Important Concepts . . .

Preview Review

Science

Grade 9

W1 - Lesson 3A: Energy Consumption

W1 - Lesson 3B: The Distribution of Matter in Space

V5-07

Important Concepts of Grade 9 Science

W1 - Lesson 1 .... Electrical Principles
W1 - Lesson 2 .... Electrical Circuits
W1 - Lesson 3A .... Energy Consumption
W1 - Lesson 3B .... The Distribution of Matter in Space
W1 - Lesson 4 .... Objects in Space
W1 - Lesson 5 .... Optical and Radio Telescopes
W1- Quiz
W2 - Lesson 1 .... Physical and Chemical Properties of Materials
W2 - Lesson 2 .... Chemical Reactions
W2 - Lesson 3 .... Using the Periodic Table
W2 - Lesson 4 .... Naming Chemical Compunds
W2 - Lesson 5 .... Writing Chemical Equations
W2 - Quiz
W3 - Lesson 1 .... Variation
W3 - Lesson 2 .... Reproduction and Patterns of Inheritance
W3 - Lesson 3A .... Genes and Cell Division
W3 - Lesson 3B .... Organisms and Matter in their Environment
W3 - Lesson 4 .... Biological and Chemical Monitoring/Acids and Bases
W3 - Lesson 5 .... Transfer of Materials through the Air, Ground, and Water/Biological Impacts of Hazardous Chemicals
W3 - Quiz

Materials Required

Textbook:
Science in Action 9

Science Grade 9
Version 5
Preview/Review W1 - Lesson 3

Publisher: Alberta Distance Learning Centre
Author: Nicole Bondarchuk
In-House Reviewer: Barb Philips

Project Coordinator: Dennis McCarthy
Preview/Review Publishing Coordinating Team: Nina Johnson, Laura Renkema, and Donna Silgard

The Alberta Distance Learning Centre has an Internet site that you may find useful. The address is as follows: **http://www.adlc.ca**

The use of the Internet is optional. Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

Preview/Review Concepts
for
Grade Nine Science

W1 - Lesson 3A:
Energy Consumption

OUTLINE

By the end of this lesson, you should

- know the definition of power and be able to calculate it using current and voltage
- know the definition of energy and be able to calculate it using power and time

GLOSSARY

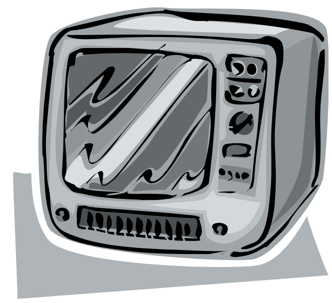
kilowatt hour - commonly used unit of electrical energy equal to the power consumption of 1000 W for one hour

power - rate at which a device converts energy

W1 - Lesson 3A: Energy Consumption

Do you get in trouble when you leave the lights or television on in a room that is not in use? It probably has something to do with the **cost** of electricity. This lesson is about how electricity is measured.

Energy Usage



To operate your favorite video game, you need power. **Power** is defined as the rate at which a device converts energy. A unit of power is a **watt**, which is the same as a **joule / second**. Every appliance in your house has a power rating (how fast an appliance uses **power**). Many new appliances are more **efficient** in the amount of power they use.

The amount of power a device uses is calculated mathematically using a formula:

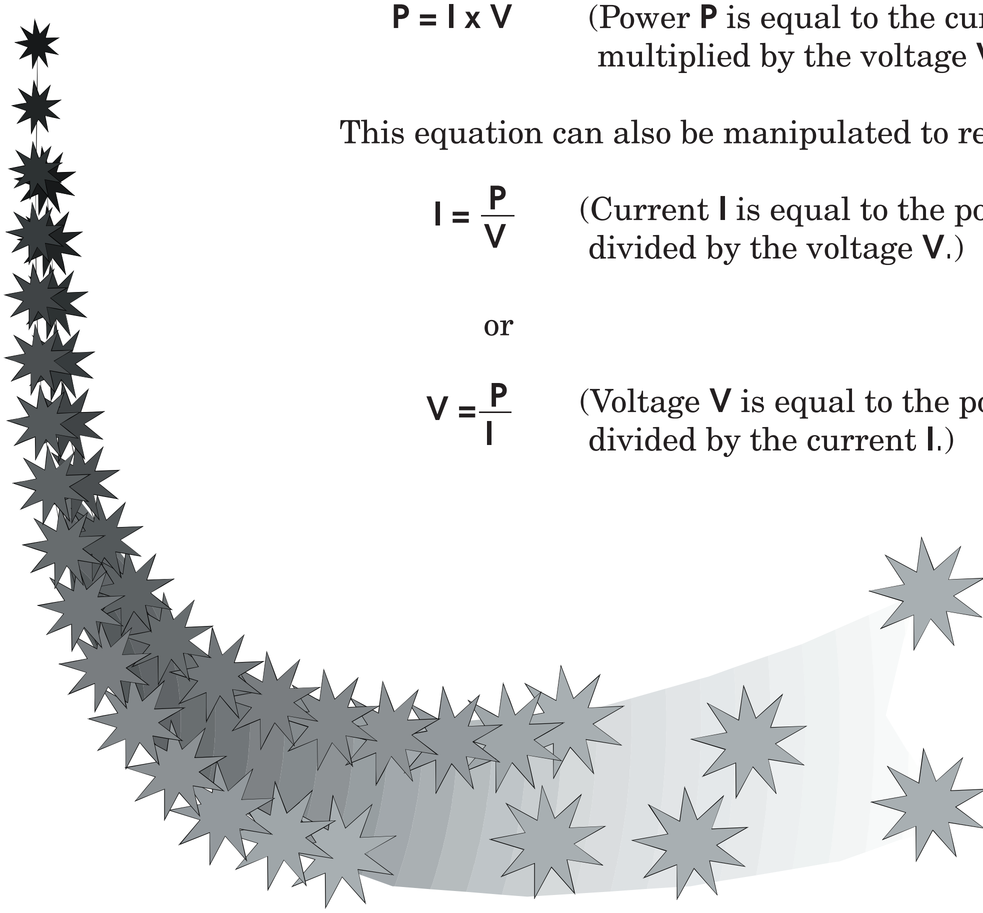
$P = I \times V$ (Power **P** is equal to the current **I** multiplied by the voltage **V**.)

This equation can also be manipulated to read

$I = \frac{P}{V}$ (Current **I** is equal to the power **P** divided by the voltage **V**.)

or

$V = \frac{P}{I}$ (Voltage **V** is equal to the power **P** divided by the current **I**.)



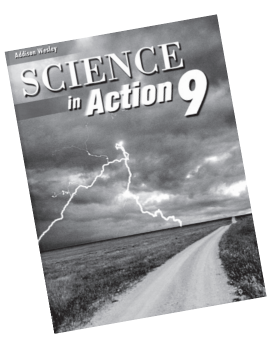
Here is a sample problem:

A refrigerator has 6.5 amps of current flowing to it and requires 115 volts to operate. How much power does the fridge require?

Problem Solving Steps:

Step 1	**Identify the variables.**	I = 6.5 amps V = 115 volts P = ?
Step 2	**Identify the equation and substitute in your numbers** (including units).	P = I x V P = 6.5 amps x 115 volts
Step 3	**Solve the problem.**	P = 747.5 watts

Read page 332 of *Science in Action 9*.



1. Your bedside lamp has a 60 watt light bulb. If it is plugged into a 120 volt socket, what is the current flowing through the light bulb?

2. A dryer requires a 120 volt wall socket to supply its power. If the current flowing through it is 8 amps, what is its power rating?

The second calculation you need to complete is how to determine energy. **Energy** is the ability to do work. A unit of energy is a **joule**. To determine how much **energy** an appliance (such as a stereo) uses, the power rating of the appliance we are looking at must be calculated.

Here is the mathematical calculation for energy.

E = P x t (Energy is equal to the amount of power used **P** multiplied by time used **t** in seconds.)

