

TABLE OF CONTENTS

UNIT 1 - THE CHEMISTRY OF LIFE

IMPORTANT WORDS TO KNOW	1
CHAPTER 1 WHAT IS BIOLOGY?	
LIFE!	2
YOU ARE A SCIENTIST	3
FANCY NAMES	4
MORE FANCY NAMES	5
REAL LIFE	6
CHAPTER 2 CHARACTERISTICS OF LIVING THINGS	
CHARACTERISTICS	7
LIVING THINGS	8
BIOLOGY FUN	9
LOOK AROUND	10
THE SCIENTIFIC METHOD	11
CHAPTER 3 ATOMS, MOLECULES, AND CHEMICAL BONDS	
LIFE IS ORGANIZED	12
ATOMS	13
ATOMS MAKE UP MOLECULES	14
ELEMENTS, MOLECULES, AND COMPOUNDS	15
THE SMALLEST OF THE SAME	16
CHAPTER 4 WATER	
WATER FACTS	17
WATER WINS OVER GRAVITY	18
BUGS ON WATER	19
THE TEMPERATURE IS RIGHT FOR LIFE	20
SUBSTANCES LOVE WATER	21

CHAPTER 5 CARBON

VALUABLE .....	.22
DIAMONDS .....	.23
CARBON IS NEEDED .....	.24
C IS FOR CARBON .....	.25
GROUPS .....	.26

CHAPTER 6 METABOLISM

METABOLISM .....	.27
HOW METABOLISM WORKS .....	.28
BUILDING UP AND BREAKING DOWN .....	.29
FAT OR SKINNY? .....	.30
ATP, ENZYMES, AND HORMONES .....	.31

UNIT 2 CELL BIOLOGY

IMPORTANT WORDS TO KNOW32
-------------------------------	-----

CHAPTER 7 CELLS AND THEIR PARTS

CELL THEORY .....	.33
CELLS .....	.34
PARTS OF A CELL .....	.35
SAME AND DIFFERENT .....	.36
CELL PARTS AND THEIR JOBS .....	.37

CHAPTER 8 CELL PARTS AND THEIR JOBS

THE BLOB .....	.38
CYTOPLASM .....	.39
BAGS .....	.40
THE NUCLEUS RUNS THE SHOW .....	.41
THE CONTROL CENTER .....	.42

CHAPTER 9 THE FOOD OF CELLS

THE CHEMICAL FACTORY43
----------------------------	-----

CARBOHYDRATES ARE SWEET	44
LIPIDS ARE FATS	45
MUSCLE UP!	46
THE TWISTED LADDER	47

CHAPTER 10 HOW CELLS GET ENERGY

PLANTS GET ENERGY	48
ANIMALS GET ENERGY	49
WHAT'S FOR LUNCH?	50
ENERGY FROM THE SUN.....	51
YOUR FOOD BECOMES ENERGY	52

CHAPTER 11 PHOTOSYNTHESIS

SUNLIGHT TO PLANT ENERGY	53
LIGHT ENERGY BECOMES CHEMICAL ENERGY.....	54
CALVIN	55
CHANGE CAN BE BAD	56
IN REVERSE.....	57

CHAPTER 12 REPRODUCTION

LIVING THINGS REPRODUCE	58
MAKING NEW CELLS	59
MY TOES IS?	60
MEIOSIS AND SEX.....	61
MITOSIS AND MEIOSIS.....	62

UNIT 3 GENETICS

IMPORTANT WORDS TO KNOW	63
-------------------------------	----

CHAPTER 13 WHAT IS GENETICS?

