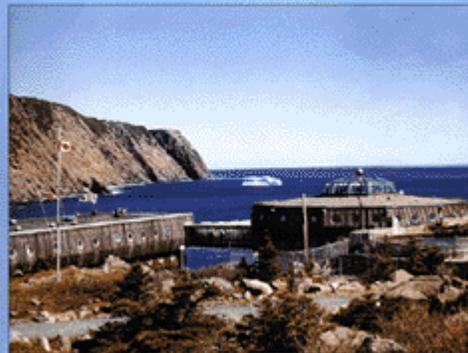


THE WORLD OF SCIENCE



CALVIN COISH

College of the North Atlantic

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INTRODUCTION

The World of Science is a general science reader aimed mainly at adult learners. The book is intended for use by learners, with help from facilitators where necessary. It is suggested that the words at the beginning of each chapter be read to students before starting work on the chapter.

Students or facilitators might wish to tape record word pronunciations or other material from this book. The world of science is so vast that deciding what to include in a book such as this is not easy. There is information here about science and its many branches. There are also some hands-on activities and pieces of information we hope you find helpful. The book includes a glossary and index. We hope this book opens up the world of science to you.

I want to say thanks to the following people who helped in various ways in the production of this book: my wife Vera, Harve Parsons, Don McDonald, Lillian Moores, Olive Reeves, students at the Literacy Centre in Grand Falls-Windsor, Cyril Farrell, Ida Keough, Marilyn MacGillivray, Isabelle Hall, Sandra Brown, Sandra Dingle, Lorne Woolridge, and Dr. Brian Taylor.

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Cal Coish

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Chapter 1 - What is Science?

Words to know:

1. Alexander Fleming
(AI-ex-an-der Flem-ing)

17. knowledge
(knowledge)

2. archaeologist
(archaeologist)

18. laboratory
(lab-o-ra-to-ree)

3. archaeology
(ar-cha-e-ol-o-gee)

19. mathematics
(mathematics)

4. astronaut
(astronaut)

20. meteorite
(meteorite)

5. biological
(biological)

21. meteorology
(me-te-or-ol-ogee)

6. biology
(bi-ol-o-gee)

22. molecule
(mol-e-cule)

7. conclusion
(conclusion)

23. penicillin
(penicillin)

8. discoveries
(dis-cov-er-ees)

24. physical
(fizz-e-kal)

9. electricity
(e-lec-tric-i-tee)

25. poisonous
(poisonous)

10. enzyme
(en-zyme)

26. pollution
(pollution)

11. eruption
(e-rup-tion)

27. procedure
(procedure)

12. experiment
(experiment)

13. geologist
(geologist)

14. geology
(ge-ol-o-gee)

15. hypothesis
(hypothesis)

16. kilometre
(kilometre)

28. psychology
(si-koi-o-gee)

29. sociologist
(sociologist)

30. sociology
(so-ci-ol-o-gee)

31. temperature
(temperature)

32. volcanic
(vol-can-ic)

33. zoology
(zo-ol-o-gee)

Chapter 2 - Matter and Energy

Words to know:

- | | |
|-------------------------------------|----------------------------------|
| 1. conductivity (con-duc-tiv-i-tee) | 6. kinetic (ki-net-ic) |
| 2. electron (e-lec-tron) | 7. pendulum (pen-du-ium) |
| 3. gravitational (gravitational) | 8. plasma (plas-ma) |
| 4. horsepower (horsepower) | 9. potential (potential) |
| 5. ionic (I-on-ic) | 10. solubility (sol-u-bii-i-tee) |
-

Everything in the world is made of matter. Scientists define matter as anything that takes up space. Matter can exist in one of four states or phases. The three most common states of matter are solid, liquid and gas. The fourth state is called plasma. All matter has certain properties.

Solids, Liquids and Gases

A solid has a definite shape and size. A piece of wood is a solid. An ice cube is a solid. Water is a liquid. A liquid will take the shape of the container into which it is poured. How much space a liquid takes up depends on the temperature. Some solids can be turned into liquids by heating them. For example, if you melt lead, it can be poured into a mold to make things. When the lead cools, it becomes a solid again. Gases are not as dense as liquids and solids. Gases can spread out into a large space. If you heat a liquid enough, it can produce gas. Boiling water produces a gas called steam.

-

Chapter 3 - Living Things

Words to know:

- | | |
|----------------------------------|--|
| 1. amoeba (a-mee-ba) | 10. Galapagos (Ga-lap-a-gos) |
| 2. antibiotic (antibiotic) | 11 . microscope (microscope) |
| 3. bacteria (bac-ter-i-a) | 12. naturalist (naturalist) |
| 4. cellulose (cellulose) | 13. photosynthesis (fo-to-syn-the-sis) |
| 5. chlorophyll (chior-o-fill) | 14. protoplasm (protoplasm) |
| 6. decomposition (decomposition) | 15. reproduce (reproduce) |
| 7. evolution (evolution) | 16. saprophyte (sap-ro-fite) |
| 8. expedition (expedition) | 17. species (spe-cies) |
| 9. fission (fish-un) | 18. symbiosis (symbiosis) |

Bios means life. The study of life is called biology. Biology has two main divisions. The study of plant life is called botany. The study of animal life is called zoology.

Cells are the basic units of life. All living things are made of cells. The centre of a cell is called the nucleus. Most cells are so small that you need a microscope to see them, Cells come in many different shapes. Cells contain genetic material, which is a kind of blueprint of the organism.

Chapter 4 - The Human Body

Words to know:

- | | |
|--|------------------------------------|
| 1. appendicular (ap-pen-dic-u-iar) | 11. involuntary (in-vol-un-tar-ee) |
| 2. capacity (ca-pac~i-tee) | 12. melanin (mel-a-nin) |
| 3. chromosome (chromosome) | 13. melanocytes (me-lan-o-sites) |
| 4. circulatory (cir-cu-la-to-ree) | 14. reproduce (reproduce) |
| 5. deoxyribonucleic (de-ox-ee-ri-bo-nu-cle-ic) | 15. reproductive (reproductive) |
| 6. diaphragm (di-a-fragm) | 16. respiration (respiration) |
| 7. epidermis (epidermis) | 17. respiratory (re-spir-a-to-ree) |
| 8. excretory (ex-cre-to-ree) | 18. subcutaneous (subcutaneous) |
| 9. heredity (he-red-i-tee) | 19. urinary (ur-i-na-ree) |
| 10. intestine (intestine) | 20. vertebrae (vertebrae) |
| | 21. voluntary (vol-un-tar-ee) |

The human body is a wonderful thing. It lets us eat and breathe and move. It allows us to see and hear and smell and touch. It allows us to think. It allows us to reproduce.

CHAPTER 5 - Reproduction

Words to know:

1. amniocentesis (am-ni-o-cen-te-sis)
2. amniotic (am-ni-ot-ic)
3. chromosome (chromosome)
4. contraceptive (contraceptive)
5. controversial (controversial)
6. ejaculate (ejaculate)
7. embryo (em-bree-o)
8. estrogen (es-tro-gen)
9. fallopian (fai-io-pi-an)
10. fertile (fer-tile)
11. fertilization (fertilization)
12. fungi (fun-gi)
13. gamete (gam-ete)
14. intercourse (intercourse)
20. menstruation (menstruation)
21. miscarriage (miscarriage)
22. organism (or-gan-ism)
23. ovulation (ovulation)
24. penetrate (penetrate)
25. placenta (placenta)
26. pregnancy (preg-nan-see)
27. progesterone (progesterone)
28. reproduce (reproduce)
29. reproduction (reproduction)
30. reproductive (reproductive)
31. rhythm (rith-um)
32. scrotum (scro-tum)
33. spermicide (sperm-i-side)

15. intrauterine (intrauterine)

34. spontaneous (spontaneous)

16. ligation (li-ga-tion)

35. testicle (tes-ti-cle)

17. medication (medication)

36. uterus (u-ter-us)

18. menopause (menopause)

37. vasectomy (va-sec-ta-mee)

19. menstrual (menstrual)

38. zygote (zy-gote)

Chapter 6 - Physical and Mental Health

Words to know:

- | | |
|-----------------------------------|---------------------------------------|
| 1. alternatives (alternatives) | 14. manufacture (manufacture) |
| 2. ascorbic (a-scor-bic) | 15. menstruation (menstruation) |
| 3. carbohydrates (carbohydrates) | 16. moderation (moderation) |
| 4. carotene (car-o-tene) | 17. nutrients (nutrients) |
| 5. cholesterol (cholesterol) | 18. nutrition (nutrition) |
| 6. circulatory (cir-cu-ia-to-ree) | 19. osteoporosis (os-te-o-por-o-sis) |
| 7. diabetes (di-a-be-tes) | 20. polyunsaturated (polyunsaturated) |
| 8. disinfected (disinfected) | 21. psychologist (si-kol-o-gist) |
| 9. folacin (fo-la-cin) | 22. riboflavin (riboflavin) |
| 10. glycogen (gly-co-gen) | 23. scurvy (skur-vee) |
| 11. hemoglobin (he-mo-gio-bin) | 24. supplement (supplement) |
| 12. intestine (intestine) | |
| 13. magnesium (magnesium) | |
-

It is important to keep your body in good physical condition. Physical health affects

mental health and vice versa. This chapter deals with how to keep your mind and body healthy.

-

Chapter 7 - Drugs and Medicines

Words to know:

1. amphetamine (am-fet-a-meen)
2. analgesic (an-ai-gee-sic)
3. anesthetic (an-es-thet-ic)
4. antianxiety (an-ti-anx-i-e-tee)
5. antibodies (antibodies)
6. antiserums (an-ti-ser-ums)
7. cardiovascular (cardiovascular)
8. depressant (depressant)
9. diuretic (di-u-ret-ic)
10. globulins (globulins)
11. hallucinate (hallucinate)
12. hallucinogen (hallucinogen)
13. hepatitis (hepatitis)
14. hypertension (hi-per-ten-sion)
15. medication (medication)
16. meningitis (meningitis)
17. mescaline (mescaline)
18. narcotics (narcotics)
19. nitroglycerin (nitroglycerin)
20. nonnarcotics (non-nar-cot-ics)
21. nonprescription (non-pre-scrip-tion)
22. pharmacist (far-ma-cist)
23. pneumonia (new-mon-ee-a)
24. prescription (prescription)
25. resistance (resistance)
26. sedative (sed-a-tive)
27. stimulant (stimulant)
28. tetanus (tet-a-nus)

15. hypnotic (hip-not-ic)

32. tranquillizer (tranquillizer)

16. infectious (infectious)

33. vaccinate (vaccinate)

17. influenza (influenza)

-

Chapter 8 - The Solar System

Words to know:

- | | |
|--------------------------------------|----------------------------------|
| 1. agriculture (agri-cul-ture) | 10. hydrosphere (hi-dro-sfeer) |
| 2. artificial (arti-ficial) | 11. meteorite (mete-or-ite) |
| 3. asteroid (as-ter-oid) | 12. meteoroid (mete-or-oid) |
| 4. astronomer (astro-nom-er) | 13. satellite (sat-el-lite) |
| 5. atmosphere (at-mos-feer) | 14. silicates (sil-i-cates) |
| 6. biosphere (bi-o-sfeer) | 15. sulphuric (sul-fur-ic) |
| 7. circumference (cir-cum-fer-ence) | 16. terrestrial (ter-re-str-ial) |
| 8. galaxy (gal-ax-ee) | 17. Uranus (U-ray-nus) |
| 9. gravitational (grav-i-ta-tion-al) | |

The centre of our solar system is a star called the sun. The sun is the largest object in our solar system. The planets and other objects travel in orbits around the sun. An orbit is a curved path.

Our solar system is part of a galaxy called the Milky Way. A galaxy is a system of stars, dust and gases held together by gravity. Astronomers believe there are billions of galaxies scattered throughout the universe. There are more than 1 00 million stars in the Milky Way.

Chapter 9 -The Environment

Words to know:

- | | |
|--|----------------------------------|
| 1. alternative (alternative) | 8. hydrocarbon (hydrocarbon) |
| 2. aluminum (a-iu-mi-num) | 9. moratorium (moratorium) |
| 3. chlorofluorocarbons
(klor-o-flor-o-car-bons) | 10. pesticides (pesticides) |
| 4. conservation (conservation) | 11. phosphate (fos-fate) |
| 5. contaminate (contaminate) | 12. pollutants (pollutants) |
| 6. environment (environment) | 13. sulphuric (sul-fur-ic) |
| 7. formaldehyde (form-al-de-hide) | 14. zooplankton (zo-o-plank-ton) |

Everything in the world around us is part of our environment. Water is part of our environment. Trees are part of our environment. Animals are part of our environment. People, plants and animals all share the air, water, food and soil. People have made many changes to the environment and some of these changes have not been good.

Chapter 10 - Weather and Climate

Words to know:

- | | |
|----------------------------------|-------------------------------|
| 1. condensation (condensation) | 7. prevailing (prevailing) |
| 2. humidity (hu-mid-i-tee) | 8. radiosonde (radiosonde) |
| 3. hurricane (hurricane) | 9. satellite (satellite) |
| 4. inversion (inversion) | 10. saturated (saturated) |
| 5. meteorologist (meteorologist) | 11. westerlies (west-er-lees) |
| 6. precipitation (precipitation) | |

Weather is the condition of the air at a particular time and place. There are many different kinds of weather. The weather may be hot or cold, sunny or cloudy. It may bring rain, snow, hail or fog.

The weather affects us in many ways. We wear warm clothing when the weather is cold. We wear light clothing when the weather is warm. We use fuel to heat our homes when the weather is cold. The weather can even affect how we feel.

The weather also affects fisherpeople, farmers, travellers and other persons. Fisherpeople need good weather to get out to their nets and traps. Farmers need good weather to plant their crops, They need rain and sunshine to help crops grow. They need good weather to harvest crops.

-

Glossary

alternative: a choice

amniocentesis: process of removing fluid from the amniotic sac

amniotic: having to do with the amnion, or sac surrounding the fetus

amoeba: a single-celled organism

amphetamine: a drug used to relieve congestion or to stimulate the nervous system

analgesic: a drug used to relieve pain

anesthetic: a drug used to deaden all or part of the body

antibodies. substances produced by the blood to fight disease

antibiotic: a drug which weakens or destroys bacteria or other organisms that cause disease

appendicular: added onto or attached; from appendix

archaeologist: a scientist who studies things people of earlier times made and used

archaeology: the study of things people of earlier times made and used

artificial: not real; made by a person or machine

asteroid: a small, rocky body that revolves around the sun

astronomer: a scientist who studies stars, planets and other objects in the universe

atmosphere: the air that surrounds the earth

barometer: an instrument used to measure air pressure

biology: the science which involves the study of life

biological: having to do with biology

biosphere: areas on and above the earth containing life

capacity: upper limit., the most something can hold

carbohydrates: foods which contain carbon, oxygen and hydrogen

cardiovascular: involving the heart and blood vessels

cellulose: the material which makes up the cell walls of most plants

chlorofluorocarbons: compounds which contain chlorine and fluorine

-

Answers

Chapter 1

- | | |
|----------------|----------------|
| 1. friction | 6. botany |
| 2. gravity | 7. zoology |
| 3. geology | 8. archaeology |
| 4. meteorology | 9. sociology |
| 5. biology | |

Chapter 2 (Crossword)

(Across)

1. density
2. liquid
3. conductivity
4. potential
5. solid
6. gravity
7. negative

(Down)

1. solubility
2. energy
3. kinetic
4. power
5. plasma
6. matter
7. ions

8. mass

Chapter 3

1. cells

6. evolution

2. nucleus

7. oceanographers

3. chlorophyll

8. protoplasm

4. oxygen

9. virus

5. photosynthesis

10. fossils

Chapter 4

1. genes

10. tendons

2. heredity

11. nervous

3. epidermis

12. spinal

4. dermis

13. circulatory

5. system

14. arteries

6. skeleton

15. veins

7. vertebrae

16. respiration

8. spleen

17. digestive

9. ligaments

18. excretory

Chapter 5

1. puberty

2. testicles

3. ovaries

4. sperm

5. eggs (oocytes)

6. zygote

7. oocytes

8. ultrasound

9. amniocentesis

10. miscarriage

-

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-

What is science? Science is all around us. It affects us in many ways. Boats and ships float because they are not as heavy as the water they displace. Friction helps car tires get a grip on the road. A force called gravity keeps us from floating off into space. Science has given us cars, telephones, television and computers. Science has given us cloning and cures for many diseases.

