Name _____ Date _____

Work and Energy

Section 1 Work and Machines

CHAPTER 4 DRW

Skim *Section 1 of your text. Write three questions that come to mind from reading the headings and the illustration captions.*

1. _____
2. _____
3. _____

Review Vocabulary

Define *the word* force.

force _____

New Vocabulary

Use your book or a dictionary to define these terms.

work _____

machine _____

simple machine _____

compound machine _____

efficiency _____

mechanical advantage _____

Academic Vocabulary

Look up the words per and cent in a dictionory.

percent _____

Name _____ Date _____

Section 1 Work and Machines (continued)

Main Idea | **Details**

What is work?

I found this information on page _____.

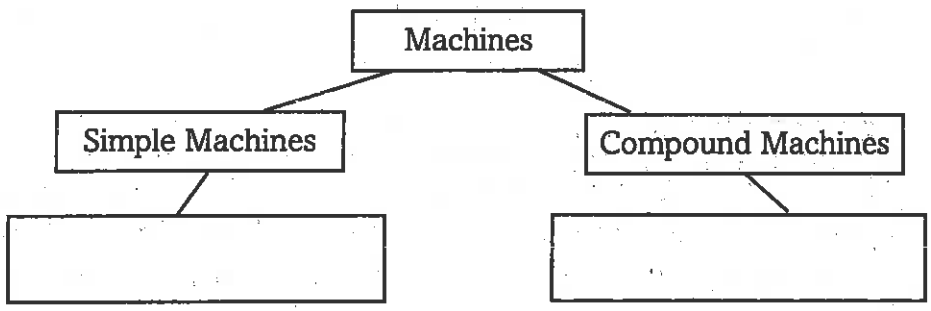
Create *three sketches showing the following situations involving work.*

A force is doing work.	A force is not doing work, because there is no motion.	A force is not doing work, because the force does not point to the direction of motion.

What is a machine?

I found this information on page _____.

Complete *the concept map relating simple and compound machines.*



Sketch *a nail and a screw.* **Explain which one uses less force and why.**

Name _____ Date _____

Section 1 Work and Machines (continued)

Main Idea

Efficiency

I found this information on page _____.

Details

Evaluate the efficiency of two identical-looking conveyor belts. Belt A can move a 10 newton weight one meter in 3 seconds. Belt B can move a 10 newton weight 2 meters in 3 seconds. (one joule = 1 newton meter) The input work for both belts is 20 joules. Fill in the missing numbers below.

What do you know?

Belt	A	Belt B
Weight (newtons)		
Distance (meters)	1	
Time (seconds)	3	3
Joules = Newton/meter	10 Nm	6 Nm
Joules		
Input work (W_{in})	20 J	20 J
Output work (W_{out})		
Efficiency (%) = $W_{out} \div W_{in} \times 100$		

CONNECT IT

A child sits at the top of a slide at a playground. He wiggles forward slightly, and then slides all the way down with no further effort. Explain the source of the force acting on the child, and how you would calculate the work being done.

Name _____ Date _____

Work and Energy

Section 2 Describing Energy

Scan *Section 2 to find at least four forms of energy.*

_____

_____

Review Vocabulary

Define work *to show its scientific meaning.*

work _____

New Vocabulary

Read the definitions below. Then write the key term for each one in the left column.

_____ the ability to do work

_____ anything that you can imagine a boundary being around

_____ energy a moving object has because of its motion

_____ energy stored in an object

_____ energy stored by thing that stretch or shrink

_____ energy stored in chemical bonds

_____ energy stored in objects because of their position above Earth's surface

Academic Vocabulary

Use a dictionary to define analogy.

analogy _____

_____

Name _____ Date _____

Section 2 Describing Energy (continued)

Main Idea

Details

Change Requires Energy

I found this information on page _____.

Identify *at least eight familiar items that consume energy. Group items by the form of energy they use.*

Kinetic	Potential

Create *an analogy to show how energy is like water.*

_____

_____

_____

_____

Kinetic Energy

I found this information on page _____.