WHAT IS GENETICS?	64
FAMILY TIES	65
WHAT IS HEREDITY?	66
HEREDITY IS FOR THE BIRDS!	67

BUILDING YOUR HOUSE	68
---------------------------	----

CHAPTER 14 MENDEL AND HIS GREAT IDEA

PASS THE PEAS	69
PEAS AND SEX	70
LOOKING AT PEAS	71
TALL AND SHORT	72
OTHER PARENTS	73

CHAPTER 15 THE STRUCTURE OF DNA

DNA IS A DOUBLE HELIX	74
DNA STRUCTURE	75
NUCLEOTIDES	76
LOOKING AT DNA	77
COOL NEWS	78

CHAPTER 16 CHROMOSOMES

WHAT ARE CHROMOSOMES?	79
IDENTITY	80
MORE ABOUT CHROMOSOMES	81
A PROBLEM	82
SEX CHROMOSOMES	83

CHAPTER 17 FROM GENE TO PROTEIN

FROM GENES TO PROTEIN	84
PROTEINS GET THE JOB DONE	85
BUILDING A PROTEIN	86
PROOFREADING!	87
TRANSLATION	88

CHAPTER 18 THE GENE POOL

CRICK AND WATSON	89
ALLELES	90
SPLASH INTO THE GENE POOL	91

CHANGING THE POOL	92
BREEDING DOGS	93

UNIT 4 TAXONOMY AND ECOLOGY

IMPORTANT WORDS TO KNOW	94
-------------------------------	----

CHAPTER 19 TAXONOMY

KNOW IT ALL	95
NAMING EVERYTHING	96
CLASSIFY	97
DOGS, CATS, AND HUMANS	98
HUMANS ARE HOMO SAPIENS	99

CHAPTER 20 CLASSIFYING ORGANISMS

SIMPLE ORGANISMS	100
CLASSIFYING	101
THE TOP FOUR	102
MUSHROOMS AND MOLD	103
MOLD IS IMPORTANT	104

CHAPTER 21 NATURAL SELECTION

SPONTANEOUS GENERATION	105
LIFE CHANGES OVER TIME	106
ONLY THE STRONG SURVIVE	107
HOW DO WE KNOW?	108
HUMAN EVOLUTION	109

CHAPTER 22 ECOLOGY

ECOLOGY	110
ECOSYSTEMS	111
LIVING TOGETHER	112
HABITATS AND NICHEs	113
SUCCESSION	114

CHAPTER 23 BIOMES AND RESOURCES

BIOMES	115
LAND BIOMES	116
WATER BIOMES	117
NATURAL RESOURCES	118
POLLUTION	119

CHAPTER 24 CYCLES IN NATURE

CYCLES	120
WATER CYCLE	121
CARBON CYCLE	122
NITROGEN CYCLE	123
PHOSPHORUS CYCLE	124

UNIT 5 THE PLANT KINGDOM

IMPORTANT WORDS TO KNOW	125
-----------------------------------	-----

CHAPTER 25 INTRODUCTION TO PLANTS

WHAT IS A PLANT?	126
KINDS OF PLANTS	127
MOSS	128
THE BIG T	129
THE WORLD'S TALLEST TREES	130

CHAPTER 26 TYPES OF PLANTS

WHAT ABOUT FERNS?	131
SEED PLANTS	132
ANGIOSPERMS	133
CHRISTMAS TREES	134
GYMNOSPERMS	135

CHAPTER 27 PARTS OF PLANTS

PARTS OF PLANTS	136
---------------------------	-----

ROOTS	137
ROOT LAYERS.....	138
STEMS	139
LEAVES.....	140

CHAPTER 28 PLANT GROWTH

HOW PLANTS GROW	141
MONOCOTS AND DICOTS	142
WATER AND SUNLIGHT	143
PLANT GROWTH	144
OUCH!.....	145

CHAPTER 29 PLANT REPRODUCTION

MAKING MORE PLANTS	146
FLOWERS.....	147
REPRODUCTIVE ORGANS.....	148
SEXUAL REPRODUCTION	149
CYCLE.....	150

CHAPTER 30 BIODIVERSITY

PLANTS AROUND THE WORLD.....	151
FORESTS	152
RAINFORESTS AND BIODIVERSITY	153
GRASSY AREAS	154
EXTREME!	155

UNIT 6 THE ANIMAL KINGDOM

IMPORTANT WORDS TO KNOW	156
-------------------------------	-----

CHAPTER 31 INTRODUCTION TO ANIMALS

WHAT ARE ANIMALS?.....	157
ABOUT BACKBONES.....	158
NO BACKBONES	159

INVERTEBRATES	160
BUGS AND OTHERS	161

CHAPTER 32 BACKBONES

PHYLUM CHORDATA	162
FISH AND AMPHIBIANS	163
REPTILES	164
BIRDS	165
MAMMALS	166

CHAPTER 33 BASICS ABOUT THE HUMAN BODY

THE HUMAN BODY	167
THE SKIN	168
THE SKELETAL AND MUSCULAR SYSTEMS	169
THE DIGESTIVE SYSTEM	170
THE URINARY SYSTEM	171

CHAPTER 34 BODY SYSTEMS

THE RESPIRATORY SYSTEM	172
THE ENDOCRINE SYSTEM	173
THE NERVOUS SYSTEM	174
THE BRAIN	175
BRAIN PARTS	176

CHAPTER 35 BODY SYSTEMS

THE CIRCULATORY AND LYMPHATIC SYSTEMS	177
THE HEART	178
THE REPRODUCTIVE SYSTEM	179
BABY	180
MULTIPLE BIRTH	181

CHAPTER 36 BEHAVIOR AND HEALTH

SOCIAL BEHAVIORS	182
----------------------------	-----

HEALTH	183
WATCH OUT!	184
INFECTION	185
HOW INFECTIOUS DISEASES ARE SPREAD	186
IMPORTANT WORDS AND MEANINGS	187

ELEMENTS OF
BASIC BIOLOGY SAMPLE

YOU ARE A SCIENTIST

Scientists examine living things. When you see that one kind of fish looks different from another, you are observing nature. When you watch the way birds fly, you are studying biology.



