TEACHER INTRODUCTION

WELCOME TO God's Design® for Life

God's Design for Life is a series that has been designed for use in teaching life science to elementary and middle school students. It is divided into three books: The World of Plants, The World of Animals, and The Human Body. Each book has 35 lessons including a final project that ties all of the lessons together.

In addition to the lessons, special features in each book include biographical information on interesting people as well as fun facts to make the subject more fun.

Although this is a complete curriculum, the information included here is just a beginning, so please feel free to add to each lesson as you see fit. A resource guide is included in the appendices to help you find additional information and resources. A list of supplies needed is included at the beginning of each lesson, while a master list of all supplies needed for the entire series can be found in the appendices.

Answer keys for all review questions, worksheets, quizzes, and the final exam are included here. Reproducible student worksheets and tests may be found on the supplementary CD-Rom for easy printing. Please contact Answers in Genesis if you wish to purchase a printed version of all the student materials, or go to www.AnswersBookstore.com.

If you wish to get through the *Life* series in one year, plan on covering approximately three lessons per week. The time required for each lesson varies depending on how much additional information you include, but plan on 20 minutes per lesson for beginners (grades 1–2) and 40 to 45 minutes for grades 3–8.

Quizzes may be given at the conclusion of each unit and the final exam may be given after lesson 34.

If you wish to cover the material in more depth, you may add additional information and take a longer period of time to cover all the material, or you could choose to do only one or two of the books in the series as a unit study.

WHY TEACH LIFE SCIENCE?

Maybe you hate science or you just hate teaching it. Maybe you love science but don't quite know how to teach it to your children. Maybe science just doesn't seem as important as some of those other subjects you need to teach. Maybe you need a little motivation. If any of these descriptions fits you, then please consider the following.

It is not uncommon to question the need to teach your kids hands-on science in elementary school. We could argue that the knowledge gained in science will be needed later in life in order for your children to be more productive and well-rounded adults. We could argue that teaching your children science also teaches them logical and inductive thinking and reasoning skills, which are tools they will need to be more successful. We could argue that science is a necessity in this technological world in which we live. While all of these arguments are true, not one of them is the real reason that we should teach our children science. The most important reason to teach science in elementary school is to give your children an understanding that God is our Creator, and the Bible can be trusted. Teaching science from a creation perspective is one of the best ways to reinforce your children's faith in God and to help them counter the evolutionary propaganda they face every day.

God is the Master Creator of everything. His handiwork is all around us. Our Great Creator put in place all of the laws of physics, biology, and chemistry. These laws were put here for us to see His wisdom and power. In science, we see the hand of God at work more than in any other subject. Romans 1:20 says, "For since the creation of the world His invisible attributes are clearly seen, being understood by the things that are made, even His eternal power and Godhead, so that they [men] are without excuse." We need to help our children see God as Creator of the world around them so they will be able to recognize God and follow Him.

The study of life science helps us understand the balance of nature so that we can be good stewards of our bodies, the plants, and the animals around us. It helps us appreciate the intricacies of life and the wonders of God's creation. Understanding the world of living things from a biblical point of view will prepare our children to deal with an ecology-obsessed world. It is critical to teach our children the truth of the Bible, how to evaluate the evidence, how to distinguish fact from theory and to realize that the evidence, rightly interpreted, supports biblical creation, not evolution.

It's fun to teach life science! It's interesting, too. Children have a natural curiosity about living things, so you won't have to coax them to explore the world of living creatures. You just have to direct their curiosity and reveal to them how interesting life science can be.

Finally, teaching life science is easy. It's all around us. Everywhere we go, we are surrounded by living things. You won't have to try to find strange materials for experiments or do dangerous things to learn about life.

HOW DO I TEACH SCIENCE?

In order to teach any subject, you need to understand that people learn in different ways. Most people, and children in particular, have a dominant or preferred learning style in which they absorb and retain information more easily.

If a student's dominant style is:

Auditory

He needs not only to hear the information but he needs to hear himself say it. This child needs oral presentation as well as oral drill and repetition.

Visual

She needs things she can see. This child responds well to flashcards, pictures, charts, models, etc.

Kinesthetic

He needs active participation. This child remembers best through games, hands-on activities, experiments, and field trips.