The word science comes from the Latin word scientia. Scientia means knowledge. Scientists are always trying to gain more knowledge. Science is always changing, as new discoveries are made. Discoveries are sometimes made by accident. That is how Alexander Fleming discovered penicillin. Post-it Notes(D were also invented by accident.

Why do onions make you cry? This is one question science can answer Onions are made up of cells. These cells contain sulphur. They also contain an enzyme which speeds up chemical reactions. When onion cells are cut open, the sulphur and enzymes come together and react. This reaction releases molecules containing sulphur into the air Sulphur reacts with the liquid in your eyes and creates sulphuric acid.

There are two ways you can solve this problem. You can run cold water over an onion as you cut it. The sulphur will react with the cold water instead of the water in your eyes. Another thing you can do is put the onion in a freezer for 10 or 15 minutes before you cut it. The cold temperature will slow down the chemical reaction in the onion.

-

Put the correct answer in the blank in each of the following. (Choose from these words: **botany gravity friction meteorology sociology geology zoology biology archaeology**)

1. _____ helps car tires get a grip on the road.
 2. _____ keeps us from floating off into space.
 3. _____ is the study of rocks, minerals and other things which make up the earth and other planets.
 4. _____ involves the study of the earth's atmosphere
 5. _____ is the study of living things.
 6. _____ is the study of plants.
 7. _____ is the study of animals.
 8. _____ is the study of things people of earlier times made and used.
 9. _____ involves the study of societies and communities.
-

Plasma

There is a fourth state of matter we don't hear much about. It is called plasma. This is not the same as the plasma in blood. The kind of plasma we are talking about here forms when the atoms in a gas take on electrical charges. Stars such as the sun, as well as other objects in space contain plasma. Plasma is also found in lightning. Electricity turns the gas in a fluorescent light or neon sign into a plasma that gives off light. A plasma conducts electricity well and is affected by magnetic fields.

Mass

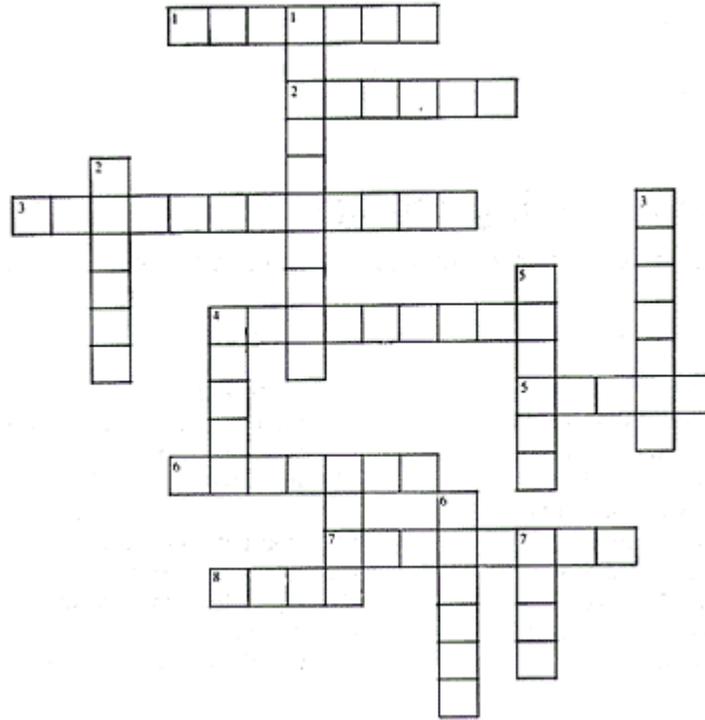
The amount of matter in an object is called its mass. Mass is not the same as weight. Weight is the result of gravity pulling on an object. You would weigh less on the moon than you do on the earth. This is because the moon's gravitational pull is less than that of the earth. But your mass will stay about the same wherever you are.

Energy

Energy is the ability to do work. We cannot see energy, but we know it can exist in many different forms. Energy can be used in many different ways. People and animals use energy to do work. We burn wood, oil and other fuels to produce heat energy. Light bulbs produce energy in the form of light. Tides, waves and waterfalls contain energy. Sometimes this energy is used to produce electric power. Wind has energy. That is why it can blow down trees and houses and blow trucks off the road.

-

Chapter 2 Crossword



Across

1. Mass per unit volume of an object
2. This will take the shape of a container into which it is poured.
3. The ability of matter to conduct heat or electricity
4. This kind of energy is also called stored energy.
5. This state of matter has a definite shape and size.
6. Weight is the result of this pulling

Down

1. The ability of one kind of matter to dissolve in another kind
2. The ability to do work
3. The energy of movement
4. The rate at which work is done.
5. The fourth state of matter
6. Everything in the world

on an object.

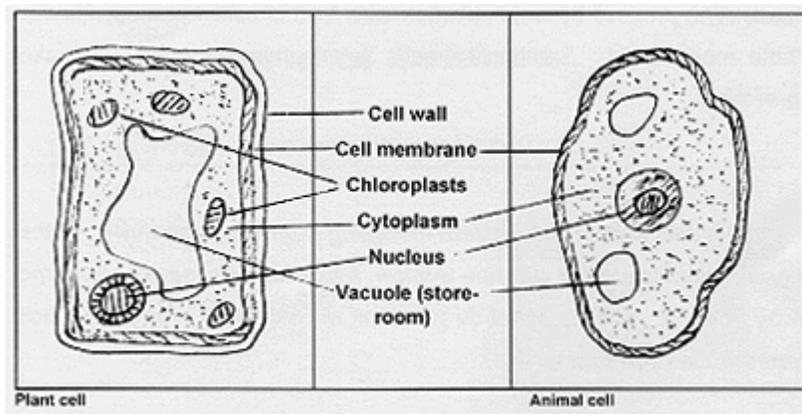
is made of this.

7. Electrons have this kind of electrical charge

7. Atoms or groups of atoms with either a positive or negative electrical charge

8. The amount of matter in an object

-



Plants and Animals

Plants and animals are organisms. All organisms are made of cells. Plant cells are different from animal cells. Plant cells have a thick wall made of cellulose. Plant cells contain chlorophyll, which gives plants their green colour.

Scientists believe there are more than 350,000 species of plants on the earth. Plants may be big or small. They may be simple or complex. Trees, flowers, grass and mosses are all plants.

Most plants have three main parts. These parts are roots, stems and leaves. The stem helps hold up the plant and carries water and minerals from the roots to the leaves. The stem carries food from the leaves to the roots.

Plants are very useful to humans and other animals. We could not survive without plants. Plants take in carbon dioxide and give off oxygen.

Here is a way to make your own fossils. Get two leaves that look alike. Put one in a bottle and put a cover on the bottle. Punch several small holes in the cover. Put the other leaf in a clear, plastic container. Fill the container with water and put it in a freezer. Check the two leaves after about two weeks. Which one is in better condition?

Put the correct answer in the blank in each of the following.

(Choose from these words: **chlorophyll, oxygen, protoplasm, fossils, virus, evolution, cells, oceanographers, nucleus, photosynthesis**)

1. _____ are the basic units of life.
 2. The centre of the cell is called the _____.
 3. _____ is the substance which gives plants their green colour.
 4. Plants take in carbon dioxide and give off _____.
 5. Plants make their food by a process called _____.
 6. Charles Darwin developed the theory of _____.
 7. Scientists who study the oceans are called _____.
 8. An amoeba consists of a jelly-like material called _____.
 9. _____ is a Latin word which means poison.
 10. Remains of living things preserved in mud, rocks and ice are called _____.
-

Cells

The human body is made of cells. Cells are so small that you need a microscope to see them. Each cell takes in food and gives off wastes. There are about 100 trillion cells in the human body. Your body creates three billion new cells every minute to replace those that die.

Cells contain genes. Genes are units of heredity. Heredity refers to the traits we inherit from our parents. These traits include height, sex and hair colour. Genes are located on chromosomes inside the cells. Each body cell contains 23 pairs of chromosomes and about 100,000 genes. Genes are made of DNA. DNA is short for deoxyribonucleic acid.

Organs

The human body contains many different organs. The heart, stomach, lungs, liver, kidneys and brain are all organs. The skin is also an organ.

Skin

The skin is the largest organ of the human body. The skin protects the body in several ways. It protects our tissues from the sun's harmful rays. The skin prevents bacteria and chemicals from entering the body. It keeps the body from drying out. The skin is an important part of the body's immune system. It also helps regulate body temperature. When your body overheats you sweat. The sweat evaporates and cools the body. When you are cold, the body holds in more heat by narrowing the blood vessels inside the skin. The blood flow near the skin then decreases and the body gives off less heat.

-

Put the correct answer in the blank in each of the following. (Choose from these words: **vertebrae, digestive, spleen, genes, tendons, respiration, spinal, skeleton, dermis, arteries, circulatory, heredity, veins, nervous, system, epidermis, ligaments**)

1. _____ are units of heredity.
 2. _____ refers to the traits we inherit from our parents.
 3. The outer layer of skin is called the _____.
 4. The _____ is the second layer of skin.
 5. A group of organs working together in the human body makes up a _____.
 6. The _____ supports the body and gives the body its basic shape.
 7. The spine is made up bones called _____.
 8. The _____ stores red blood cells until the body needs them.
 9. _____ link bones to other bones.
 10. _____ link muscle to bone.
 11. The _____ system transmits messages to and from the brain.
 12. The _____ cord runs from the brain to the pelvic area.
 13. The _____ system consists of the heart and blood vessels.
 14. _____ are blood vessels which carry blood away from the heart.
 15. _____ are blood vessels which carry blood to the heart.
 16. _____ is the process by which our bodies obtain and use oxygen.
 17. The mouth, stomach and intestine are parts of the _____ system.
-

Humans are born with reproductive organs, but we cannot reproduce until the organs are mature enough. This happens during puberty. Puberty is the time between childhood and adulthood.

Glands in our bodies produce different hormones. Sex hormones control the development of sex characteristics in males and females. The sex glands in males are called testicles. These glands produce hormones. Hormones make the male voice deeper and cause body hair to grow. The sex glands in females are called ovaries. These glands produce hormones. These hormones cause breasts to develop. They also cause body hair to grow, and hips to widen.

Living things can produce offspring like themselves because they have genes. Genes are tiny pieces of DNA. (DNA is short for deoxyribonucleic acid). DNA is the substance that determines traits. Each cell of an organism contains chromosomes. The chromosomes contain genes. Genes are passed on to offspring during reproduction.

Reproduction may be either sexual or asexual. Most animals reproduce sexually. In asexual reproduction, an organism creates a copy of itself. Bacteria and other simple organisms reproduce in this way. In asexual reproduction, offspring are identical to their parents.

In sexual reproduction, a new organism is formed when a sex cell (sperm) from one organism joins with a sex cell (egg) from another organism. Sex cells are also called gametes.

An egg which has just been fertilized is smaller than the period at the end of this sentence. The egg develops into a mass of cells called an embryo. These cells continue to grow and form various tissues. Within two months of conception, all the major body organs and organ systems have formed. The embryo looks human and is then called a fetus.

Put the correct answer in the blank in each of the following. Choose from these words: (eggs, miscarriage, oocytes, sperm, ovaries, testicles, puberty, amniocentesis, ultrasound, zygote)

1. _____ is the time between childhood and adulthood.
 2. The male sex glands are called _____.
 3. The female sex glands are called _____.
 4. The testicles produce _____.
 5. The ovaries produce _____.
 6. A fertilized egg is called a _____.
 7. Egg cells are also called _____.
 8. _____ involves the use of high-frequency sound waves to produce an image of the fetus on a screen.
 9. _____ involves using a needle to take a sample of the amniotic fluid.
 10. A spontaneous abortion is also called a _____.
-

Nutrients

When a car runs out of gas it stops. A car needs fuel to run. Your body needs fuel to run properly. The fuel your body needs comes from food and fluids. It is important to eat the right foods. Foods provide nutrients. Nutrients are things your body needs to live and grow. Every cell in your body needs nutrients.

There are six main groups of nutrients. They are.. (1) water, (2) carbohydrates, (3) fats, (4) proteins, (5) minerals, and (6) vitamins. Nutrition is the science that deals with food and how the body uses food.

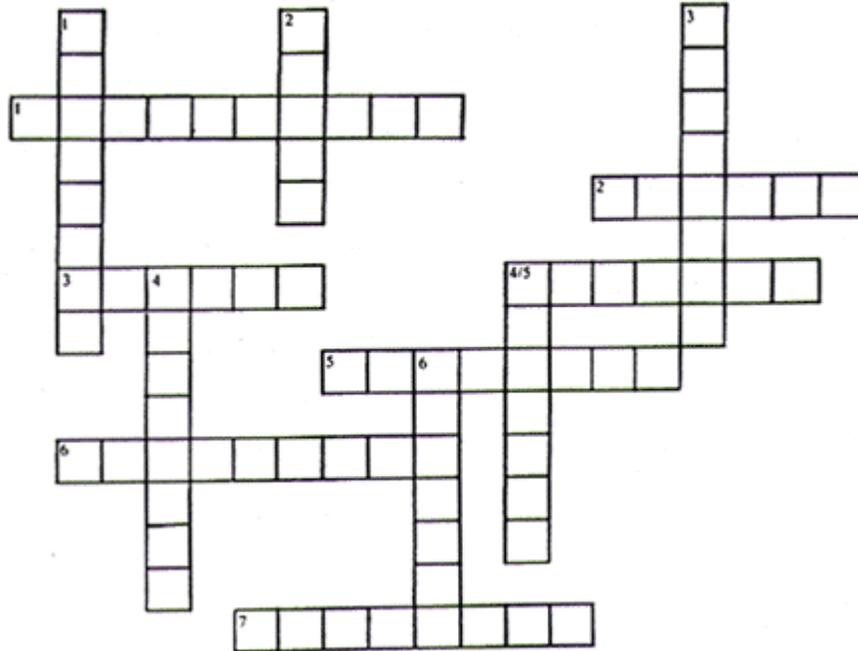
We need lots of water to keep our body tissues from drying out. Up to 60 per cent of a person's body weight may come from water. A person can survive without water for about a week. You should drink about 1.5 litres of fluids per day. This is about six glasses. You should drink extra fluids in hot weather, or when you exercise.

Carbohydrates, fats and proteins provide the energy our bodies need. We measure this energy in units called calories. A calorie is the amount of energy needed to increase the temperature of one gram of water one degree Celsius. We often talk about how many calories are in different foods.

Carbohydrates

Carbohydrates provide energy for your body. Carbohydrates are found in fruits, vegetables, and grain products such as cereals, bread, pasta and rice. One gram of carbohydrate contains about 4 calories. Carbohydrates may be simple or complex. Sugars are simple carbohydrates. Complex carbohydrates include starches. Your body stores extra carbohydrates in the form of glycogen and fat.