What flavor of ice cream do you like best?

You did an investigation when you tasted other flavors. You compared the flavors and learned that you like some flavors better than others. You are a scientist!

The Game: Check (✓) the things you have done.

- | | |
|--|---|
| <input type="checkbox"/> gone to a zoo | <input type="checkbox"/> walked on a nature path |
| <input type="checkbox"/> fed a kitten | <input type="checkbox"/> barked or made animal sounds |
| <input type="checkbox"/> found a bird nest | <input type="checkbox"/> looked at the stars |
| <input type="checkbox"/> planted seeds | <input type="checkbox"/> swam in a lake or ocean |
| <input type="checkbox"/> felt a spider web | <input type="checkbox"/> watched an animal eat or sleep |

LAB SAFETY IS IMPORTANT

- Listen carefully and follow directions.
- Don't goof off, run, push others, or make a mess. No eating or drinking in the lab.
- Stay safe. Wear goggles, gloves, masks, and lab coats. Gloves may cause latex allergies.
- Wash your hands before and after each experiment.
- Know what is poisonous. Know what to do if there is an emergency.
- Never stick your nose into or look directly into a test tube. Don't taste chemicals.
- Never point the open end of a test tube toward yourself or anyone.
- Use only clean glassware that isn't broken or chipped.
- Keep electrical equipment away from water.
- Never reach across a flame. Keep flames and flammable solutions far apart.
- Throw away all needles, razors, pins, and toothpicks in a safe container.
- Treat animals with safety and respect.

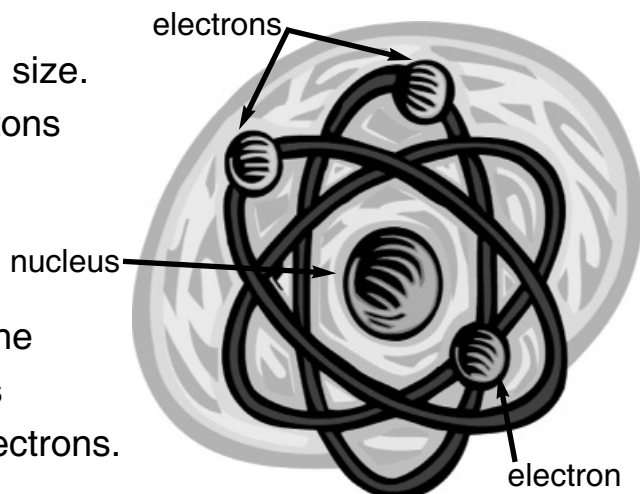


What is a word that means to look at something carefully?

ATOMS MAKE UP MOLECULES

Protons and neutrons are about the same size. They are much larger than electrons. Protons have a positive charge. Neutrons have no electrical charge.

Almost all the mass of an atom is inside the nucleus. Most of the volume of an atom is outside the nucleus and is taken up by electrons.



Electrons have a negative charge. The negative charge of an electron is equal to the positive charge of a proton. A very strong force keeps the parts of an atom together.

When the same kinds of atoms group together, they form an element. When atoms bond together, they form larger building blocks of matter called molecules. A molecule of water is made of two hydrogen atoms and one oxygen atom.

The Game: Fill in the blanks with the words below.

Protons and neutrons are about the same _____. They are much larger than electrons. Protons have a _____ charge. Neutrons have no electrical charge. Electrons have a _____ charge. The negative charge of an electron is equal to the positive charge of a _____.

proton size negative positive

BUGS ON WATER

Bugs seem to skate on water. They do not sink, because water has high surface tension. Surface tension is a way to measure how hard it is to break the surface of a liquid. Water seems like it has an invisible film on the surface that bends.



Think about blowing a bubble with gum. You can push your finger into the bubble before it breaks.

The surface of water can bend and stretch somewhat like the gum. Water has this characteristic because of its hydrogen bonds.

Have you ever skipped rocks on water? The high surface tension is the reason the stones can skip. Your skill is another reason.

Belly-flops hurt. When you dive into water, your hands or feet break the surface tension of the water, and you don't have the pain of a belly-flop!

Test surface tension. Slightly overfill a glass with water. You can see that the water stands just above the rim of the glass without spilling.

The Game: Write T for True or F for False.