Also, some people are more relational while others are more analytical. The relational student needs to know why this subject is important and how it will affect him personally. The analytical student, however, wants just the facts.

If you are trying to teach more than one student, you will probably have to deal with more than one learning style. Therefore, you need to present your lessons in several different ways so that each student can grasp and retain the information.

Grades 1–2

Because God's Design Science books are

designed to be used with students in grades 1–8, each lesson has been divided into three sections. The "Beginner" section is for students in grades 1–2. This part contains a read-aloud section explaining the material for that lesson followed by a few questions to make sure that the students understand what they just heard. We recommend that you do the hands-on activity in the blue box in the main part of the lesson to help your students see and understand the concepts.

Grades 3–8

The second part of each lesson should be completed by all upper elementary and junior high students. This is the main part of the lesson containing a reading section, a hands-on activity that reinforces the ideas in the reading section (blue box), and a review section that provides review questions and application questions (red box).

Grades 6–8

Finally, for middle school/junior high age students, we provide a "Challenge" section that contains more challenging material as well as additional activities and projects for older students (green box).

We have included periodic biographies to help your students appreciate the great men and women who have gone before us in the field of science.

We suggest a threefold approach to each lesson:

Introduce the topic

We give a brief description of the facts. Frequently you will want to add more information than the essentials given in this book. In addition to reading this section aloud, you may wish to do one or more of the following:

- Read a related book with your students.
- Write things down to help your visual students.
- Give some history of the subject. We provide some historical sketches to help you, but you may want to add more.
- Ask questions to get your students thinking about the subject.
- The "FUN FACT" section adds fun or interesting information.

Make observations and do experiments

- Hands-on projects are suggested for each lesson. This part of each lesson may require help from the teacher.
- Have your students perform the activity by themselves whenever possible.

Review

- The "What did we learn?" section has review questions.
- The "Taking it further" section encourages students to
 - Draw conclusions
 - Make applications of what was learned
 - Add extended information to what was covered in the lesson

By teaching all three parts of the lesson, you will be presenting the material in a way that children with any learning style can both relate to and remember.

Also, this approach relates directly to the scientific method and will help your students think more scientifically. The *scientific method* is just a way to examine a subject logically and learn from it. Briefly, the steps of the scientific method are:

- 1. Learn about a topic.
- 2. Ask a question.
- 3. Make a hypothesis (a good guess).

- 4. Design an experiment to test your hypothesis.
- 5. Observe the experiment and collect data.
- 6. Draw conclusions. (Does the data support your hypothesis?)

Note: It's okay to have a "wrong hypothesis." That's how we learn. Be sure to help your students understand why they sometimes get a different result than expected.

Our lessons will help your students begin to approach problems in a logical, scientific way.

HOW DO I TEACH Creation vs. Evolution?

We are constantly bombarded by evolutionary ideas about living things in books, movies, museums, and even commercials. These raise many questions: Did dinosaurs really live millions of years ago? Did man evolve from apes? Which came first, Adam and Eve or the cavemen? Where did living things come from in the

first place? The Bible answers these questions and this book accepts the historical accuracy of the Bible as written. We believe this is the only way we can teach our children to trust that everything God says is true.

There are five common views of the origins of life and the age of the earth:

Historical biblical account	Progressive creation	Gap theory	Theistic evolution	Naturalistic evolution
Each day of cre-	The idea that	The idea that	The idea that God	The view that
ation in Genesis	God created vari-	there was a long,	used the process	there is no God
is a normal day of	ous creatures to	long time between	of evolution over	and evolution of
about 24 hours in	replace other crea-	what happened in	millions of years	all life forms hap-
length, in which	tures that died out	Genesis 1:1 and	(involving strug-	pened by purely
God created	over millions of	what happened	gle and death) to	naturalistic pro-
everything that	years. Each of the	in Genesis 1:2.	bring about what	cesses over billions
exists. The earth	days in Genesis	During this time,	we see today.	of years.
is only thousands	represents a long	the "fossil record"		
of years old, as	period of time	was supposed		
determined by the	(day-age view)	to have formed,		Ken Ham et al.,
genealogies in the	and the earth is	and millions of		The Answers Book,
Bible.	billions of years	years of earth his-		(El Cajon: Master
	old.	tory supposedly		Books, 2000),
		passed.		33–76.