Chapter 6 Crossword



Across

1. Vitamin B2 is also called this.
2. This is a result of the body's reaction to challenges
3. This vitamin allows cells to release energy from carbohydrates.
4. People who lack this mineral may develop osteoporosis.
5. Vitamin B12 and folate help in the formation of these cells.
6. These are the parts of food your body uses to keep healthy.
7. These are made of smaller units

Down

1. Another name for Vitamin B1.
2. The human body needs these elements in tiny amounts.
3. This acid is also called Vitamin C.
4. PMA stands for positive mental
5. The amount of energy needed to raise the temperature of one gram of water one degree Celsius.
6. Stress makes it harder for the body to fight off this.

called amino acids.

.

-

There are many different kinds of drugs. Drugs may be taken in pill, capsule, gas or liquid form. A person can swallow, inhale or inject drugs. In fact, you may inhale or swallow a drug without even knowing it. Paint, glue, cleaners, and exhaust fumes from cars all contain chemicals. This means that these substances are drugs. Alcohol is a drug. Cough medicines contain drugs.

Good and Bad Drugs

Drugs can be either good or bad. Many of the drugs we use today were unknown 50 years ago. Some drugs are used to cure or prevent diseases. Penicillin is one of these useful drugs. Aspirin is another.

We need a doctor's prescription to get certain drugs. These are called prescription drugs. There are some medicines we can get without a prescription. These are called over-the-counter medicines.

Drugs may be also classified as legal or illegal. Prescription and over-the-counter medicines are legal drugs. Marijuana, cocaine and heroine are illegal drugs.

Even good drugs can hurt or kill people if they are not used properly. Aspirin is good if it is used in the right way. It can cure headaches and relieve many kinds of pain. But every year many children die after taking too many Aspirin. In some cases, children eat Aspirin because they think the pills are candy. Any drug can be dangerous if it is misused. One example of misuse is taking a drug overdose.

Put the correct answer in the blank in each of the following. (Choose from these words: **bacteria, instructions, tranquilizers, hypertension, antibodies, diuretics, children, diseases, cardiovascular, stimulants, illegal, anesthetics, hallucinogens**)

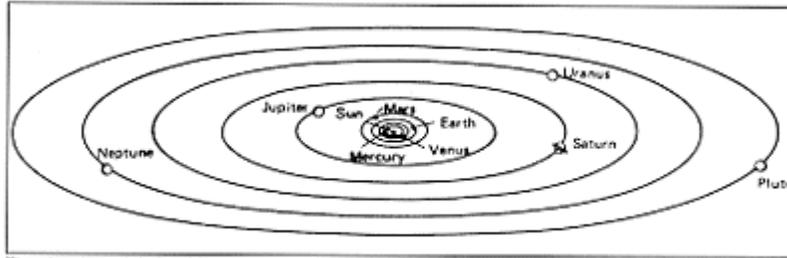
1. Marijuana, cocaine and heroin are _____ drugs.
2. Antibiotics and sulfa drugs are used to fight _____.
3. Vaccines, serums and globulins are used to fight infectious _____.
4. A vaccine causes the body to produce substances called _____.
5. Drugs used to treat the heart and blood vessels are called _____ drugs.
6. _____ is another name for high blood pressure.
7. Dentists and doctors use _____ to deaden all or part of the body.
8. _____ are drugs which cause people to see, hear and sense things that are not real.
9. _____ are drugs which keep people awake.
10. _____ are drugs which relax and calm people.
11. _____ are drugs which cause the body to produce more urine than it normally would.
12. Read all the _____ on drug labels.
13. Keep all drugs out of reach of _____.

Questions and Activities:

1. Prepare a report on the discovery of a vaccine.
 2. How do drugs affect the nervous system?
 3. Invite a speaker in to talk about drugs.
 4. What precautions should you follow when using medicines? (p. 66)
 5. Penicillin has been called the "wonder drug." Discuss why this drug is not as effective as it once was.
-

The Planets

There are nine planets in our solar system. The four planets which are closest to the sun are called terrestrial planets. This means they are like the earth in some ways.



The planets and their orbits

Earth

The earth is about 150 million kilometres from the sun. Earth is the "third rock from the sun." Carl Sagan was an astronomer who wrote several books. He wrote a book about the earth called Pale Blue Dot. The earth looks blue when seen from outer space. It looks blue because the dust and gases that surround the earth filter out all colours except blue from the sun's rays.

The earth is always moving, and circles the sun once a year. The earth also makes one complete turn on its axis every 24 hours. The exact time is 23 hours, 56 minutes, and 4.091 seconds. This figure is rounded off to give us a 24-hour day. Half the earth is always in daylight, while half is always in darkness.

Questions and Activities:

1. Find out more about the theory that an asteroid collided with the earth and killed off the dinosaurs.
 2. What causes the northern lights?
 3. Prepare a scale model of our solar system.
 4. On a clear night, look at the sky through a telescope. Identify various objects such as Venus, Jupiter, the Big Dipper, and Orion.
 5. Here is a sentence you can use to remember the names of the planets in our solar system. **My Very Eager Monkey Just Stole Uncle Ned's Pants. (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune Pluto)**
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The Oceans

The oceans are part of the environment. We have not always taken good care of the oceans. Too many fish have been caught over the years and the stocks are very low. Time was needed to rebuild the stocks. That is why the moratorium on cod fishing was declared in 1992. There are signs that the cod stocks may be coming back.

-

Put the correct answer in the blank in each of the following. (Choose from these words: **seven, chlorofluorocarbons, conservation, environment, oxygen, acid rain, pollutants, heavy, ozone, gas**)

1. Everything in the world around us is part of our _____.
2. Things which pollute our environment are called _____.
3. Lead and mercury are examples of _____ metals.
4. _____ is formed when moisture in the air combines with nitrogen oxide and sulphur dioxide.
5. Methane is a _____ formed from decaying plants.
6. _____ is a form of oxygen used to purify water and as a bleaching agent.
7. _____ are chemical compounds which contain chlorine, fluorine and carbon.
8. _____ is the protection of the Earth's natural balance and the wise use of its resources.
9. Plants take in carbon dioxide and give off _____.
10. Tropical rain forests cover about _____ per cent of the earth's land surface.

Questions and Activities:

1. How is acid rain a problem for the environment? (pp. 83-84)
 2. What is the greenhouse effect? Why is it a problem? (pp. 84-85)
 3. What is the ozone layer? Why is it important? (p. 86)
 4. Do a report on pollution. Suggest ways we can take better care of the earth.
-



This fisherman depends on the weather.

Fisherpeople depend on the weather. They watch the sky and listen to weather reports. They know that certain wind conditions are better than others for catching fish and they may stay in port when it is very windy. They talk about things like "caplin scull weather" and "gale force winds."

Which do you think holds more water vapour. warm air or cold air? Here is a way to find out. You need a bottle, a bowl of ice water and a bowl of warm water Breathe hard into the bottle until the inside is covered with condensation. Put the cover on the bottle right away. Make sure the cover is on tight. Put the bottle into the bowl of warm water. Wait a minute and take the bottle out. What happens to the condensation inside the bottle? Next put the bottle in the bowl of ice water. Wait a minute and take the bottle out. What happens inside the bottle?

-

Put the correct answer in the blank in each of the following. (Choose from these words: **westerlies, humidity, weather, chinook, front, climate, inversion, air pressure, wind chill, saturated**)

1. _____ is the condition of the air at a particular time and place.
 2. _____ is the average weather over a long period of time.
 3. _____ is the force of air pressing on the earth.
 4. A _____ is a zone that develops when the edge of a cold air mass meets the edge of a warm air mass.
 5. _____ is the estimate of how cold the wind makes people feel.
 6. The amount of water vapour in the air is called _____.
 7. The prevailing _____ are winds which blow across most of Canada.
 8. Air which holds as much moisture as it can is said to be _____.
 9. A _____ is a warm, dry wind that sometimes flows down the eastern slopes of the Rocky Mountains.
 10. A thermal _____ happens when a layer of warm air settles over a layer of cool air just above the ground.
-
-

chlorophyll: the substance which gives plants their green colour

chromosome: a threadlike body containing genes inside a cell

circulatory: involving circulation of the blood

circumference: outer rim or perimeter

conclusion: final answer or decision

condensation: the changing of a gas into a liquid

conductivity: the ability of matter to conduct heat or electricity

contaminate: to make impure

contraceptive: birth control method or device

controversial: causing arguments

decomposition: decaying, rotting

dehydrate: to dry out

depressant: a drug which relaxes the nervous system; a sedative

disinfected: free of infection; no longer infected

diuretic: a drug which causes the body to produce more urine

ejaculation. the release of sperm

electron: a tiny particle with a negative charge within an atom

embryo: a plant or animal just starting to develop, before its birth

enzyme: a substance which speeds up a chemical reaction

epidermis: the outer layer of skin

essential: needed

estrogen: a hormone produced by the ovaries

evolution: slow change or development

excretory: having to do with the removal of waste from the body

expedition: a trip made for a special reason, such as to study animals or plants

fertilization: the joining of sperm and egg

galaxy: a system of stars, dust and gases held together by gravity

geology: the study of rocks, minerals and other things which make up the earth and other planets

geologist: a scientist who studies rocks, minerals and other things which make up the earth and other planets

glycerol: a sweet liquid obtained from fats and oils

-

sociologist: a scientist who studies society

sociology: the study of society

solubility: ability of one substance to dissolve in another substance

species: a group of plants or animals with certain common characteristics

spermicide: a substance which kills sperm

spontaneous: happening naturally or without warning

stimulant: a drug which stimulates the nervous system

subcutaneous: beneath the skin

supplement: something added

symbiosis: a relationship which is good for all organisms involved

terrestrial: like the earth

testicle: the male sex gland

tetanus: an illness caused when a germ enters the body through a deep wound; also called lockjaw

tranquillizer: a drug which has a calming effect on the body without causing sleep

vaccinate: to administer a vaccine

vasectomy: an operation which makes a male infertile (unable to father children)

vegetation: plant growth

vertebrae: bones in the spinal column

volcanic: having to do with a volcano

voluntary: can be controlled

zoology: the study of animals

zooplankton: microscopic organisms in the ocean

zygote: a fertilized egg

Chapter 6 (Crossword)

(Across)

1 .riboflavin

2. stress

3. niacin

4. calcium

5. red blood

6. nutrients

7. proteins

(Down)

1 .thiamine

2. trace

3. ascorbic

4. attitude

5. calorie

6. disease

Chapter 7

1 .illegal

2. bacteria

3. diseases

4. antibodies

5. cardiovascular

6. hypertension

7. anesthetics

8. hallucinogens

9. stimulants

10. tranquilizers

11. diuretics

12. instructions

13. children

Chapter 8 (Crossword)

(Across)

1. comets

2. Saturn

3. sun

4. Mercury

5. Neptune

6. moon

(Down)

1. Venus

2. asteroids

3. galaxy

4. Jupiter

5. Uranus

6. Mars

7. meteorites

8. Pluto

Chapter 9

1. environment

2. pollutants

3. heavy

4. acid rain

5. gas

6. ozone

7. chlorofluorocarbons

8. conservation

9. oxygen

10. seven

Chapter 10

1. weather

6. humidity

2. climate

7. westerlies

3. air pressure

8. saturated

4. front

9. chinook

5. wind chill

10. inversion

-

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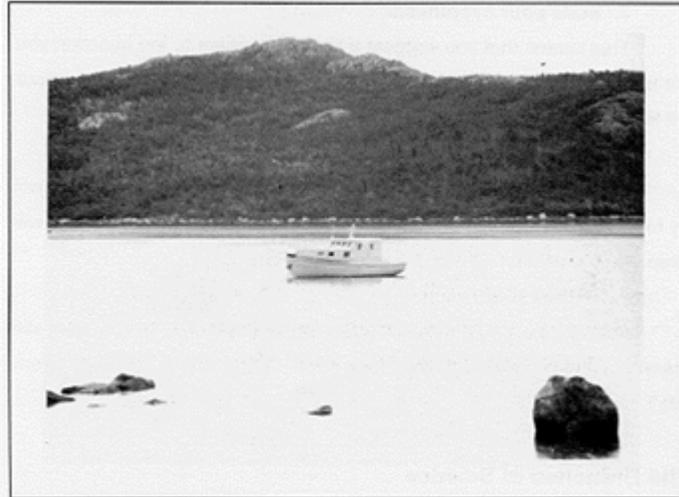
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-



Boats and ships float because they are not as heavy as the water they displace.

Scientific Method

Scientists use a standard method to study various problems and conduct experiments. Here are the steps in the scientific method.

1. State the problem.

Ask a question you will try to answer. You might ask, "What happens to a green plant when it is placed in darkness?"

2. Collect data.

Find out as much as you can about the problem you are studying. Read books and talk to other people about the problem.

-

Safety

You should follow safety procedures when you conduct certain experiments. These procedures will depend on the experiment. Check with an instructor before you start an experiment. Read all instructions carefully. Sometimes you will need to wear goggles or special clothing. You will need to know that certain chemicals should not be mixed or that some plants are poisonous. Keep your work area neat and clean. Make sure equipment is in good condition and know what to do in case of a fire.

Pretty Poison

Sodium and chlorine are dangerous elements. Sodium is corrosive and will burn the skin. Chlorine is a poisonous gas. If we put these two dangerous elements together we get sodium chloride. Sodium chloride is the chemical name for common salt. Salt is a substance we need to survive.

-

Power is a measure of the rate (speed) at which work is done. The work needed to move a weight of one pound a distance of one foot is one foot-pound. James Watt was a Scottish engineer He came up with the term horsepower to measure the power of steam engines. One horsepower equals 550 foot-pounds per second. The watt is used to measure power in the metric system. One horsepower equals 745.7 watts of power.

All living things need energy. Plants use the sun's energy to make food. Animals use the energy found in food.

There are two kinds of energy. They are potential energy and kinetic energy. Potential energy is also called stored energy. A rock on the top of a cliff has potential energy. If you push the rock off the cliff, potential energy becomes kinetic energy. Kinetic energy is the energy of movement. A moving speedboat has kinetic energy. So does a person jogging.

-

Does anyone want a 24-carat graphite ring? Carbon is an element. Graphite is pure carbon. Graphite is the dark material in the centre of some lead pencils. Graphite is also used as a lubricant. A diamond is also made of carbon. So, why don't women wear 24-carat graphite rings? The reason is that graphite is much softer than diamond. Graphite is soft because its atoms are arranged in flat sheets or layers. These sheets can easily slide back and forth over each other. The atoms in a diamond are very close together. This makes a diamond so hard that it can cut other materials.

-

Animals breathe in oxygen and give off carbon dioxide. This exchange of oxygen and carbon dioxide is an important part of the cycle of life on earth. Plants serve as food for many animals. All animals depend on plants in some way for survival. Plants also keep soil from being blown or washed away.

Plants make their own food. To do this, plants use air, sunlight and water. The process by which plants make food is called photosynthesis. Photo means light. Synthesis means putting things together to make something.

Try this simple experiment involving plants and sunlight. Place a green plant in a room with one window. Make sure the leaves are facing away from the window. What do you think will happen? Was your guess correct? Can you explain this?

Evolution

Charles Darwin was a scientist who was born in England in 1809. Darwin was a naturalist. This means that he studied nature. Darwin is best known for developing the theory of evolution.

The theory of evolution says that life on earth has changed. Most of these changes happened slowly over millions of years. One part of the theory of evolution is called natural selection. This means that plants and animals best suited to their environments have the best chance of survival. They also produce the most offspring. This idea is also called survival of the fittest. The theory of evolution has led to many arguments since Darwin presented it.