Here is a sample problem:

A television has a power rating of 100 watts. If the TV is on for 2 hours, how much energy (in joules) is being used?

Problem Solving Steps:

Step 1 **Identify the variables.**

P = 100 wats
t = 2 hours (must convert to **seconds**)
E = ?

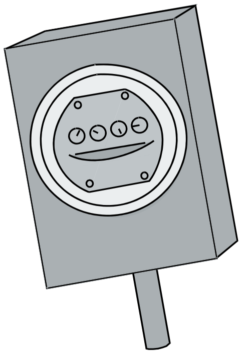
$$t = 2 \text{ hours} \times \frac{3600 \text{ sec}}{1 \text{ hour}} = 7200 \text{ seconds}$$

Step 2 **Identify the equation and substitute your numbers** (including units).

E = P x t
E = 100 watts x 7200 seconds

Step 3 **Solve the problem.**

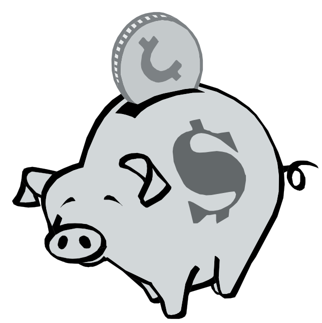
E = 720 000 joules or 720 kilojoules



Read page 333 of *Science in Action 9*.

3. How much energy is being used if a dishwasher with a power rating of 2 300 watts runs for 30 minutes?

4. How much energy is being used if a microwave oven (with a power rating of 1000 watts) runs for 15 minutes?



Calculating the cost of power is also significant. The present cost of power is approximately 6.5 cents per kilowatt hour. The amount of electricity your household uses is measured and billed in **kilowatt hours**. A kilowatt is basically a watt divided by 1000. To calculate the cost of power, multiply the amount of power used (**kWh**) by the cost (**$**).

Read page 333 of *Science in Action 9*.

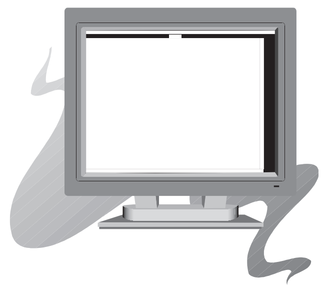
5. An average household uses 650 kWh per month. If the cost of electricity is 6.5 cents per kWh, how much does this power cost?

Internet Websites

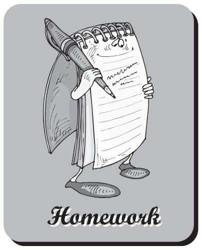
The addresses for the websites below were valid at the time of printing.

www.energysolutionsalta.com/default.asp?V_DOC_ID=871

www.miltonhydro.com/downloads/Energy_Saving_Tips.pdf



After completing this lesson, you should be able to calculate the amount of power your family uses and also the actual dollar cost of that power. Complete the following homework assignment.



Homework

6. Go home and ask to look at a power bill for your residence. Find out how many kilowatts of energy (**kWh**) your family used in a month and identify the actual cost of that power.

Preview/Review Concepts
for
Grade Nine Science

W1 - Lesson 3B:
The Distribution of Matter in Space

OUTLINE

By the end of this lesson, you should

- identify the distribution of matter in space
- identify characteristics of the planets in our solar system and compare them to Earth

GLOSSARY

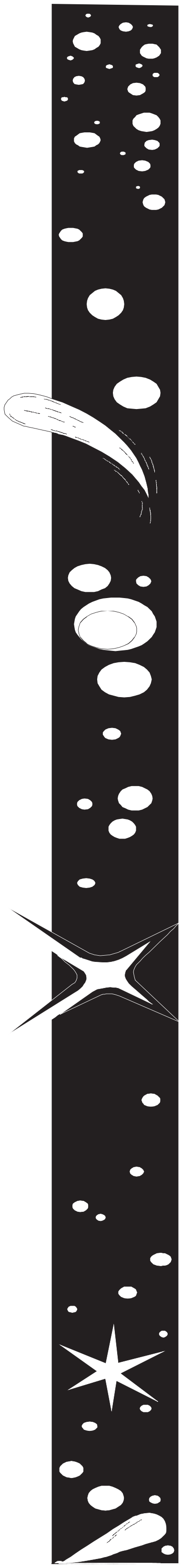
black hole - a super-dense remnant of a supernova; an object around which gravity is so intense that even light cannot escape.