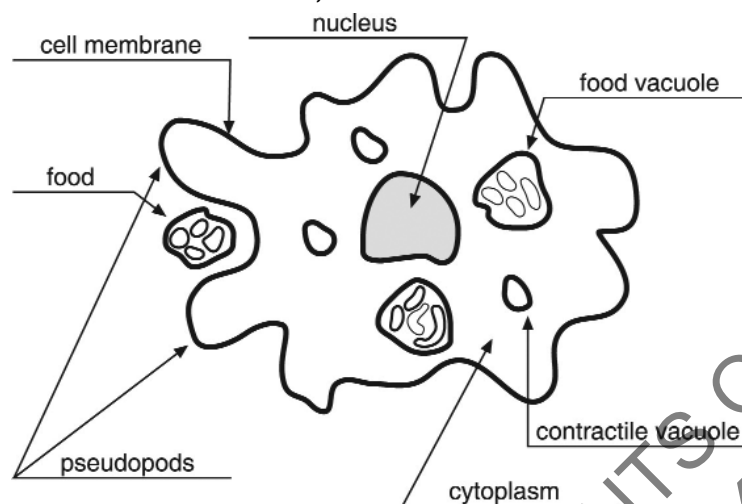
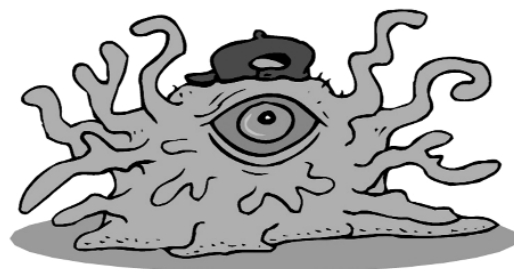
1. Some bugs can move on water without sinking. _____
2. Belly-flops hurt because of botany. _____
3. Water seems like it has an invisible film on the surface. _____
4. Surface tension is about how hard it is to break the surface of water. _____
5. Water has low surface tension. _____



Why can bugs seem to skate on water?

CELL PARTS AND THEIR JOBS

Each part of the cell has a job, but they all work together to keep the cell alive. The parts are called organelles. The bigger a cell, the more organelles it has. For example, a larger cell needs to eat more, so it has more mitochondria to turn the food into energy.



An amoeba is so small that it can only be seen through a microscope. The body of an amoeba has only one cell. The cell membrane surrounds the cell. The nucleus is the control center. Cytoplasm fills most of the cell. The contractile vacuole helps to get rid of waste. Amoebas move around and catch food with their pseudopods. Food is digested in the food vacuoles.

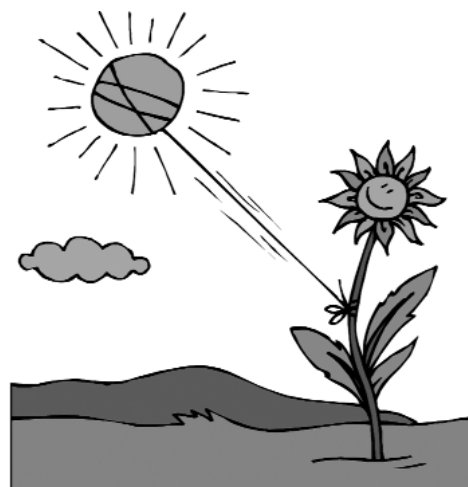
Amoebas live in ponds and puddles. They live inside animals too. They can live inside you! Most amoebas that live in your body are harmless, but some can cause you to get sick. It is important to drink clean water, wash vegetables and fruit, and wash your hands after going to the restroom.

The Game: Draw an amoeba. Label the nucleus, cytoplasm, cell membrane, and pseudopods.

PLANTS GET ENERGY

Plants get energy through photosynthesis.

Think about sunlight. Light is energy. Plants use mostly red and blue wavelengths. This seems odd because a plant is mostly green! The rule is that the color the object does not take in is the color you see. So, plants do not take in which color? _____



When light comes to plants, many chemical reactions happen for sugar to be made. Photosynthesis happens in the organelle called the chloroplast. The chlorophyll in the chloroplast catches the sunlight.

Plants take in carbon dioxide from the air and water from the ground. Carbon dioxide and water combine with light to make oxygen and sugar (glucose). The plant sends the oxygen out into the air. The glucose is the food for the plant. ATP is important in this process. The energy glucose creates is measured in molecules of ATP.

Scientists write about photosynthesis this way:



This is a chemical equation. It means that six molecules of carbon dioxide plus six molecules of water plus sunlight make one molecule of sugar plus six molecules of oxygen.

After plant cells make their food, the mitochondria uses oxygen to send out food molecules and to make ATP. This is done in the same way in animal cells.

The Game: Follow the directions.



1. Circle the letter that tells you carbon is part of the sugar molecule.
2. Put an X through the letter that tells you hydrogen is part of the molecule.
3. Draw an arrow to the letters that tell you oxygen is part of the molecules.