-

The male and female caplin separate into different groups just before spawning begins. The males move inshore and the females stay in deeper water. The females come ashore later.

Each female may mate with two males. The female releases her eggs into the shallow waters washing over the beach. The male deposits his milt (sperm) over the eggs. The tiny eggs then sink into the sand and gravel. Fifteen to twenty days later the larvae hatch and are washed out to sea. The larvae measure from three to six millimetres long. Six months later the caplin are ten times that length. Three or four years later, the caplin come back to their birth place to reproduce.

Fossils

When living things die their remains may be preserved in mud, rocks or ice. These remains are called fossils. There are fossils in different parts of Newfoundland and Labrador. Fossils can be seen along the banks of the Manuels River in Conception Bay. Fossils have been discovered at Sculpin Island near Nain and at Mistaken Point, near Cape Race. The Mistaken Point fossils are the oldest deep-water marine fossils in the world. Fossils have also been found near Knob Lake, Labrador. They have also been found at Point Riche, Daniel's Harbour, Random Island and other places.

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The skin has three layers. These are the epidermis, the dermis, and subcutaneous tissue. The epidermis is the outer layer of skin. It is about as thick as a sheet of paper in most places. The dermis is the next layer. It is much thicker than the epidermis. The inside layer is called subcutaneous tissue. This layer is much thicker than the dermis and epidermis. Hair, nails and sweat glands are also considered part of the skin.

Why doesn't everyone have the same skin colour? Skin colour comes mainly from melanin. This is a brown pigment produced by melanocytes. Melanocytes are cells in the epidermis. Melanocytes of darkskinned people produce more melanin than do those of light-skinned people. Sunlight also causes the skin to produce more melanin. Sometimes melanin builds up and forms freckles.

Organ Systems

A group of organs working together makes up a system. There are several different systems in the human body. There is the skeletal system, the muscular system, the nervous system, the circulatory system, the respiratory system, the digestive system, the reproductive system, and the excretory system.

Skeletal System

The stem, keel and ribs are the basic framework of a boat. These things also give the boat its basic shape. The skeleton works something like that. The skeleton supports the body and gives the body its basic shape. The human skeletal system contains 206 bones.

-

Excretory System

The excretory system removes water, waste material and harmful substances from the body. This process is called excretion or elimination. The lungs, skin, kidneys and lower intestine are involved in excretion. The urinary system is considered part of the excretory system. The kidneys and bladder are parts of the urinary system. Solid wastes are removed from the body through the intestine during bowel movements.

Reproductive System

To reproduce means to make more of a certain thing. The reproductive system makes it possible for humans to create other humans. The next chapter deals with reproduction.

Are you right-eyed or left-eyed? Each of your eyes sees things from a different angle. But your brain pays more attention to what one eye sees than what the other sees. You can find out which eye is the dominant one for you. Here's how. Take a sheet of paper and put a small hole in the centre. Hold the sheet about half a metre in front of your face. Keep both eyes open. Look through the hole in the paper and focus on a small object such as a button or small knob. Close your left eye. Can you still see the object? If you can, you are right-eyed. Close your right eye. Can you still see the object? If so, you are left-eyed.

-

The female reproductive system consists mainly of several organs located in the pelvic area. The uterus is one of these organs. The uterus is a hollow, pear-shaped, muscular organ inside the female's body. This is where a baby develops. The uterus is also called the womb. The ovaries are two small, oval organs, one on each side of the uterus. The ovaries make, store and release eggs. The ovaries also produce two kinds of hormones. These are progesterone and estrogen. Eggs from the ovaries reach the uterus through the fallopian tubes.

The female menstrual cycle covers about 28 days. During each menstrual cycle, the female reproductive system gets ready for fertilization and pregnancy.

Each ovary contains about 400,000 egg cells. These cells are called oocytes. They are in the female's body when she is born but are not active until the first menstrual cycle. After that, many oocytes mature every month. Usually, only one oocyte in one of the ovaries reaches full maturity each month. This mature egg is released from the ovary through a process called ovulation. This happens about halfway through the menstrual cycle. After ovulation, the egg travels through one of the fallopian tubes toward the uterus. The egg may be fertilized as it passes through the fallopian tube. If the egg is not fertilized, the uterus releases tissue containing the egg. This process is called menstruation. Menstruation usually lasts from three to seven days.

Most women produce eggs until they are between the ages of 45 and 55. The menstrual cycle changes and then stops. This period of a woman's life is called menopause. A woman cannot become pregnant after she has gone through menopause and not had a period for 12 months.

Some couples use what is called natural family planning to prevent or to cause pregnancy. In the rhythm method of birth control, couples do not have intercourse during the time each month when an egg can be fertilized. The main problem with the rhythm method is in figuring out a woman's fertile period. The rhythm method is very unreliable.

Abortion involves ending a pregnancy before the fetus has fully developed. This operation kills the embryo or fetus. An abortion may be either spontaneous or induced. A spontaneous abortion is also called a miscarriage. During a miscarriage, the fetus passes from the woman's body. Many spontaneous abortions result from natural causes. A pregnancy may also be ended by deliberately removing the unborn fetus. This is called induced abortion. Doctors can induce abortions in several ways. The issue of abortion is very controversial.

-

Fats

Fats contain more calories than carbohydrates. One gram of fat contains about 9 calories. Polyunsaturated fatty acids are an important part of a healthy diet. These fatty acids are found in safflower, corn, soybean, peanut, cottonseed, canola, sunflower, and sesame seed oils. They are also found in some fish such as salmon and mackerel.

Proteins

Proteins also provide energy. One gram of protein contains about 4 calories. Proteins are important building materials for the body. Proteins are made of smaller units called amino acids. Our bodies can manufacture some amino acids. Others must come from the foods we eat. Meat, poultry, eggs, cheese, fish and milk are good sources of protein.

Minerals and Vitamins

Minerals and vitamins help the body grow and function properly. The human body needs only small amounts of various vitamins and minerals. But these small amounts are important. For example, calcium, magnesium and phosphorus help keep bones and teeth strong. Calcium is important for blood clotting. People who do not get enough calcium may develop osteoporosis. Other factors such as smoking and lack of exercise also increase the risk of getting osteoporosis. Osteoporosis is a weakening of the bones. Calcium is found in milk, cheese and other dairy products. If you cannot consume milk products, you may need to take a calcium supplement.

-

There are many things you can do to deal with stress. Many people use relaxation and deep breathing. Others use meditation or prayer. Some people listen to soothing music. Others take a warm bath. Some people go for a walk, a swim or a workout at the gym. Others read a book. Studies show that pets can help people relax. Regular exercise and proper nutrition are important in preventing and dealing with stress.

You will have to find what helps you handle stress. The library probably has several books on the subject of stress. You may need help from a friend, a doctor or counsellor. People who help you are part of your support group.

Attitude

Attitude is also important in handling stress. You should try to make the best of every situation. This is what psychologists call having a positive mental attitude. Sometimes we just have to accept things as they are. There are some things we can change. There are other things we cannot change.

-

Groups of Drugs

Drugs can be classified in different ways. This means that they can be put into different groups. There are four important groups of drugs. These are: (1) drugs which fight bacteria, (2) drugs which prevent infectious diseases, (3) drugs which affect the heart and blood vessels, and (4) drugs which affect the nervous system.

Some drugs are used to fight bacteria. These drugs include antibiotics and sulfa drugs. Sulfa drugs are prescribed to treat diseases like pneumonia, meningitis and flu. Flu is short for influenza. Some drugs prevent diseases. These drugs may be vaccines, antiserums or globulins.

Vaccines

A vaccine causes the body to produce substances called antibodies. Antibodies travel through the bloodstream and fight a particular disease. The body then builds up resistance to this disease. Vaccines have been used to fight diseases like polio, hepatitis, cholera, measles, mumps and smallpox.

Antiserums and Globulins

Antiserums and globulins also prevent diseases. These medications contain antibodies. This means that they act more quickly than vaccines in fighting diseases. Doctors prescribe antiserums or globulins for a person who has been exposed to a disease but has not been vaccinated. Antiserums are used to fight such diseases as tetanus (lockjaw) and diphtheria. Globulins are used against tetanus, rabies and hepatitis.

Precautions

It is important to be careful when taking any kind of drug. Here are some things to remember.

1. Do not take a drug prescribed for another person. Taking another person's medication can be dangerous. You may not have the same illness as the other person. The dosage may be too high for you. You may be allergic to certain drugs. There can be other problems as well.
 2. Do not save prescription drugs to use later. You should get a new prescription. You may not have the same illness you had before. The medicine can change over a period of time, so that it is no longer useful. The medicine might even be dangerous.
 3. Do not keep nonprescription drugs too long. These drugs can also change and become useless or dangerous.
 4. Read all the instructions on drug labels. Follow the instructions carefully. These instructions tell you how much medication to take and for how long. The instructions might tell you to take the medicine at a certain time. They might tell you to take the medication with food, water or juice.
 5. Tell your doctor (or dentist) about any unexpected side effects you get from medication. Just because a medicine has been prescribed doesn't mean it will be what you need. Some people have allergies or other side effects from taking certain medicines.
 6. Keep all drugs in a safe, cool, dry place. This will make the drugs last longer.
 7. Keep all drugs out of reach of children.
 8. If you have questions about drugs, talk to your pharmacist.
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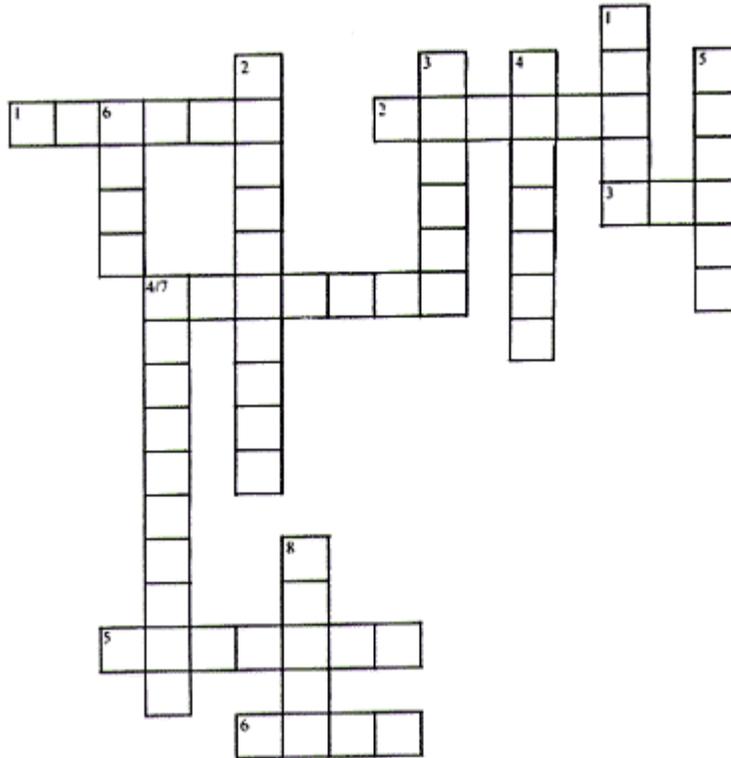
Why do we have a leap year every four years? It takes the earth 365.25 days to go around the sun once. A year on earth is 365 days long. We have a leap year every four years. Can you figure out why?

There are many artificial satellites orbiting the earth. These satellites were put there by humans. The earth has one natural satellite. It is called the moon. The moon exerts a gravitational pull on the earth. The pull of the moon and the sun causes the tides in our oceans. The gravitational pull of the earth keeps us from floating off into space.

The moon gets its light from the sun. Set up a model to show how this works. Get a globe of the earth. Get a lamp that is taller than the globe. Place the lamp about 25 cm. from the globe. Use a small ball as a model of the moon. Turn on the lamp. Turn off all other lights in the room. Hold the model of the moon over the globe. What do you notice? One side of the moon is lit up. The other side is dark. That's the way it is with the real moon when the sun shines on it. The side of the moon we see at night is lit up. The other side is dark. If you were on the moon, you would see the earth lit up. Half the earth is always in light, while the other half is dark. You can also use this model to show why we have night and day.

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Chapter 8 Crossword



Across

- 1 . These are made of dust and frozen gases.
- 2. This planet gets its name from the Roman god of agriculture.
- 3. It is the centre of our solar system.
- 4. The closest planet to the sun
- 5. This planet gets its name from the Roman god of the sea.

Down

- 1. This planet is often called the earth's twin.
- 2. Large objects which orbit in a belt between Mars and Jupiter.
- 3. A system of stars, dust and gases held together by gravity.
- 4. The largest planet in our solar system.
- 5. This planet is named for the Greek and Roman god of the sky.

6. This is the earth's natural satellite.

6. It is sometimes called the red planet.

7. Meteoroids which reach the earth before burning up.

8. It is the farthest planet from the sun most of the time.

Pollution

Pollution of the environment is a serious problem. Humans have polluted the air, soil and water. Polluted air can cause allergies and other illnesses. It can even cause death.

Carbon monoxide causes people to feel dizzy. Sulphur dioxide and oxides of nitrogen are harmful to the respiratory system. These oxides are also harmful to plants.

Things which pollute our environment are called pollutants. Many pollutants are created by things we use every day. Autos, factories, fertilizers and pesticides all cause pollution.

Here's how you can count dust. Get six microscope slides. Tape a piece of graph paper to one side of each slide. The graph paper serves as a grid. Spread a thin layer of Vaseline on the other side of each slide. Place the slides in various locations indoors and outdoors for a day or longer. Make sure the Vaseline side faces up. Collect the dusty slides. Look at each one under a microscope. Count the dust particles in five or ten of the little squares of the grid. Find the average number of dust particles in each location. Show this information in a bar graph.

The average Canadian produces two kilograms of garbage per day. This garbage includes plastic, glass, paper, aluminum cans, clothing and wood. There are things we can do to cut down on waste and help the environment. We can practise the four Rs. These are reduce, reuse, recycle, and recover. We can deliver waste materials to a recycling company. Some communities have what is called a "blue box" program. People leave newspapers, bottles and plastic in a blue box. A recycling company then collects these materials.

It is important to take care of the environment. This means that we should not leave cigarette butts, aluminum cans, plastic bags and other garbage around. It means we should not pour engine oil down the drain. It means we should not allow sewage to drain into ponds and rivers. There are many other things we can do to take care of our environment. Can you name some of these things?

Our homes are part of our environment. There are things we can do to make our homes environmentally friendly. We can check through the house for toxic wastes, such as paint thinners and strippers, weed killer, motor oil, lighter fluid, rat poison and bug sprays. All these things should be handled carefully and stored properly. They should not be poured down a drain or into the ground. They should be disposed of in a safe place. We can use phosphate-free detergents and non-toxic cleaners. Baking soda, vinegar and ammonia, and water can be used as cleaners and air fresheners.

Many appliances, cars and buildings today are more energy-efficient than they used to be. This means they use less electricity, gas or other forms of energy. We have to look at other energy sources besides coal, oil, gas and electricity. Solar energy, wind power, and wave and tidal power could be alternative energy sources.

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Weather is not the same as climate. Weather is the condition of the air over a short time and it can change quickly. Climate is the average weather over a long period of time. Climate includes average temperature, humidity, sunshine, and the amount of rain and snow.

Temperature is a measure of heat. Only about one two-billionth of the sun's heat enters the atmosphere. The rest is lost in space. About 34 per cent of the sunlight that enters the atmosphere is reflected back into space. Clouds cause most of this reflection. Heat from the ground and oceans warms the atmosphere. The atmosphere absorbs the heat and prevents it from easily passing back into space. This causes what we call the greenhouse effect.