constellations - groupings of stars that form patterns in the night sky (e.g., Ursa Major)

fusion - the process by which hydrogen is converted into helium, releasing large quantities of energy

solar winds - streams of electrically charged particles discharged by the Sun in every direction; solar winds pass Earth at nearly 400 km/s

W1 - Lesson 3B: The Distribution of Matter in Space



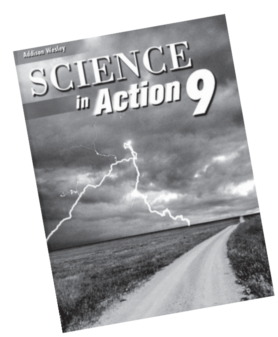
Do you enjoy watching the stars at night? What are you actually looking up at in the sky?

The Life of a Star

Have you ever looked into the night sky and viewed the Big Dipper and the Little Dipper? When you see this you are viewing **stars** across the night sky. The Big Dipper is known as an **asterism**, an unofficially recognized star grouping. A **star** is a hot, glowing ball of hydrogen gas that gives off massive amounts of light energy.

A star starts its life in a **nebula**. This is a cloud of large amounts of dust and gases in space . A **protostar** is the first part of the life of a star. It starts as a rotating cloud of gas and dust with a core that starts to glow. As the protostar gets hotter (to 10 000 000 degrees Celsius), hydrogen is converted to helium in a process called **fusion**. Large quantities of energy are released and a new star is created.

Two categories of stars are formed. They can be either **massive stars** or **sun-like stars**. A star spends most of its life converting hydrogen to helium. A star can last for millions or billions of years. Eventually, the fuel in the star is used and it begins to swell into a red giant. A **red giant** forms when a sun-like star increases in size because the nuclear reactions expand past the core of the star. When the fusion reaction stops in a sun-like star, it shrinks and becomes a **white dwarf** that is no larger than the size of Earth. Eventually the star forms into a **black dwarf** which is cold and dark.



Read pages 384 - 387 of *Science in Action 9*.

1. List two characteristics by which stars differ from each other.

____

____

2. How does the life cycle of a massive star compare to the life cycle of a sun-like star?

____

____

____

____

3. Give a definition of a supernova.

____

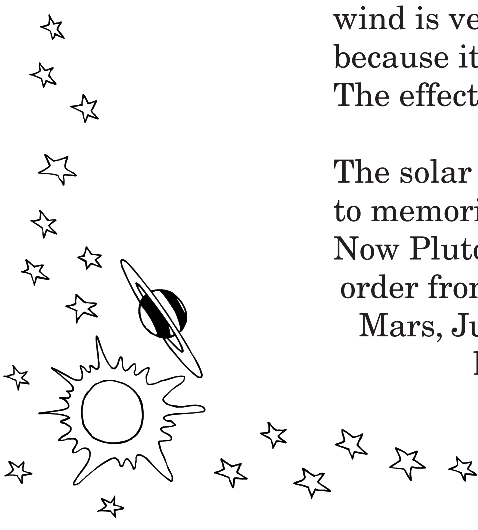
____

Our Solar System

Have you ever heard of the "Milky Way"? This is the name of the galaxy that we live in. A galaxy is a grouping of millions of stars, gas, and dust held together by gravity. Our galaxy includes the sun, the planets, asteroids, comets, and meteoroids.

The sun is a star that provides energy to our world. Hydrogen and helium in the core of the sun undergo fusion to produce energy. The sun also produces a solar wind that is made of charged particles that are released towards all planets in the solar system. This solar wind is very harmful to living things, but the Earth is protected because it has a magnetic field that deflects the charge particles. The effects of these particles are evident in the Aurora Borealis.

