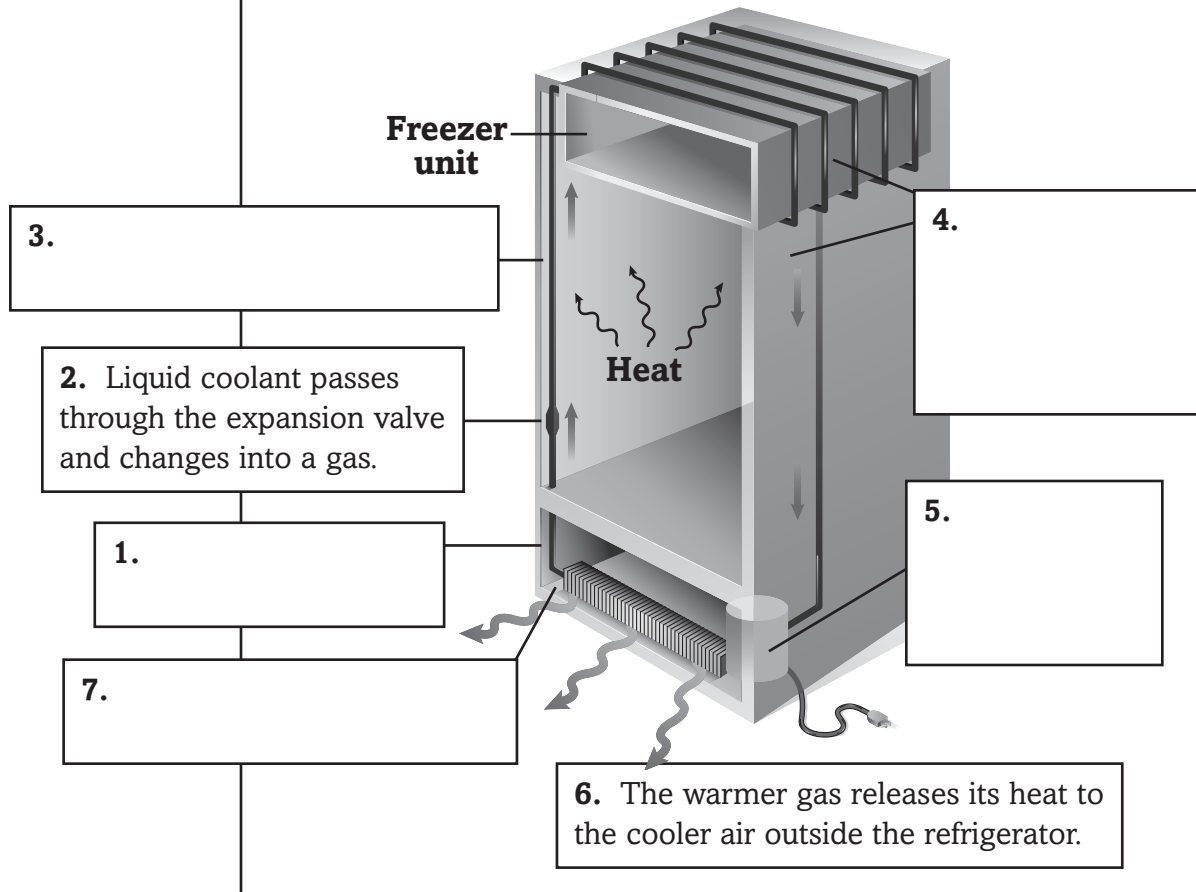
Main Idea

Refrigerators

I found this information on page _____.

Details

Sequence steps to show how a refrigerator stays cold inside. Explain what happens as coolant moves through a refrigerator by writing what occurs at each location.



SYNTHESIZE IT

Analyze and discuss why the statement “An air conditioned building is like stepping into a giant refrigerator!” is true.

Tie It Together

Synthesize

Suppose that you are a television weather forecaster. As a part of your job, you have been asked to help educate people about science. On the lines below, plan a weather forecast for your region. After you have finished planning, present your forecast to the class. Explain as many of the following terms as possible during your forecast.

temperature Fahrenheit scale Celsius scale radiation convection conduction

Tomorrow's Weather Forecast

Date: _____ **Location:** _____

Forecast: _____

Notes about terms: _____

Thermal Energy Chapter Wrap-Up

After You Read

Examine the list of terms that include the root therm- that you wrote at the beginning of this chapter. Write in the space below what you think therm- means.

Review

Use this checklist to help you study.

- Review the information you included in your Foldable.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three things that you have learned about the movement of molecules.