Air pressure is the force of air pressing on the earth. Temperature affects air pressure. Warm air is lighter than cool air. Warm air forms a low-pressure area, also called a low. Cool air forms a high-pressure area, or high. Air usually moves from high-pressure areas to low-pressure areas. High-pressure areas usually have clear skies. Low-pressure areas usually have cloudy skies.

A front is a zone that develops when the edge of a cold air mass and the edge of a warm air mass meet. Most changes in the weather happen along fronts. Cold fronts cause sudden changes in weather. The jet stream is a band of fast-moving air currents high in the atmosphere. The jet stream has a great effect on the weather.

Ships relay weather information to ground stations. Weather ships also launch balloons that record conditions in the upper atmosphere. Ships also release special buoys, which float on the ocean. These buoys record weather conditions and transmit the information to satellites. Meteorologists use computers to study the data they get from various sources. They use this data to prepare weather maps and forecast weather conditions.

Weather Lore

Many of us have heard the following saying: "Red sky at night, sailors delight. Red sky at morning, sailors take warning. " Another belief is that if March comes in like a lamb it will go out like a lion, and vice versa. Can you think of other sayings or beliefs about the weather?

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gravitational: having to do with gravity

hallucinate: to see, hear or sense things that are not real

hallucinogen: a drug which causes people to hallucinate

hemoglobin: protein found in red blood cells; it carries oxygen throughout the body

hepatitis: a disease of the liver

heredity: the passing on of characteristics from parents to offspring

humidity: amount of moisture in the air

hydrocarbon: compound which contains hydrogen and carbon

hydrosphere: the water on the earth and in the air

hypertension: high blood pressure

hypertensive: having to do with high blood pressure

hypnotic: having to do with hypnosis

hypothesis: a possible answer to a question

infectious: can be passed from one person to another, as in an infectious disease

influenza: the flu

intrauterine: within the uterus

inversion: turning upside down

involuntary: cannot be controlled

ionic: having to do with an electrically-charged atom or molecule

kinetic: having to do with movement

ligation: tying off

medication: medicine

melanin: skin pigment

melanocytes: cells which produce melanin

menopause: the final stopping of a female's menstrual period

menstruation: a female's monthly release of blood from the vagina

mescaline: a drug made from a Mexican cactus

meteorite: a piece of natural metal or stone that falls to the earth

meteoroid: a chunk of iron and stone

meteorologist: a person who studies the weather

meteorology: the study of weather

-

microscopic: can be seen only with a microscope

moderation: just the right amount

molecule: the smallest particle which has the chemical properties of the original substance

moratorium: the death or end of something

narcotics: drugs that dull the senses, relieve pain, and bring on sleep

naturalist: a scientist who studies nature

nutrients: the parts of food your body needs to live and grow

nutrition: food; the process by which food is taken in and used by the body

osteoporosis: a weakening of the bones caused by lack of calcium

ovulation: the release of an egg from the ovary

penicillin: a drug used to fight many diseases

pesticides: chemicals used to control insects and other pests

phosphate: a compound of phosphorus used in fertilizers

photosynthesis: the process by which plants make their own food, using sunlight and air

placenta.. an organ which connects the embryo to the mother's blood supply

pollutants: things which pollute

potential: that which is possible, as in potential energy

precipitation: rain, snow, sleet and other forms of moisture which fall from the air

progesterone: a hormone produced by the ovaries

protoplasm: a jelly-like substance in plant and animal cells

psychologist: a scientist who studies behaviour

psychology: the study of behaviour

respiration: the process of breathing

respiratory: having to do with breathing

riboflavin: vitamin B2

saprophyte: fungi which live on decaying matter

saturated: holding as much moisture as possible

sedative: a drug which relaxes the nervous system

silicates: salts which come from silica (sand)

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reproductive system, 39, 41-49
respiratory system, 36-37
rest, 58
safety (laboratory), 9
Saturn, 73-74
science, branches of, 4-6
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Illustrations:

C. Coish (Cover - Marine Lab at Logy Bay, p. 31 p. 51 p. 141 p.211 p. 801 p. 91), Steck Vaughn (p. 17), DFO (p. 27), B. C. ABE Science (p. 38), Supply and Services Canada, (p. 57), Globe Book Company, (p. 69), NASA, (p. 72, p. 74), NOAA (p. 96).

3. State your hypothesis.

This means that you suggest a possible answer to the question you are asking. Your hypothesis might be that the plant will lose its green colour if it is put in a dark place.

4. Test your hypothesis.

In this step, you conduct experiments and do other research. You will try to find the answer to the question or questions you have asked. You will keep one plant in the light and one in darkness.

5. Report your results.

Write down your results and state your conclusions. Is one plant still green? What happened to the other plant? What do you conclude from this?

The Branches of Science

Science has four main branches. These branches are: (1) mathematics and logic, (2) the physical sciences, (3) the life sciences, and (4) the social sciences.

Geology is one of the physical sciences. It involves the study of rocks, minerals and other things which make up the earth and other planets. Geologists study volcanic eruptions, earthquakes and erosion. Erosion is the wearing away of land by water, wind or other forces. Geologists also study moon rocks and meteorites. Geologists have been very busy in this province since the big mineral discovery at Voisey's Bay in Labrador.

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111. Materials and Methods

Say exactly what you did to test your hypothesis. Tell what the conditions were, what equipment you used, how long it took, the order in which you did things, and so on. Include as much detail as possible. You should also have a control for your experiment. For example, if you are studying the effects of acid rain on the growth of spruce seedlings, you will expose some seedlings to acid rain. Some seedlings will not be exposed to acid rain. The seedlings not exposed to acid rain will be your control.

IV. Observations and Results

Write down what you observed during your experiment. Tell exactly what happened. How tall were the seedlings when you started your experiment? How tall were they a week later? Two weeks later? A month later? You can use graphs, tables and drawings to show your observations.

V. Analysis and Conclusions

In this part of your report you say what the results mean. All conclusions must be based on the data you collect. If you give an opinion, you should say that a certain statement is your opinion.

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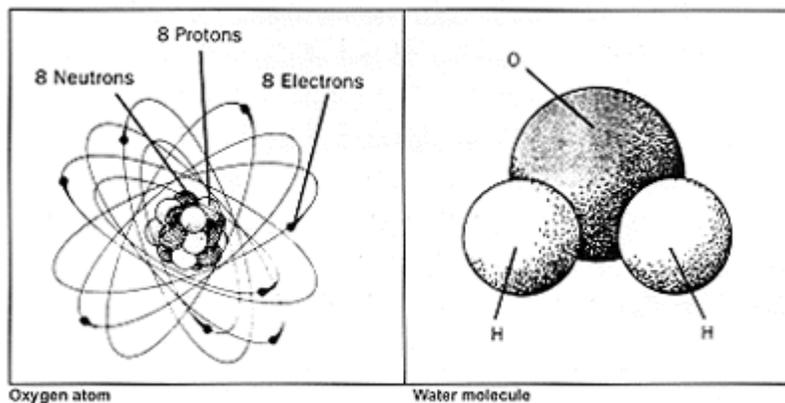


Tides and waves contain energy.

Magic Wand

Take a plastic comb and rub it back and forth on a piece of wool cloth. The comb will pick up electrons from the cloth. This gives the comb a negative charge. You can now use the comb to attract some things and repel other things. Tear a piece of tissue into small pieces. Hold the charged comb next to the pieces of tissue. What happens? Try holding the comb near a ping pong ball. What happens? Hold the comb near a stream of water running from a tap. What happens? Sprinkle some salt and pepper on a plate. Rub the comb well on the wool cloth and hold it just above the plate.

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Atoms and molecules are very small. If you could count 10 million molecules per second, it would take about 5 million years to count all the molecules in a single drop of water!

A water molecule consists of two hydrogen atoms and one oxygen atom. The chemical formula for water is H_2O . The size of a molecule depends on the size and number of atoms it contains. Some molecules have only two atoms. Other molecules contain thousands of atoms.

Some substances are made of units called ions. Ions are atoms or groups of atoms with either a positive or negative charge. These substances are called ionic substances. Table salt is an ionic substance. It consists of positive sodium ions and negative chloride ions. Electric forces among the ions hold the salt crystals together in a certain pattern.

Darwin took part in a scientific expedition on board the H. M. S. Beagle. Darwin studied plants and animals in different parts of the world. One of these places was the Galapagos Islands, off the coast of Ecuador. Many unusual animals live on the Galapagos Islands. These animals include giant sea turtles, iguanas, and unusual mockingbirds.

Organisms can adapt to their environment. Polar bears live in very cold weather. Most organisms would not survive in such cold temperatures. Polar bears have a thick layer of fat and dense fur which protect them from the cold. The camel lives in the hot, dry desert. Alligators can live in hot, humid marshes.

Plants must also adapt to their environment. The cactus grows in a hot, dry desert. A fir tree needs a cool, moist environment.

An organism must be well suited to its environment in order to survive. It must be able to stand the climate. It must also be able to get food, protect itself from enemies, and reproduce.

Simple Organisms

An amoeba is an organism that consists of a single cell. An amoeba is neither a plant nor an animal. Some amoebas live in water and moist soil. Some live in the bodies of animals and humans. Most amoebas are not harmful to people.

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Codfish live near the ocean floor. They often swim up closer to the surface for feeding. They swim at an average speed of 6 kilometres per hour.

Most cod spawn in offshore waters during late winter and early spring. One codfish may produce as many as 8 million eggs at one time. Very few of these eggs develop into mature fish. Most eggs rise to the surface and drift around with the plankton. This is where the eggs hatch.

The young codfish feed on plankton. They move to the bottom of the ocean when they are from 2.5 to 5 centimetres long. There they feed on worms and small shrimp.

Cod populations will not be the same at all times in any one area. Some cod migrate when the water temperature changes. This usually happens when the seasons change. Cod may also migrate to search for food or to spawn. Mature codfish eat smaller fish, squid and shellfish.

Caplin

Codfish eat a lot of caplin. The caplin is one of the smallest fish in this part of the world. It measures from 13 to 20 centimetres at maturity. The caplin has a blue or olive green back and a silvery underside. This little fish is a close relative of the smelt. The caplin is also a food for herring, salmon, flounder, haddock, seals, whales, gulls, pets and people.

Spawning ridges develop on the male a month or so before the spawning season. These ridges give the male a sturdier look than the slender female. During the rest of the year it is hard to tell the difference between male and female caplin.

Caplin live in the North Atlantic. They can also be found in the North Pacific. Caplin come ashore to spawn, usually in June or July. This often happens during what we call caplin scull weather. This weather brings onshore wind, fog, and drizzle. Some caplin spawn offshore in water from 30 to 60 metres deep.

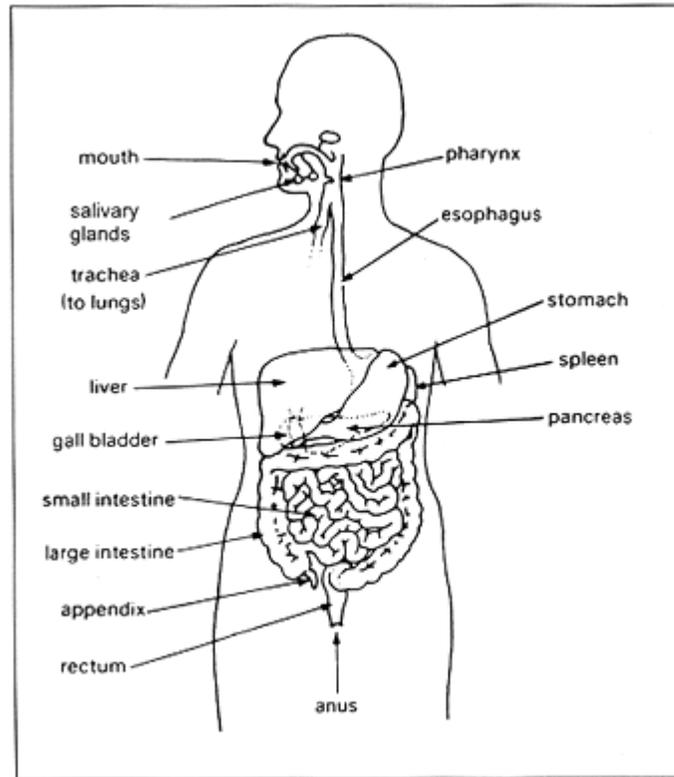
There are two main parts to the human skeleton. The axial skeleton consists of the bones of the head, neck and trunk. The trunk is the main part of your body between your neck and waist. The skull and spine are parts of the axial skeleton. The spine is made up of bones called vertebrae. The vertebrae have discs between them. The bones of the arms, hands, legs and feet make up the appendicular skeleton. Appendicular comes from the word appendix. An appendix is something which is added on or attached to something else.

The human skeleton has two basic kinds of joints. One kind is called fixed joints. Fixed joints cannot move. The bones of the skull contain fixed joints. The other kind is called movable joints. The elbow, the knee and the jawbone are examples of movable joints.

Bones work with the muscles to allow us to move. Bones protect our brain, heart, lungs and other body organs. Bones also store minerals that our bodies need. Our bone marrow is always producing new red blood cells. The spleen stores these cells until the body needs them. Then the cells are released into the bloodstream. Ligaments link bones to other bones. Muscles move bones by pulling on tendons. Ligaments also hold body organs in place. Ligaments are as strong as rope, but they can be damaged. A sprain is an injury to a ligament. Damaged ligaments take a long time to heal. Special medical treatment is often needed.

Tendons link muscle to bone. Tendons are also called sinews. Tendons may be round or long and flat. A cut tendon can be rejoined by surgery. Damaged tendons may take six weeks or longer to heal.

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Human digestive tract

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The male reproductive system includes the testicles, scrotum, glands, a duct system and the penis. The testicles produce sperm and are located in the scrotum. The duct system carries the sperm. The glands provide fluids that keep the sperm alive. The prostate is one of these glands. Sperm leave the body through the penis.

When a male ejaculates during sex, sperm enter the vagina. They travel into the uterus and from there into the fallopian tubes. Most sperm die along the way. Only a few thousand reach the area near the end of each fallopian tube.

Some sperm may reach the fallopian tubes in a few minutes. Others take hours to get there. Sperm can survive in the fallopian tubes for up to 48 hours. It takes an egg about 24 hours to pass through a fallopian tube. The egg can be fertilized only during this period. Intercourse must take place at about the time of ovulation for a woman to get pregnant.

There are two layers of cells on the surface of a newly-released egg. A sperm must pass through both layers to fertilize the egg. The sperm releases special enzymes that scatter the cells of both layers. Several sperm may begin to penetrate an egg, but only one can fertilize it. After the first sperm enters, the egg releases substances that prevent other sperm from entering.

During fertilization, the chromosomes of the sperm combine with the chromosomes of the egg. Most body cells have 23 pairs of chromosomes. Each egg and sperm cell has only 23 single chromosomes. This means that a fertilized egg has 46 chromosomes (23 pairs). A fertilized egg is called a zygote.

Hormone drugs may be used to prevent pregnancy. Oral birth control pills contain hormone drugs. These drugs prevent the release of eggs from the ovaries. They also prevent an egg from attaching itself to the uterus. Birth control pills must be used regularly, as directed by a doctor. These pills cause harmful side effects in some women.

Contraceptive implants may also be used. These implants contain hormone drugs. The implants are tiny capsules inserted under the skin by a doctor. The capsules slowly release hormone drugs into the body. The implants must be replaced regularly by a doctor. They may be removed if a woman wants to get pregnant.