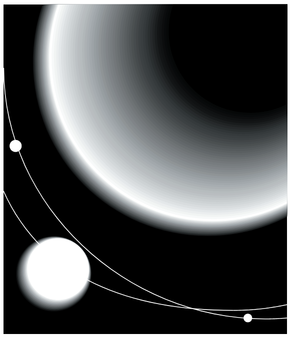
The solar system contains nine planets. Astronomy students used to memorize the following acronym: My Very Eyes May Just See U Now Pluto. This helped us remember the order of the planets. In order from closest to the sun the planets are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. Technology has allowed scientists to learn more of the characteristics of each of the planets in our solar system. The planets have several similarities and differences.



Read pages 394 - 396 of *Science in Action 9*.

4. Complete the following chart comparing characteristics of the nine planets in our solar system.

	Name of Planet & Number of Moons	Composition	Color	Average Suface Temperature	Special Characteristics
a.	Mercury				
b.	Venus				
c.	Earth				
d.	Mars				
e.	Jupiter				
f.	Saturn				
g.	Uranus				
h.	Neptune				
i.	Pluto				



5. Which planet has the fastest rotation? Which has the slowest rotation?

____

____

6. What factors determine the average surface temperature of a planet? Explain.

____

____

____

7. Describe how the Earth is different from all of the other planets in our solar system.

____

____

____

____

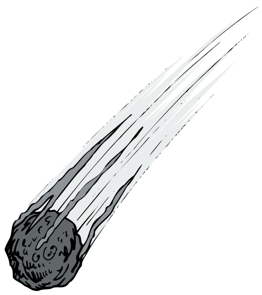
____

____

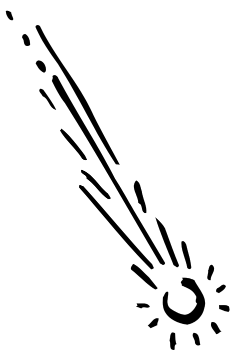
The other bodies found in our solar system include asteroids, comets, meteoroids, meteors, and meteorites. The **asteroid belt** is made of thousands of small metallic and rocky bodies travelling between Mars and Jupiter. A **comet** is dust and ice. Its tail begins to glow when it comes near the sun. The heat from the sun boils the frozen gases of the comet, and the gases trail behind it in a tail. The tail of a comet can be millions of kilometres long. **Meteoroids** are small pieces of rock that have no particular path. We usually notice them only when they enter Earth's atmosphere and burn up as **meteors** or fall to the ground as **meteorites**.

Read pages 397-398 of *Science in Action 9*.

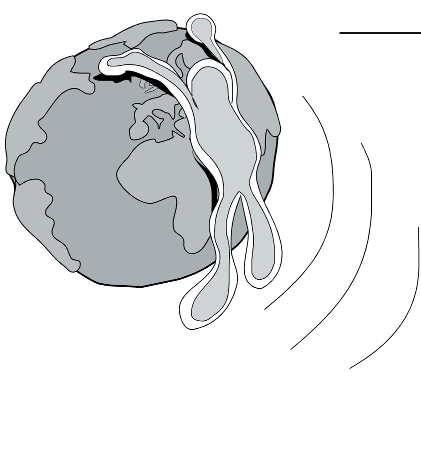
8. Explain the difference between a meteor and a meteorite.



9. What is a nickname for a comet? Where are comets usually found in our solar system? What famous comet orbits the sun?



10. How large can asteroids be?



Internet Websites

The addresses for the websites below were valid at the time of printing.

http://www.enchantedlearning.com/subjects/astronomy/planets

http://ladyk.com/interactive/learning

http://www.the-solar-system.net

After completing this lesson, you should be able to identify the life cycle of a star and identify the major bodies found in our solar system. Complete the following homework assignment.

Homework

11. If you could visit any planet in our solar system, which one would you choose? Explain.

12. Before you go to sleep at night, look closely at the features of the moon. Describe what you see.