Complete *the formula for the kinetic energy equation of a moving object. Use* mass (kg), speed (m/s), *and* kinetic energy (joules) *in your equation.*

word equation:

_____ = $\left(\frac{1}{2}\right)$ _____ × [_____]^2

symbol equation:

Name _____ Date _____

Section 2 Describing Energy (continued)

Main Idea

Potential Energy

I found this information on page _____.

Details

Analyze *the types of* potential energy *being used by an athlete competing in each of these athletic events.*

archery

_____

sprinting

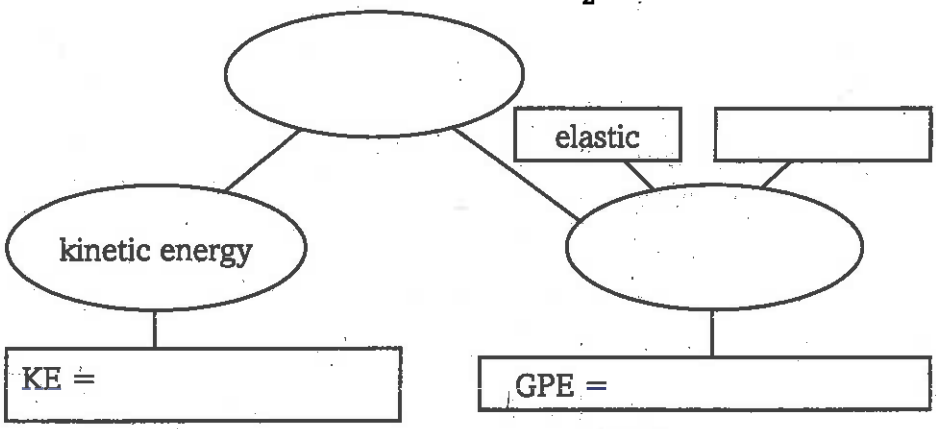
_____

platform diving

_____

Complete *the concept map by entering each term or phrase in the appropriate location.*

- chemical
- energy
- gravitational
- mgh
- potential energy
- $\frac{1}{2}$ mass × velocity^2



ANALYZE IT

Make an analogy comparing energy and money.

Name _____ Date _____

Work and Energy

Section 3 Conservation of Energy

Predict *three things that be discussed in this section. Read the section title to help you make your predictions.*

1. _____
2. _____
3. _____

Review Vocabulary

Define friction *in a sentence that shows its scientific meaning.*

friction _____

_____

New Vocabulary

Use your book to define the following key terms.

mechanical energy _____

_____

law of conservation of energy _____

_____

power _____

_____

Academic Vocabulary

Find convert *in a dictionary. Then use it as a verb in a scientific sentence.*

convert _____

_____

Name _____ Date _____

Section 3 Conservation of Energy (continued)

Main Idea	Details
The Law of Conservation of Energy *I found this information on page _____.*	**Predict** *the energy transformations when a fast-moving roller coaster finishes its ride and comes to a stop. Give three possibilities.* 1. _____ 2. _____ 3. _____
Energy Transformations *I found this information on page _____.*	**Create** *a drawing of an apple falling from a tree. Label where:* • kinetic energy is low and gravitational potential energy is high • kinetic energy is high and gravitational potential energy is low • kinetic energy is about equal to gravitational potential energy
The Effect of Friction *I found this information on page _____.*	**Create** *two examples of changes that might be brought about by thermal energy produced through friction when two materials rub together. Remember, energy is defined as the ability to cause change.*

Name _____ Date _____

Section 3 Conservation of Energy (continued)

Main Idea

Mechanical Energy Transformations

I found this information on page _____.

Details

Compare and contrast mechanical energy of a projectile with mechanical energy of a swing.

Alike	Different

Power–how fast energy changes

I found this information on page _____.

Analyze How do work and Power compare?

Work is the force applied to an object over a distance.

You can write that as a formula:Work (W) = force (f) × distance (d)

Or W = f × d

Forces are measured in Newtons (N), and distance is measured in meters (m).

A Newton meter is called a Joule (j).

Power is the rate at which energy is converted.

The formula is P = E ÷ t, where P = power in watts (W), E = energy in joules, and t = time in seconds.

Explain how energy (E) is related to work (W).

_____

_____

_____

_____

CONNECT IT

Describe an experience where it would have been helpful for you or someone you know to understand how energy can change form.

_____

_____

_____