IUDs are also effective in preventing pregnancy. The full name for IUDs is intrauterine devices. An IUD is a tiny metal or plastic device that is inserted into the uterus by a doctor. IUDs are easy to care for, but some women have undesirable side effects when using them.

The diaphragm and the cervical cap are other birth control devices that must be fitted by a doctor. These are inserted into the vagina and cover the opening of the uterus. A spermicide must be applied to the diaphragm or cervical cap. (A spermicide is a drug that kills sperm.) A device called the vaginal sponge can also be used to prevent pregnancy. The sponge is treated with spermicide. It works in a similar way to the diaphragm and the cervical cap. Vaginal spermicides can be used by themselves, but they are not very effective in preventing pregnancy.

A condom is a thin sheath made of latex rubber. It is worn over the penis during sexual intercourse. Sperm are trapped inside the condom and cannot reach the fallopian tubes. Another birth control method is to withdraw the penis from the vagina before the sperm are released. This is not very effective.

Some minerals are needed in tiny amounts. These are called trace elements. Some of these trace elements are iron, copper, iodine, manganese and zinc. Trace elements are found in green, leafy vegetables, whole-grain breads and cereals, seafood, liver and other foods. Iron is needed for healthy blood. Iron helps make hemoglobin. Hemoglobin carries oxygen to the cells of your body. Generally, women need more iron than men. The reason is that women lose iron each month through menstruation. This iron needs to be replaced. Fish, meat, chicken and turkey are good sources of iron. Whole grain and enriched breads and cereals also contain iron.

Our bodies also need vitamins. Vitamins regulate chemical reactions in the body which change food into energy and new cells.

Vitamin A is important for healthy skin and bones. This vitamin is also important for good eyesight and night vision. (This does not mean that Vitamin A can take the place of eyeglasses!) The human body can make Vitamin A from a substance called carotene. Dark green and orange vegetables and orange fruits contain carotene. These foods include spinach, carrots, sweet potatoes, apricots and cantaloupe. It is better to get Vitamin A from natural foods rather than pills.

Vitamin B1 helps change starches and sugars into energy. Vitamin B1 is also called thiamine. Meat and whole grain cereals, broccoli and other foods contain this vitamin.

Vitamin B2 is also called riboflavin. This vitamin is important in chemical reactions that occur when the body processes food. Fish, meats, liver, cheese, milk and green vegetables contain riboflavin.

The B6 vitamins are also important in the chemical reactions in our bodies. Many foods contain small amounts of these vitamins.

Exercise and Rest

It is important to get regular exercise. Walking, swimming and jogging are good forms of exercise. Check with a doctor before starting an exercise program. Your body also needs a certain amount of sleep and rest.

Proper foods, exercise and rest are also important for parts of the body such as the muscles and circulatory system. High blood pressure can lead to strokes or heart attacks. It is important to have your blood pressure checked regularly, at least every two years, or as often as your doctor recommends.

Stress

Stress is a result of the body's reaction to challenges. Stress can be good or bad. We need a certain amount of stress to do our best at work and in other situations.

Dr. Hans Selye was a Canadian doctor, who did a lot of research on the subject of stress. Dr. Selye talked about good stress and bad stress. Too much bad stress can have bad effects on the body.

Everyone does not react the same way to the same stress. Imagine that two people are involved in the same fender-bender. One person may remain quite calm while another person may be very upset about the damage to the car. The first person feels in control of the situation and will handle it. The second person may not feel in control of the situation. That person is avoiding the problem.

Stress may make it harder for the body to fight off disease. Doctors believe that some illnesses may be related to long or repeated periods of stress. These illnesses include ulcers and colitis, and other diseases of the stomach and intestines. Abnormal heart rhythms and heart attacks sometimes occur because of stressful events.

Heart and Blood Vessel Drugs

Diseases of the heart and blood vessels cause many deaths every year. Certain drugs are used to treat the heart and blood vessels. These are called cardiovascular drugs. Some of these drugs are used to steady the heartbeat. Other drugs strengthen the heartbeat. Others, such as nitroglycerin, are used to dilate (widen) small blood vessels. This allows the blood to flow more freely. Some drugs are used to treat high blood pressure, also called hypertension.

Drugs and the Nervous System

Many drugs affect the human nervous system. Alcohol, caffeine, cocaine, marijuana, heroin, morphine and sleeping pills are some of these drugs. Five main kinds of drugs affect the nervous system. These are: (1) analgesics, (2) anesthetics, (3) hallucinogens, (4) stimulants, and (5) antianxiety and hypnotic drugs.

People use analgesics to relieve pain. The two kinds of analgesics are narcotics and nonnarcotics. Nonnarcotics usually do not affect a person's senses. Aspirin and Anacin are common nonnarcotic analgesics. People take these to relieve headaches and other common ailments. Narcotic analgesics are more powerful and may make a person drowsy, dazed or "high". Codeine, heroin and morphine are narcotic analgesics. Doctors prescribe these drugs for severe pain.

Anesthetics make part of the body feel numb, or they may make a person unconscious. Dentists use local anesthetics to deaden the area around the mouth. Doctors use local anesthetics for surgery in which the person can remain conscious. They use general anesthetics to put people "asleep" during operations.

Hallucinogens are drugs which cause people to hallucinate. This means they see, hear, or sense things that are not real. Marijuana, LSD and mescaline are hallucinogens.

Stimulants are drugs which keep you awake. They also keep you from feeling tired. These drugs stimulate the nervous system and may make a person feel good for a while. Many people become depressed or tense after the effects of these drugs have worn off. Some people may continue to take the drugs and become addicted. Stimulants are like all drugs since they can be very dangerous, especially if used often. Caffeine, cocaine and amphetamines are stimulants. "Pep pills" and "speed" are amphetamines. Antianxiety and hypnotic drugs also affect the nervous system. These drugs help a person relax. Alcohol, tranquilizers and sedatives are examples of these drugs. Tranquilizers are drugs which relax and calm people. These drugs are also called depressants.

Other Drugs

There are other kinds of drugs. Some of these are vitamins, hormones and antidiuretics. The human body needs many different vitamins. Doctors may prescribe vitamins for people who are lacking certain ones. Hormones are chemicals produced by the body. Sometimes people are lacking certain hormones. Some diabetics do not produce enough insulin.

Diuretics are drugs which cause the body to produce more urine than it normally would. When the body does not produce enough urine, salts, wastes and fluids build up in the body. Diuretics may also be used to treat high blood pressure.

The earth is surrounded by air. This air is the earth's atmosphere. The atmosphere is 78 per cent nitrogen and 21 per cent oxygen. The remaining 1 per cent consists of argon or traces of other gases. The air also contains water vapour and dust particles. Air farther from the earth is thinner than air closer to the earth.

Seventy per cent of the earth's surface is covered by water. This water, as well as ice and water vapour make up the earth's hydrosphere. Hydro means water. This means that only 30 per cent is dry land. The biosphere includes all areas of the earth and atmosphere where life is found.

Mercury

Mercury is the closest planet to the sun. It is almost 58 million kilometres from the sun. The surface of Mercury seems to be much like the surface of the earth's moon. This planet has broad, flat plains, steep cliffs and many craters. It is dry and very hot. During the day the temperature can be more than 400 degrees Celsius. At night the temperature drops to -173 degrees Celsius. The atmosphere of Mercury contains oxygen, hydrogen, helium, and sodium. Mercury orbits the sun once every 88 days. The ancient Romans named Mercury in honour of their speedy messenger of the gods. Mercury can sometimes be seen low in the western sky just after sunset. At other times people on earth can see Mercury close to the eastern horizon just before sunrise.

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Other Objects in the Sky

There are also asteroids, comets and meteoroids orbiting the sun. Asteroids are large objects which orbit in a belt between Mars and Jupiter. Asteroids are also called planetoids, because they are like planets. Asteroids are made of rock, metal or both. Astronomers have calculated the orbits of around 4,000 asteroids. About 30 of these asteroids are greater than 190 kilometres in diameter.

Comets are made of dust and frozen gasses. Most comets stay near the outer edge of our solar system. When a comet travels close to the sun, we can see its bright head and long, glowing tail. Probably the most famous comet is Halley's Comet. It orbits the earth once every 76 years.

Meteoroids are chunks of iron and stone. Scientists believe these resulted from collisions between asteroids. Meteoroids may also be formed when comets break up. Meteoroids that reach the earth before burning up are called meteorites.

Why does a comet's tail point away from the sun? If you hold a streamer in front of a fan, the strands will point away from the fan. It's the same way with a comet. Solar radiation and solar winds push the dust and gases of the comet's tail away from the sun.

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Some people help reduce waste by starting a compost heap. They place potato peel, grass cuttings, soil, tea bags, egg shells and other waste materials in a special container or pile. They turn the pile regularly. Bacteria and other micro-organisms break down the material until it becomes a rich, natural fertilizer. We must find ways to cut back on our use of certain things. We also have to find ways to reduce pollution. Can you think of some ways to do this?

Air pollution is caused by such common pollutants as carbon monoxide, lead, nitrogen oxides and hydrocarbons. These pollutants come from coal, oil, wood and gasoline being used by people and industry. Smog is a problem in some large cities. This hazy pollution can be a serious health hazard. Can you suggest some ways to reduce air pollution?

Water is one of the earth's precious natural resources. We cannot live without it. Water pollution is a problem on the earth. This pollution is caused by many things. Raw sewage, fertilizer, pesticides and other toxic chemicals get into rivers, lakes and oceans and kill the fish. Oil spills damage the oceans and the shoreline. These spills kill fish, birds and other animals.

Pesticides can be very dangerous. Chemicals get into the air, water and soil. Fish take in these chemicals. People eat fish which contains these pesticides. These chemical substances can build up in the human body. They can cause illness and death.

Lead and mercury are examples of heavy metals. Heavy metals are dangerous when they get into the air, soil and water. These chemicals and substances can get into the food chain. Heavy metals are toxic to humans and can affect the nervous system.

Taking Care of the Environment

Conservation is the protection of the earth's natural balance and the wise use of its resources. Some resources are renewable. These include things like fish, animals and trees. Other natural resources are non-living and non-renewable. These are things like oil, natural gas and minerals. Our natural resources will not last forever, and we must do everything we can to protect them.

Many plant and animal species on earth are endangered. This means they might not be here for us to use and enjoy in the future. The government brought in the cod moratorium to protect cod stocks around Newfoundland and Labrador. The province does not have nearly as many pine trees as it once did. An animal called the pine marten is in danger of extinction, because much of its habitat has been destroyed.

Trees are a very important part of the environment. They take in carbon dioxide and give off oxygen. They store water and release it slowly as needed. They provide homes for birds and other animals. Swamps, bogs, marshes and ponds are also important for plants and animals. Tropical rain forests cover about seven per cent of the earth's land surface. These forests are disappearing. People are cutting down the trees to make lumber and to provide farmland.

There is such a thing as indoor pollution and it can also be a problem. Indoor pollution can affect the health of people. Indoor pollution can be caused by smoke, chemical fumes, and urea formaldehyde insulation. Can you think of others?

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Winds are named for the direction from which they blow. A southerly wind blows from the south. An easterly wind blows from the east. The prevailing westerlies blow across much of Canada. Weather announcers often talk about the wind chill factor. Wind chill is the estimate of how cold the wind makes people feel. A strong northerly wind will make the temperature seem colder than it would be with no wind.

Most of the moisture in the air comes from the oceans. Water evaporates from oceans and lakes and rises into the air. The amount of water vapour in the air is called humidity. The more moisture in the air, the higher the humidity. Air that holds as much moisture as it can is said to be saturated. The temperature at which the air becomes saturated is called the dew point. If the temperature falls below the dew point, the moisture in the air condenses. When this happens, drops of water settle on grass, leaves, windows and other surfaces. These drops of water are called dew. If the dew point is at or below freezing, we get frost. When warm, moist air near the ground is cooled to its dew point, we may get fog. When the air cools, we may get precipitation, such as rain or snow.

How did the horse latitudes get their name? The prevailing westerlies are winds which blow across most of Canada. The trade winds blow from the north and south and meet near the equator. There is an area between the prevailing westerlies and the trade winds called the horse latitudes. The winds in the horse latitudes are very light. Early Spanish sailors brought horses to America. The Spanish sailing ships sometimes became stalled in the light winds of the area. When the sailors ran out of water for the horses, they would throw the horses overboard.

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There is a type of weather balloon called a constant-level balloon because it floats at a certain altitude. This kind of balloon can stay in the air for many months. Constant-level balloons transmit data to satellites. The satellites relay the information to stations on the ground.

Satellites carry television cameras that take photos of the earth. The photos show such things as cloud patterns and large areas of snow and ice on the ground. The satellites beam picture signals to stations on the ground. These signals are used to make photos. Meteorologists use these photos to spot hurricanes and other weather features. Satellites also provide information on temperature and humidity, as well as wind speed and direction.

Airplanes and ships are also used to track weather. Special weather planes measure atmospheric conditions. Some commercial airplanes have equipment that records temperature, as well as the direction and speed of the wind. Some planes can transmit this information to satellites. Some planes release a type of radiosonde called a dropsonde. This device records weather conditions as it floats to earth on a parachute.

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Geologists study mountains like this one in Gros Morne National Park

Meteorology does not involve the study of meteors. This branch of science involves the study of the earth's atmosphere and the conditions that create different kinds of weather. Meteorologists study satellite pictures, the jet stream and weather patterns. They use this data to predict what the weather will be like. Some weather announcers are meteorologists.

The life sciences are also called the biological sciences. Biology is the study of living things. The two main divisions of biology are botany and zoology. Botany is the study of plants. Zoology is the study of animals. Botany and zoology both have smaller divisions or branches.

The Laboratory and Experiments

We often think of a laboratory as a special room where people conduct experiments. Lab is a short form of the word laboratory. A lab does not have to be indoors. It can be anywhere.

A lab can be big or small. It can be a single room or a whole building. The ocean is a huge laboratory where scientists study seals, cod, salmon, sea urchins and other species. The Marine Lab at Logy Bay is an example of a large laboratory. Scientists at the Marine Lab have done research on seals, cod, caplin and other species.

The forest can be a laboratory, where you might study fir trees or the spruce bud worm. Your own garden can be a laboratory, where you might look for weeds or bugs. Your kitchen can be a laboratory, in which you try out new recipes.

You should follow certain procedures when conducting an experiment or using a laboratory. It is a good idea to do a written report of your experiment. You should include the following in your written report:

1. Title

The title of your experiment should be specific. It should tell exactly what your research deals with. A title such as "Fish Populations" or "Tree Growth" is too vague. A good title might be "The Relationship Between Acid Rain and Tree Growth."

11. Purpose

State the problem you are studying. Don't use more words than you need. It is a good idea to state the problem as a question. For example, your question might be: "How does acid rain affect the growth of seedlings?" Scientists often use a hypothesis to state the problem they plan to study. A possible hypothesis might be: "Acid rain slows the growth of seedlings."

What happens? Why? You can probably find other "tricks" to do with a charged comb.

If we look at a pendulum we see an example of how energy can be changed and conserved. A pendulum at the top of its swing has potential energy because of its position. As the pendulum swings through the lowest point of its swing, it has only kinetic energy. When the pendulum swings to the top, its energy becomes potential energy again. The pendulum would swing back and forth forever if not for friction and air resistance. The energy used up in overcoming friction is changed into heat.

Properties of Matter

Matter has both physical and chemical properties. We observe physical properties through the five senses. We use these senses to recognize things around us. We recognize sugar and salt by taste. We recognize a loonie by its shape and colour. We recognize gasoline by its smell.

Density is another physical property of matter. Density is the mass per unit of volume. All objects do not have the same density. A block of cork weighs much less than a block of birch wood the same size. The cork is not as dense as the birch.