Any theory that tries to combine the evolutionary time frame with creation presupposes that death entered the world before Adam sinned, which contradicts what God has said in His Word. The view that the earth (and its "fossil record") is hundreds of millions of years old damages the gospel message. God's completed creation was "very good" at the end of the sixth day (Genesis 1:31). Death entered this perfect paradise *after* Adam disobeyed God's command. It was the punishment for Adam's sin (Genesis 2:16–17; 3:19; Romans 5:12–19). Thorns appeared when God cursed the ground because of Adam's sin (Genesis 3:18).

The first animal death occurred when God killed at least one animal, shedding its blood, to make clothes for Adam and Eve (Genesis 3:21). If the earth's "fossil record" (filled with death, disease, and thorns) formed over millions of years before Adam appeared (and before he sinned),

then death no longer would be the penalty for sin. Death, the "last enemy" (1 Corinthians 15:26), diseases (such as cancer), and thorns would instead be part of the original creation that God labeled "very good." No, it is clear that the "fossil record" formed some time *after* Adam sinned—not many millions of years before. Most fossils were formed as a result of the worldwide Genesis Flood.

When viewed from a biblical perspective, the scientific evidence clearly supports a recent creation by God, and not naturalistic evolution and millions of years. The volume of evidence supporting the biblical creation account is substantial and cannot be adequately covered in this book. If you would like more information on this topic, please see the resource guide in the appendices. To help get you started, just a few examples of evidence supporting biblical creation are given below:

HOW DO I TEACH CREATION VS. EVOLUTION? • 9

Evolutionary Myth: Humans have been around for more than one million years.

The Truth: If people have been on earth for a million years, there would be trillions of people on the earth today, even if we allowed for worst-case plagues, natural disasters, etc. The number of people on earth today is about 6.5 billion. If the population had grown at only a 0.01% rate (today's rate is over 1%) over 1 million years, there could be 10^{43} people today (that's a number with 43 zeros after it)! Repopulating the earth after the Flood would only require a population growth rate of 0.5%, half of what it is today.

John D. Morris, Ph.D., *The Young Earth* (Colorado Springs: Creation Life Publishers, 1994), 70–71. See also "Where Are All the People" at www.answersingenesis.org/creation/v23/i3/people.asp.

Evolutionary Myth: Man evolved from an ape-like creature.

The Truth: All so-called "missing links" showing human evolution from apes have been shown to be either apes, humans, or deliberate hoaxes. These links remain missing.

Duane T. Gish, Ph.D., *The Amazing Story of Creation from Science and the Bible*, (El Cajon: Institute for Creation Research, 1990), 78–83.

Evolutionary Myth: All animals evolved from lower life forms.

The Truth: While Darwin predicted that the fossil record would show numerous transitional fossils, even more than 145 years later, all we have are a handful of disputable examples. For example, there are no fossils showing something that is part way between a dinosaur and a bird. Fossils show that a snail has always been a snail; a squid has always been a squid. God created each animal to reproduce after its kind (Genesis 1:20–25).

Ibid., p. 36, 53-60. See also www.answersingenesis.org/missinglinks.

Evolutionary Myth: Dinosaurs evolved into birds.

The Truth: Flying birds have streamlined bodies, with the weight centralized for balance in flight; hollow bones for lightness, which are also part of their breathing system; powerful muscles for flight; and very sharp vision. And birds have two of the most brilliantly-designed structures in nature—their feathers and special lungs. It is impossible to believe that a reptile could make that many changes over time and still survive.

Gregory Parker et. al., Biology: God's Living Creation, (Pensacola: A Beka Books, 1997) 474-475.

Evolutionary Myth: Thousands of changes over millions of years resulted in the creatures we see today.

The Truth: What is now known about human and animal anatomy shows the body structures, from the cells to systems, to be infinitely more complex than was believed when Darwin published his work in 1859. Many biologists and especially microbiologists are now saying that there is no way these complex structures could have developed by natural processes. Ibid., p. 384–385.

Since the evidence does not support their theories, evolutionists are constantly coming up with new

ways to try to support what they believe. One of their ideas is called punctuated equilibrium. This theory of evolution says that rapid evolution occurred in small isolated populations, and left no evidence in the fossil record. There is no evidence for this, nor any known mechanism to cause these rapid changes. Rather, it is merely wishful thinking. We need to teach our children the difference between science and wishful thinking.