Scientists also talk about the solubility of different substances. Solubility is also a physical property. It refers to the ability of one kind of matter to dissolve in another. For example, sugar and salt can dissolve in water. We can also say that these substances are soluble in water.

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Another physical property is conductivity. This is the ability of matter to conduct heat or electricity. Copper conducts heat and electricity better than wood does.

Substances may undergo physical changes. When we freeze water we get ice. When we boil water we get steam. Water, ice and steam have different physical properties. But they all have the same chemical makeup. Each molecule of water, ice or steam contains two atoms of hydrogen and one atom of oxygen.

Substances also have chemical properties. Iron rusts when it combines with oxygen and moisture. Rusting is a chemical property of iron. The chemical reaction creates rust, which is also called iron oxide.

Molecules

A molecule is the smallest particle which has the chemical properties of the original substance. If the substance is broken down further, only atoms will remain. A drop of water contains billions of water molecules. If you could keep splitting a drop of water until only a single water molecule remained, that final drop would still have all the chemical properties of water. But if a water molecule is split, only hydrogen and oxygen atoms will remain.

Molecules are made up of atoms. Atoms contain protons, neutrons and electrons. Every atom has a nucleus at its centre. The nucleus contains protons and neutrons. The protons give the nucleus a positive electrical charge. Neutrons have no electrical charge. Electrons have a negative electrical charge and revolve around the nucleus. An atom usually has an equal number of protons and electrons.

An amoeba is made of a jelly-like material called protoplasm. Its skin is a thin, elastic membrane. An amoeba changes its shape every time it moves. Amoebas reproduce by splitting in two. This process is called fission.

A bacterium is also a simple organism consisting of one cell. Most bacteria can be seen only by using a microscope. Scientists are not sure whether bacteria should be classified as plants or animals. Some scientists say bacteria are neither plants nor animals.

Bacteria live almost everywhere. Many bacteria live in and on the human body. Most of these are helpful to humans. Bacteria help humans digest food. They help ferment cheese and wine. Bacteria help break down garbage so that much of what we throw away is no longer harmful.

Some strains of bacteria are harmful to humans. They cause diseases such as tuberculosis, pneumonia and whooping cough. Dead or weakened bacteria are used to make vaccines. These vaccines are then used to prevent diseases such as smallpox and mumps.

Most bacteria divide asexually. This means that a bacterium does not need another bacterium in order to reproduce. The bacterium splits in two through a process called binary fission. Some bacteria can double their numbers every 20 minutes. This means that if there is enough food, a single bacterium can produce a billion bacteria in 10 hours. This does not usually happen because the bacteria run out of food.

Viruses are microscopic organisms. They live inside the cells of other living things. Virus is a Latin word which means poison. Viruses cause diseases such as the common cold and measles. Many scientists think viruses are both living and non-living, because a virus by itself is lifeless and cannot reproduce. When it gets inside a cell, a virus becomes active and can multiply hundreds of times. Viruses sometimes live inside cells without causing any harm.

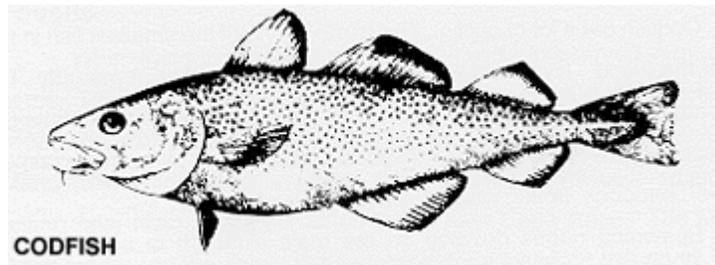
Life in the Oceans

Oceans cover 70 per cent of the surface of the earth- The oceans are important for many reasons. They influence the temperature of the air. Water evaporates from the oceans and later falls as rain. Life on earth could not exist without the oceans. Many scientists believe that life began in the oceans.

Scientists who study the oceans are called oceanographers. The oceans are full of life. Plankton are simple organisms found in the oceans. They serve as food for other forms of life in the sea.

Codfish

One species that lives in the ocean is codfish. Codfish have always been an important part of life in Newfoundland. Whole communities have existed because of this fish.



Codfish come in different colours. They may be gray, brown, black or reddish. They have small dark spots along the upper body.

Muscular System

The muscular system consists of all the muscles in the body. There are two main kinds of muscles in the human body. One kind is called voluntary muscles. These are muscles we can control, such as those in our arms and legs. Voluntary muscles are also called skeletal muscles. We use these muscles to move our bones.

The other muscles are called involuntary muscles. These are muscles we cannot control, such as the diaphragm, which controls breathing. The large blood vessels are made of a kind of involuntary muscle. This is called smooth muscle.

Other blood vessels and the stomach contain another kind of muscle tissue. These muscles help control the flow of blood and push food through the digestive system. The heart contains a special kind of muscle which keeps the heart beating and pumps blood through the body.

Nervous System

The nervous system consists of the brain and nerves. This system transmits messages to and from the brain. The brain and spinal cord make up what is called the central nervous system. The two main kinds of nerves are sensory nerves and motor nerves. Sensory nerves carry signals from the sense organs to the brain or spinal cord. The spinal cord runs from the brain to the pelvic area. The eyes, ears, nose, mouth and skin are sense organs. Motor nerves carry messages from the brain and spinal cord to various parts of the body. Every movement we make and every thought we have involves the nervous system in some way.

The nose, mouth, windpipe, lungs and diaphragm are all parts of the respiratory system. The diaphragm is a large muscle which controls our breathing. When the diaphragm moves down, air is pulled into the lungs. When the diaphragm moves up, air is pushed out of the lungs. Even the tiny hairs in the human nose are important in breathing. These hairs catch dirt and other particles in the air which enters the nose. The air is also warmed as it passes through the nose.

Here is a way to find out how much air your lungs can hold. Fill a large glass bottle or plastic container with water. Half fill a sink or large basin with water. Put the container of water in the sink. Put your hand over the top of the container and turn it over. Put a plastic tube into the opening in the container, with one end of the tube well above the water in the sink. Hold the container in place upside down. Take a deep breath. Blow into the tube. The air from your lungs will push water out of the jug. The amount of air in the container after you have exhaled as much as you can is the amount of air your lungs can hold. This is also called your lung capacity.

Digestive System

The digestive system processes nutrients and waste from the foods we eat and the liquids we drink. The mouth, stomach and intestine are parts of the digestive system. The liver, pancreas and gallbladder also help digestion by pumping chemicals into the intestine. These chemicals help break down fats, proteins and starches so that our bodies can use or store these nutrients.

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What determines whether the zygote will develop into a boy or a girl? This is done by special chromosomes. Each body cell contains one pair of sex chromosomes. In females, the two sex chromosomes are identical. Scientists call these X chromosomes. The cells of males have one X chromosome. They also have a smaller chromosome. Scientists call this the Y chromosome.

Each sperm or egg cell has only one sex chromosome. All egg cells carry one X chromosome. Half the sperm cells carry an X chromosome, and the other half have a Y chromosome. If a sperm with an X chromosome fertilizes an egg, the zygote will develop into a baby girl. This is true because the fertilized egg will have two X chromosomes. If a sperm with a Y chromosome fertilizes an egg, a baby boy will develop. This happens because the fertilized egg will have an X and Y combination.

Usually, only one egg is fertilized and develops into one baby. Sometimes, two or more babies develop in the uterus at the same time. The birth of more than one baby from the same pregnancy is called multiple birth.

After fertilization, the zygote travels through the fallopian tube toward the uterus. After it reaches the uterus, the zygote develops into an embryo and a placenta. The placenta is an organ that connects the embryo to the mother's blood supply.

The amnion forms a sac around the embryo. This sac is filled with fluid. The embryo floats in this amniotic fluid. The fluid protects the embryo and allows it to move.

About 20 days after the egg has been fertilized, blood begins to circulate between the placenta and the embryo. The blood vessels of the mother and those of the embryo exchange substances through the placenta.

Waste products from the embryo are carried away through this barrier. Oxygen and nutrients from the mother's blood pass through the barrier to the blood of the embryo.

About two months into the pregnancy, all the tissues and organs of the body have started to form. The central nervous system and the circulatory system have formed. The eyes, ears and limbs have developed. Defects in development may happen during these early weeks. These defects may be caused by substances which pass from the mother's body through the placenta. These substances may include medications taken by the mother, as well as bacteria, viruses, and other infectious organisms. They may also include cigarette smoke, alcohol and other drugs.

The central nervous system starts to develop in the third week of pregnancy. Birth defects can happen at this stage. One of these defects is a spinal disorder called spina bifida.

Doctors have several ways to track the development of the fetus in the uterus. One way is to use ultrasound. Ultrasound involves the use of high frequency sound waves to produce an image of the fetus on a screen. From this, a doctor can see the shape and features of the fetus. Doctors also use amniocentesis to see how the fetus is doing. Amniocentesis involves using a needle to take a sample of the amniotic fluid. This fluid contains cells from the fetus. The fluid and cells are then examined.

Birth Control

Contraceptives, or birth control devices, are used to prevent a woman from getting pregnant. Sterilization is an effective method of birth control. This operation blocks the sperm ducts in men or the fallopian tubes in women. The male operation is called a vasectomy. One female operation is called tuba] ligation. These operations usually cannot be reversed.

Vitamin B12 and folate help in the formation of red blood cells. These B vitamins are also important for a healthy nervous system. Animal products such as liver, meat, fish, eggs and milk contain vitamin B12. Green leafy vegetables, legumes and other foods contain folate. Folate is also called folic acid or folacin.

Niacin is another B-complex vitamin. Niacin allows cells to release energy from carbohydrates, fats and proteins. Fish, lean meat, liver, nuts, grain products and legumes (such as peas and beans) contain niacin.

Vitamin C is also called ascorbic acid. This vitamin helps maintain ligaments, tendons and other supportive tissues in our bodies. Vitamin C helps heal wounds and broken bones. Potatoes and citrus fruits, such as oranges and grapefruit, contain vitamin C. Vitamin C is also found in tomatoes, strawberries, green peppers, broccoli, cauliflower and vitamised apple juice.

Years ago, many sailors died from a strange disease. First the men would get dizzy and lose their appetite. Their mouths would get sore and their teeth would loosen, Their skin would turn black and blue.

The "sailor's disease" was called scurvy. No one knew what caused this disease, but many sailors got better after their ship reached shore. In 1535, explorer Jacques Cartier's crew developed scurvy. They drank juices from a fruit tree and were cured. Other sailors were saved in the same way, but no one knew why.

Two centuries later, sailors were still dying from scurvy. Then, several British doctors studied the disease. They found that some fruit juices could cure or prevent scurvy, but they still did not know what caused it.

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Different People Need Different Amounts of Food

The amount of food you need every day from the 4 food groups and other foods depends on your age, body size, activity level, whether you are male or female and if you are pregnant or breast-feeding. That's why the Food Guide gives a lower and higher number of servings for each food group. For example, young children can choose the lower number of servings, while male teenagers can go to the higher number. Most other people can choose servings somewhere in between.

<p>Grain Products 5-12 SERVINGS PER DAY</p>	<p>1 Serving</p> <p>2 Servings</p>
<p>Vegetables & Fruit 5-10 SERVINGS PER DAY</p>	<p>1 Serving</p>
<p>Milk Products SERVINGS PER DAY Children 4-9 years: 2-3 Youth 10-19 years: 2-4 Adults: 2-4 Pregnant & Breast-feeding Women: 3-4</p>	<p>1 Serving</p>
<p>Meat & Alternatives 2-3 SERVINGS PER DAY</p>	<p>1 Serving</p>

Other Foods

Taste and enjoyment can also come from other foods and beverages that are not part of the 4 food groups. Some of these foods are higher in fat or calories, so use these foods in moderation.



Enjoy eating well, being active and feeling good about yourself. That's VITALITY.

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Venus

Venus is the next closest planet to the sun. The average distance of Venus from the sun is about 108 million kilometres. Venus is about the same size as the earth. It is often called the earth's twin. Venus gets its name from the Roman goddess of love and beauty. At certain times of the year, Venus is the first planet or star that can be seen in the western evening sky. At other times, it is the last planet or star that can be seen in the eastern sky in the morning. Sometimes Venus is bright enough to be seen from earth during the daytime.

The orbit of Venus around the sun is almost circular. It takes Venus about 225 earth-days to make one orbit around the sun.

Venus is surrounded by thick clouds of sulphuric acid. The atmosphere contains mainly carbon dioxide. There are also small amounts of nitrogen and water vapour. There are traces of argon , carbon monoxide, neon and sulphur dioxide.

The temperature on the surface of Venus is around 462 degrees Celsius. Scientists think this high temperature is caused by Venus'greenhouse effect. This means that radiant energy from the sun reaches the surface of Venus and is trapped there by the thick clouds and dense atmosphere.

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Uranus is the seventh planet from the sun. This planet is named for the Greek and Roman god of the sky. Sir William Herschel discovered this planet in 1781. It takes Uranus more than 30,000 earth days to complete one orbit around the sun. The planet does one complete turn every 17 hours. Uranus is mostly cold, dense gas, with a small core of rock at the centre. There are at least 11 thin rings around this planet.

Neptune is the eighth planet from the sun. This planet is named for the Roman god of the sea. Neptune orbits the sun once every 165 earth years. This planet cannot be seen with the naked eye. Neptune is about 17 times as heavy as the earth. It has eight natural satellites and several rings around it. The surface of Neptune is surrounded by thick clouds. These blue clouds are mainly frozen methane. Scientists believe this planet consists mainly of hydrogen, helium, water and silicates.

Pluto is the farthest planet from the sun most of the time. It takes Pluto around 248 earth years to orbit the sun once. For about 20 years of that time, Pluto is closer than Neptune is to the sun. For the rest of the time it is farther than Neptune is from the sun. Because it is so far away, scientists do not know much about Pluto, Pluto is also too far away to be seen with the naked eye. You need a telescope to see this planet. Scientists estimate that the temperature on the surface of Pluto is around - 230 degrees Celsius.

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Water can absorb small amounts of waste material. But even the huge oceans cannot take unlimited pollution. The oceans are a major source of food for people. We must take care of them if we are to survive.

Bacteria are very helpful in breaking down chemicals and other wastes. Algae and green plants use the nutrients created by bacteria. Zooplankton and other microscopic animals eat the algae. Small fish eat the zooplankton and large fish eat the small fish. The large fish die and are broken down by bacteria. Then the whole cycle starts all over again.

Acid Rain

Acid rain is a serious problem for the environment. It is a problem for plants and animals, including humans. Acid rain is formed when moisture in the air combines with nitrogen oxide and sulphur dioxide. This combination produces nitric and sulphuric acids. These acids fall to the earth in rain or snow. The acids pollute brooks, rivers, ponds, lakes, and oceans. They contaminate drinking water and kill fish. They cause harm to crops and trees. Acid rain or snow can even damage buildings and other structures. The water vapour can be held in a cloud for a long time before it falls as rain. This means that acid rain can affect environments far from the source of the pollution. Have you seen any evidence of acid rain in your area?

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Ozone

Ozone is a form of oxygen. It is found in small amounts in the earth's atmosphere. Ozone is produced by lightning, electrical discharge from motors and other electrical reactions. You may notice its sharp smell near electrical switches or machines. Ozone is used to purify water and as a bleach.

A thin layer of ozone surrounds the earth. Ozone is very important in the upper atmosphere. It cuts down on the amount of radiation which reaches the earth from the sun. Scientists have discovered a hole in the ozone layer over Antarctica. This hole has been getting bigger. There is a smaller ozone hole over the Arctic in the winter months.