Despite the claims of many scientists, if you examine the evidence objectively, it is obvious that evolution and millions of years have not been proven. You can be confident that if you teach that what the Bible says is true, you won't go wrong. Instill in your student a confidence in the truth of the Bible in all areas. If scientific thought seems to contradict the Bible, realize that scientists often make mistakes, but God does not lie. At one time scientists believed that the earth was the center of the universe, that living things could spring from non-living things, and that blood-letting was good for the body. All of these were believed to be scientific facts but have since been disproved, but the Word of God remains true. If we use modern "science" to interpret the Bible, what will happen to our faith in God's Word when scientists change their theories yet again?

INTEGRATING THE SEVEN C'S INTO YOUR CURRICULUM

Throughout the God's Design^{\circ} for Science series you will see icons that represent the Seven C's of History. The Seven C's is a framework in which all of history, and the future to come, can be placed. As we go through our daily routines we may not understand how the details of life connect with the truth that we find in the Bible. This is also the case for students. When discussing the importance of the Bible you may find yourself telling students that the Bible is relevant in everyday activities. But how do we help the younger generation see that? The Seven C's are intended to help.

The Seven C's can be used to develop a biblical worldview in students, young or old. Much more than entertaining stories and religious teachings, the Bible has real connections to our everyday life. It may be hard, at first, to see how many connections there are, but with practice ,the daily relevance of God's Word will come alive. Let's look at the Seven C's of History and how each can be connected to what the students are learning.



CREATION

God perfectly created the heavens, the earth, and all that is in them in six normal-length days around

6,000 years ago.

This teaching is foundational to a biblical worldview and can be put into the context of any subject. In science, the amazing design that we see in nature—whether in the veins of a leaf or the complexity of your hand—is all the handiwork of God. Virtually all of the lessons in *God's Design for Science* can be related to God's creation of the heavens and earth.

Other contexts include:

- *Natural laws*—any discussion of a law of nature naturally leads to God's creative power.
- *DNA and information*—the information in every living thing was created by God's supreme intelligence.
- *Mathematics*—the laws of mathematics reflect the order of the Creator.
- *Biological diversity*—the distinct kinds of animals that we see were created during the Creation Week, not as products of evolution.

THE WORLD OF PLANTS

UNIT 1: INTRODUCTION TO LIFE SCIENCE 16 UNIT 2: FLOWERING PLANTS & SEEDS 21 UNIT 3: ROOTS & STEMS 28 UNIT 4: LEAVES 33 UNIT 5: FLOWERS & FRUITS 38 UNIT 6: UNUSUAL PLANTS 43



UNIT 1 INTRODUCTION TO LIFE SCIENCE



IS IT ALIVE?

BIOLOGY IS THE STUDY OF LIVING THINGS.

SUPPLY LIST

Copy of "Is It Alive?" worksheet Six items to display/discuss: some living, some non-living (book, pet, can, eraser, plant, etc.)

Beginners

- If something is alive, what are some things that it will do? Eat, breathe, move, grow, reproduce, etc.
- What are the building blocks for plants and animals? Cells.
- Is it alive? **Answers will vary.**

WHAT DID WE LEARN?

• What are the six questions you should ask to determine if something is alive? Does it eat?, Does it breathe?, Does it grow?, Does it reproduce?, Can it move?, Does it have cells?

Taking it further

- Is a piece of wood that has been cut off of a tree living? (Hint: Is it growing? Can it respond?) No, it is not living anymore; although the tree it came from may still be living.
- Is paper alive? No. It is made from wood but it is not alive.
- Is a seed alive? This is a harder question. A seed has the potential for life, but it is not growing. You have to decide for yourself.



What is a Kingdom?

IT'S ALIVE, BUT WHAT IS IT?

SUPPLY LIST

Poster board Copy of "Clue Cards" Pen Scissors

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Beginners

- Which living things can make their own food—plants or animals? Plants.
- Why do plants need sunshine? They use sunlight to make food.
- Name one important difference between plants and animals. Accept reasonable answers.

CLUE CARDS

• Plants only—Chlorophyll, photosynthesis, needs sun, cannot move around, needs carbon dioxide, created on the 3rd day of creation. Animals only—Moves around, cannot make food, carbon dioxide is a waste product, no chlorophyll. Both—Alive, cells, reproduces same kind, needs oxygen, designed by God, eaten by animals.

WHAT DID WE LEARN?

- What do plants and animals have in common? God created them all, all are alive, all have cells, all reproduce their own kind, and all need oxygen.
- What makes plants unique? They have chlorophyll, perform photosynthesis, and cannot move freely.
- What makes animals unique? They cannot produce their own food and can move freely.

TAKING IT FURTHER

- Are mushrooms plants? No, they do not have chlorophyll or perform photosynthesis.
- Why do you think they are or are not? Fungi have most of the characteristics of plants, but do not have chlorophyll and can live without sunlight. This is why scientists now group them in their own kingdom.



CLASSIFICATION SYSTEM

TAXONOMY—CLASSIFICATION OF LIVING THINGS

SUPPLY LIST

Plant and animal guides or an encyclopedia

BEGINNERS

- How do scientists split living things into groups? They examine what is the same and what is different and put things that are similar in the same group.
- What is the first major division of living things called? A kingdom.
- What are the two main groups of animals? Those with backbones and those without backbones.

WHAT DID WE LEARN?

What are the five kingdoms recognized today? Plants, animals, fungi, protists, and monerans.

- How do scientists determine how to classify a living thing? They look at common characteristics and at different characteristics.
- What are the seven levels of the classification system? Kingdom, phylum, class, order, family, genus, and species.

Taking it further

- Why can pet dogs breed with wild wolves? They are both the same kind of animal. Wolves, jackals, coyotes, wild dogs, and domestic dogs all came from the same ancestors. If any two animals can produce fertile offspring then they are most likely from the same animal kind. Wolves don't generally breed with domestic dogs because of their location and habits, but biologically they are the same kind of animal.
- How many of each animal did Noah take on the Ark? Two of some animals and seven of other animals (see Genesis 7). Noah would only have taken two canines (dogs) on the Ark. Afterwards, the offspring of those two dogs resulted in the wide variety of dogs we see today.

CHALLENGE: PLANT CLASSIFICATION

Note: The third paragraph of the Challenge section should be replaced with this one.

Nonvascular plants are divided into three groups: mosses, liverworts, and hornworts. Together these are called bryophytes. These nonvascular plants have leaves and stems, but do not have true roots. They reproduce by spores, not with flowers. The bryophytes tend to grow in clumps in moist areas. You may find them growing on tree trunks or along streams, but don't confuse them with the algae growing in the water. Even though algae contain chlorophyll, they are not plants since they do not have leaves, stems, and roots.





Plant & Animal Cells

THE SMALLEST UNIT OF LIFE

SUPPLY LIST

Option A: Paper models

Colored construction paper Scissors Glue

Option B: 3-D models (messier but more fun)

For each child: Small shoe box1 qt. plastic zipper bagSeveral green grapesSeveral raisins1 large red grape or marbleFor everyone to use: Yellow gelatin mix (Note: mix this gelatin according to the package directions about an hour before you plan to do the project.)

Supplies for Challeng: Microscope Slides Onion Sharp knife

BEGINNERS

- What shape are most animal cells? Round.
- What shape are most plant cells? **Rectangular.**

MASTER SUPPLY LIST

The following table lists all the supplies used for *God's Design for Life* activities. You will need to look up the individual lessons in the student book to obtain the specific details for the individual activities (such as quantity, color, etc.). The letter c denotes that the lesson number refers to the challenge activity. Common supplies such as colored pencils, construction paper, markers, scissors, tape, etc., are not listed.

Supplies needed (see lessons for details)	Plants	Animals	Human Body
3-ring binder		2	
Aloe plant	17c		
Aluminum foil			20
Anatomy book			5–34
Balloons		21c, 27c	1, 28
Bible		35	1, 35
Bird feeder (optional)		8	
Bread slices (homemade or with no pre- servatives)	34		
Butterfly larvae (caterpillars)		23	
Cactus plant	29		
Candy sprinkles			26
Cardboard boxes or shoe boxes	4, 16, 26		
Chicken bones			бс
Chocolate chips (mini size)		29	
Cinnamon, peppermint, and other spices			18
Cocoa (unsweetened)			18
Coffee filters	19c		
Coffee stirrer	27		
Corn meal or yellow sand	21, 31		
Craft sticks	бс		
Dental floss			21
Dissection kit		29c	25c
Dividers with tabs (12 or 13 per student)		2	
DNA model kit (optional)			33c
Dried moss (from craft store)	32		
Encyclopedia (animal)		all	
Encyclopedia (plant and animal)	3		
Eyedropper			31c
Face paint		18	
Fake fur or felt		7	
Fern frond	31		