Ozone is a form of pollution when it is close to the earth. It can break down rubber and plastic. It can damage plant and animal tissue. Ozone can also react with other chemicals. It can irritate eyes and lungs and can cause headaches.

CFCs

Chlorofluorocarbons are chemical compounds. These compounds contain chlorine, fluorine and carbon. They are often called CFCs. CFCs have caused some of the destruction of the earth's ozone layer. CFCs were once very common in aerosol sprays. These compounds are also found in refrigerators and air conditioners. CFCs are also found in some kinds of insulation.

CFCs get into the air and slowly rise to the upper atmosphere. Ultraviolet radiation from the sun breaks up the CFC molecules. These fragments react with ozone and change it. This cuts down on the amount of ozone in the upper atmosphere. Scientists believe that a thinning of the ozone layer will lead to more cases of skin cancer.

Weather and Climate

Features such as oceans, large lakes and mountains, affect weather and climate. As wind blows against mountains, it rises and cools. The water vapour in this cool air condenses and forms clouds. The tops of some mountains are always hidden by clouds. The windward side of a mountain usually gets more rain and snow than the leeward side.

Land absorbs heat from the sun faster than water does. But the oceans absorb more heat, and they hold it longer. During the day, the land along coastlines becomes warmer than the ocean. The air over the land rises, and cool sea breezes blow in to replace it. Large lakes have a similar effect on the weather.

What is a chinook? A chinook is a warm, dry wind that sometimes flows down the eastern slopes of the Rocky Mountains in Alberta. The moving air becomes warmer as it falls and picks up moisture. The temperature at the foot of a mountain may rise by more than 20 degrees Celsius in three hours when a chinook passes through. Snow on the ground can melt very fast when this happens.

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The air temperature in cities is usually higher than in other places. There are several reasons for this. Autos, factories, and large buildings create lots of heat. Bricks, pavement and other materials absorb heat from the sun. This heat warms the air. Cities also create a lot of pollution. This pollution includes solid or liquid particles. Water vapour condenses on these particles and creates raindrops. This is why most cities get a lot of rain. Sunlight acts on some pollutants and forms a gas called ozone. Large amounts of ozone can kill plants. This gas can also irritate the eyes, nose and throat of some people.

What is a thermal inversion? City weather is sometimes the result of something called a thermal inversion. A thermal inversion happens when a layer of warm air settles over a layer of cool air just above the ground. This traps pollutants near the ground.

Meteorologists use information from various sources to keep track of weather conditions. These scientists use observation stations, weather balloons, and satellites to keep a record of weather conditions. They measure air pressure, temperature, humidity, rainfall, wind speed and direction, as well as other things.

Weather balloons track conditions in the upper atmosphere. About 800 weather observation stations around the world launch two weather balloons each day. The balloons are filled with helium or hydrogen. They carry an instrument called a radiosonde. The radiosonde records data concerning temperature, air pressure, and humidity and transmits the data to stations on the ground.

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The social sciences deal with people, groups and cultures. These sciences include psychology, sociology, political science and economics. Archaeology is a social science which studies things people of earlier times made and used. Archaeologists have dug at places like Red Bay, Ferryland and Cupids to learn about early settlements in Newfoundland and Labrador.

Sociology involves the study of society. Sociologists study things like crime, poverty, divorce, unemployment and other social issues. Elliott Leyton is a well-known sociologist at Memorial University. His book about the miners of St. Lawrence is called *Dying Hard*.

Did you know you can use ice to light a fire? Here's how. You will need 2 glasses with rounded inside bottoms, a pan, a cup of water, a stove or kettle, a piece of white tissue paper, and a warm flat surface. First, boil the water to get rid of the air in it. Allow the water to cool a little. It is important that the ice be clear and free of air bubbles. Pour about 1 centimetre of water into the bottom of each glass. Place both glasses in the freezer.

After the ice has frozen solid, take the glasses from the freezer. Take out the curved pieces of ice. Rub the top surface of the ice across a warm, flat surface to smooth out any rough spots. Press the two flat ice surfaces together. This will make a convex lens which will focus the sun's rays.

Take your lens outside on a cold, sunny day. Put a crumpled piece of white tissue paper in a pan. Focus the rays of sunlight on the piece of paper. If the lens is clear, you might be able to start a fire. You should be able to at least make the white paper turn brown.

Fungi

Fungi are organisms that cannot make their own food. They do not have chlorophyll. Yeasts, molds, mildews, mushrooms and plant rusts are all fungi. There are more than 100,000 species of fungi. Botanists used to put fungi in the plant kingdom. Now, fungi are considered to be a separate kingdom.

Fungi live in many places. Some fungi are parasites. They feed on living plants and animals. Other fungi live on decaying matter. These fungi are called saprophytes. Some fungi live in harmony with other organisms. This means that both organisms gain something. Such a relationship is called symbiosis. For example, a fungus and an alga may live together to form a lichen.

Fungi are important in many ways. Yeasts make bread rise and cause alcohol to ferment. Fungi are used to ripen some cheeses. Fungi break down plant and animal matter. This process is called decomposition. Decomposition makes the soil richer, provides food for plants, and puts carbon dioxide into the air. This is the process that takes place in a compost pile.

Some molds produce antibiotics. Antibiotics are drugs which weaken or destroy bacteria and other organisms that cause disease. *Penicillium notatum* is a green mold that produces penicillin. Penicillin is used to treat many diseases.

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Some fungi are harmful. Some mushrooms can cause serious illness or death if people eat them. Molds cause some foods to spoil. Fungi can ruin books, clothing and other items and can cause wood to decay. Some fungi produce diseases in animals and people.

Mold spores are in the air around us. No doubt you have seen mold growing on bread, cheese and other things. Try the following activity. Get samples of various foods: bread, cheese, orange slice, cooked potato, cooked carrot slice, etc. Put each sample in a separate plastic bag. Blow air into each bag and seal it with a rubber band or tape. Place the bags in a dark closet or cupboard. Check the bags twice each day.

Answer the following questions based on this activity:

1. How long does it take before you see mold on the samples?
2. Which sample shows mold first?
3. Which sample is the last to show mold?
4. What colours do you see in the molds?
5. Do you have any other observations?

Look at the samples under a microscope. What do you see? You should see a tangle of threads growing from the food samples. These threads are called hyphas. The hyphas may have fruits sprouting from them. These fruits will release new spores which may also sprout if they can find food.

Do you know why you get dizzy when you spin a round? Try this. Turn on a radio, tape recorder or CD player. Stand in the middle of a room. Make sure there are no chairs, tables or other objects near by. Close your eyes and cover one ear. Spin yourself around 10 times. Keep your eyes closed and stop. Try to point to the source of the sound. Could you tell where the sound was coming from? You probably could not. Why? When you spin with your eyes closed, you become disoriented. Human ears have two kinds of nerves to send messages to the brain. One controls balance, the other controls sound. These nerves are in a liquid base. When you spin, this liquid spins too, and hence the messages that go to your brain get mixed up. Your brain thinks you're spinning even when you're not.

Circulatory System

The circulatory system consists of the heart and blood vessels. The heart acts as a pump to keep blood moving throughout the body. Arteries are blood vessels which carry blood away from the heart. This blood contains a lot of oxygen and nutrients for the body. Veins are blood vessels which carry blood to the heart from various parts of the body. This blood is low in oxygen and nutrients.

Respiratory System

Respiration is the process by which our bodies take in and use oxygen. The respiratory system allows us to breathe. It also supplies oxygen to the blood and removes carbon dioxide from our bodies. When we breathe in, our lungs take in oxygen. When we breathe out, our lungs remove carbon dioxide and water from our bodies.

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After that, English ships always carried a stock of limes. Each sailor had to eat a piece of lime every day. That is why British sailors are often called 'limeys.'

Today, we know that scurvy is caused by a lack of vitamin C. Citrus fruits, such as oranges, limes and grapefruit, contain vitamin C.

Our bodies need Vitamin D in order to use calcium. Vitamin D is formed in our bodies when our skin is exposed to sunlight. Many people in our northern climate may not get much exposure to sunlight. Vitamin D is added to milk and margarine in Canada.

Vitamin E helps maintain cell membranes. Whole-grain cereals and vegetable oils contain lots of vitamin E. Most fruits, vegetables and meats contain small amounts of this vitamin.

The human body needs vitamin K. This vitamin makes it possible for blood to clot. Green leafy vegetables contain vitamin K. Normal bacteria in our intestines also produce this vitamin.

Certain vitamins can be destroyed by water, heat or air. This is why you should not leave vegetables to soak in water. Steam vegetables or cook them in small amounts of water. Use the cooking water for soup or gravy. Don't overcook vegetables; cook them until they are tender but not mushy. Eat raw fruits and vegetables. Store fruits and vegetables in a cool place. If possible, don't cut fruits and vegetables until you are ready to use them. Wrap leftovers and fruits and vegetables which have been cut.

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Healthy Eating

The foods you eat affect your health. You should eat a variety of healthy foods. That way your body will get the proper nutrients. Nutrients are the parts of food your body uses to stay healthy.

Canada's Food Guide puts foods into four groups. These groups are: (1) grain products, (2) vegetables and fruit, (3) milk products, and (4) meat and alternatives. The chart on the next page shows how much you should eat from each food group every day. Grain products include cereal, bread, biscuits, bagels, pasta and rice. The vegetables and fruit group includes a great variety of choices, including wild berries. Milk products include milk, cheese, yogurt, and other foods made from milk. Chicken, meat (including wild game) and fish are meats. Dried beans and peas, eggs, tofu, peanut butter, and nuts are meat alternatives. This means they can take the place of meat in a healthy diet. Vegetarians often eat foods like beans and tofu.

A good diet should include foods rich in fibre. Fibre is important in removing wastes from the body. Whole grain breads and cereals, dried beans and peas and vegetables and fruits are good sources of fibre.

It is important to balance our food intake. The body stores most of the extra calories we take in. It stores these calories in the form of fat. Being overweight increases the risk of heart disease, high blood pressure, diabetes and other diseases. It is also important not to eat too much food high in fat. High fat intake may increase the risk of heart attack, stroke and other illnesses. You should also limit the amount of caffeine, salt and sodium you consume. If you drink alcohol, do so in moderation, and only if drinking is not harmful to your health.

Mars

Mars is the fourth planet from the sun. It is about 228 million kilometres from the sun. The ancient Romans named this planet after their god of war. Mars is similar to the earth, although its surface temperature is usually much colder. The mass of Mars is about one-tenth that of the earth. Mars is sometimes called the red planet. The surface of Mars is covered by red sand dunes and jagged rocks. There are bright areas, dark areas and polar caps on the surface of Mars. Scientists now believe that life may have existed on Mars at one time. Carbon dioxide is the most common gas in the Martian atmosphere. There are also small amounts of oxygen, nitrogen, carbon monoxide, argon, neon, krypton and xenon. Mars has two small moons which travel in orbit around it. One is named Phobos, and the other is named Deimos.

The Giant Planets

Jupiter, Saturn, Uranus and Neptune are called the giant planets. Jupiter is the largest planet in our solar system. It is named for the king of the Roman gods. Jupiter is the fifth planet from the sun. It orbits the sun about once every 12 earth years. Jupiter is about 1 000 times the size of the earth.

Jupiter is surrounded by dense clouds. Scientists think these clouds consist of frozen crystals of ammonia and methane. They believe Jupiter consists mostly of liquid and gas. Jupiter's atmosphere is about 84 per cent hydrogen and 15 per cent helium.

Jupiter has 16 known satellites or moons. The United States has sent several unmanned space probes to within several thousand kilometres of Jupiter. The best known of these probes was probably Galileo. This probe was named for the famous Italian astronomer who was born in 1564. Galileo died in 1642.

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Lightning is always flashing on Jupiter. Here is a simple experiment to show why. You will need the following materials.. scissors, a ruler, a thin sheet of plastic such as a plastic report cover, 100 per cent wool cloth. Cut a plastic strip about 5 X 20 cm. In a dark room, hold the end of the plastic strip. Wrap the wool cloth around the plastic. Quickly pull the plastic through the cloth. Do this five or six times. Observe the cloth as you pull the plastic through it. You should see a bluish light in the folds of cloth that touch the plastic. Why does this happen? Electrons are negative particles that spin around a positively charged nucleus of an atom. Some of these electrons are rubbed off the wool and onto the plastic strip. The wool becomes positively charged and the plastic negatively charged. The electrons jump from the plastic back to the wool, and an electric spark is created. Winds on Jupiter can be as strong as 1, 280 kilometres per hour. These winds cause the molecules in Jupiter's atmosphere to rub together briskly. This rubbing together creates flashes of electricity.

Saturn is the sixth planet from the sun. This planet is named for the Roman god of agriculture. It takes Saturn 29.5 earth years to orbit the sun once. Saturn is the second-largest planet in our solar system. There are seven thin, flat rings around Saturn, These rings are made of ice particles. Many scientists believe Saturn is a huge ball of gas with iron and rock at its centre. Saturn is covered by a dense layer of clouds and has at least a dozen natural satellites. The United States has sent several unmanned spacecraft to gather information about Saturn.

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What does acid rain do to plants? Topsoil has the right nutrients for plant growth. But pollution is changing that. Gasses in polluted air mix with water to form acid rain. The rain falls and seeps into the soil. Too much acid in the soil can be harmful to plants. That is why gardeners often add limestone to soil. Limestone makes the soil less acidic. It gives the soil the proper pH balance. The pH level is a measure of acids or bases.

Here is an experiment you can do to show what acid does to plants. You need twelve radish seeds, two Styrofoam cups filled with soil, vinegar, water, a pencil and a spoon. Mark the word **acid** on one cup. Mark the words **no acid** on the other. Plant six seeds in each cup and pour a little water into each. Put two tablespoons of vinegar in the cup marked acid. Put both cups away for three days. Take out the cups. What do you see? Is there a difference between the two cups?

The Greenhouse Effect

You have probably heard of the greenhouse effect. You know that the temperature 'in a greenhouse can get quite hot. The greenhouse effect means that warm air is trapped near the ground. This warm air is trapped by gases in the air. These gases include carbon dioxide, ozone and water vapour.

The earth is about half a degree (Celsius) warmer now than it was a century ago. This might not seem like much of an increase, but it can make a big difference. Even a small rise in the earth's temperature can make a difference in weather patterns. This means that some places will get more rain and snow, while others will get less. It also means there could be more melting of ice, snow and glaciers. This causes flooding in some places on the earth. There could be other changes we do not know about yet. Scientists think the greenhouse effect will cause temperatures to rise as much as 5.6 degrees Celsius during the next few decades.

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Much of the energy we get from the sun is in the form of infrared radiation. The earth reflects much of this radiation back into the atmosphere. Gases in the air trap some of this radiation so that it cannot escape into the upper atmosphere. This drives up the temperature of the air close to the earth. The more gasses there are in the air, the greater the greenhouse effect will be.

The level of carbon dioxide in the air is increasing. There are several reasons for this. One reason is that we are destroying many of our trees. This increases the level of carbon dioxide in the air, because trees take in carbon dioxide and give off oxygen. Humans and other animals need oxygen in order to breathe and stay alive. This means that trees help keep us alive.

Methane Gas

The amount of methane gas in the air is also increasing. Methane is a hydrocarbon formed from decaying plants. Methane is often called swamp gas, because it is found around swamps and stagnant water. Methane can explode when mixed with air, oxygen or chlorine. Methane gas is found in a substance called firedamp. Firedamp can build up and cause serious explosions in mine shafts. Methane reacts with air at high temperatures to form acetylene. Methane has no colour or odour.

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