Supplies needed (see lessons for details)	Plants	Animals	Human Body
Feather (can purchase at craft store)		9	
Field guide (birds)		8	
Field guide (flowers)	5		
Field guide (plants)	27		
Field guide (sea shells)		27	
Field guide (trees)	20		
Fingernail polish remover	19c		
Flexible wire		24	
Flour		21c	
Flower (composite, such as daisy, sun- flower, or zinnia—fresh)	23c		
Flower (such as lily—fresh)	23		
Flower bulbs (tulips, daffodils, etc.— optional)	12		
Food coloring	13, 18		31c
Fruits, nuts, and vegetables	4c, 12, 10, 11, 13, 24, 30, 34c		18
Gel pens (washable)			5
Gelatin mix (yellow)	4		
Gloves (rubber or latex)			25c
Goldfish snack crackers		11	
Grass plant	6		
Grapes (red and green)	4		
Gummy worms		31	
Hair/fur from 2 or more mammals		3	
Hairspray (aerosol)	34c		
Hand lotion			29
Heart (from a cow or sheep)			25c
Hydras (live)		28c	
Index cards	7, 17, 20, 34c	22	13, 31
Jars (1 must have a lid)	8, 9, 30		
Jelly beans (white)			26
Knife or scalpel (very sharp)	9, 18, 23, 24		25c
Leaves (fresh)	19c, 20		
Lemon juice			18
Light corn syrup			26, 31c
Magnifying glass	6, 9, 11, 20, 22c, 29, 32	9, 24, 25	8c
Marshmallows (large and small)		24, 28	
Microscope and slides	4c, 22c, 33c	32	
Mirror			1, 21, 29
Modeling clay	21	13, 25, 26c 28	12, 20

Supplies needed (see lessons for details) Newspaper	Plants	Animals 21c	Huma
Newsprint (or other large roll of paper)			34
Owl pellet (optional)		10	
Paper fasteners (brads)			2, 4
Peat moss	32c		2,4
Photo album with magnetic pages or 3-ring binder	20		
Pinecones (scales tightly shut)	10		
Pipe cleaners	21	22, 24, 26c	
Plants (fast-growing; e.g., mint plants)	16, 28	22, 24, 200	
Plaster of Paris	10, 20		20
Plastic cups (clear)	13, 32c		20
Plastic zipper bags	4, 20, 34	7	15
Pollen	22c	/	15
		22	
Pond water	33c	32	
Poster board/tag board	2, 12c, 19, 35	7, 29	20
Potting soil	6с, 13, 30		
Rubber/plastic gloves		29c	25c
Sand dollar (dead and dried; check at craft store—optional)		29	
Spider web (optional)		24	
Starfish (dead and dried; check at craft store—optional)		29	
Red Hots candies			26
Rubber bands			7c
Ruler			11
Salt dough		29	
Scarves		23	
Seeds (bean, corn, grass, coconut, radish)	6c, 8, 9, 10c, 11c		
Sequins or flat beads		16	
Sea shells		27	
Sleeping bag		23	
Soap (anti-bacterial hand)		33	
Sponge (natural—optional)		30	
Sponge (synthetic)		30	
Starfish (preserved for dissection)		29c	
Steak (or other meat—raw)			8c
Steel wool	8		
Stopwatch		6	9, 11, 24, 2
Straight pins			15
Straws (flexible)	21, 27		
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Supplies needed (see lessons for details)	Plants	Animals	Human Body
String		21c	
Styrofoam balls		22	
Swabs			18
Tacks			7с
Tadpoles and tank (optional)		15	
Tape (cloth)		19	
Tape measure (cloth—the kind used for sewing)			28
Tape measure (metal)			4c
Tempera paints		30	
Toothbrush		6	21
Toothpaste			21
Toothpicks		22, 24	14
Vinegar			6с, 18
Wooden pencils			7с
Yard stick/meter stick			9, 31c
Yarn		32	