What Your Child Will Learn in Biology

Howard County

2014-2015

A State-Assessed Course

Includes *What Can You do to Help?*

COMMON CORE STANDARDS

The Common Core State Standards Initiative is a state-led effort coordinated by the National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO). The standards were developed in collaboration with teachers, school administrators, and experts to provide a clear and consistent framework to prepare our children for college and the workforce.

These standards define the knowledge and skills students should have within their K-12 education experience so that they will graduate from high school able to succeed in entry-level, credit-bearing academic college courses and in workforce training programs. The standards are informed by the highest, most effective models from states across the country and countries around the world. They provide teachers and parents with a common understanding of what students are expected to learn and provide appropriate benchmarks for all students, regardless of where they live.

Source: www.corestandards.org/about-the-standards

MARYLAND'S COLLEGE AND CAREER-READY STANDARDS

Following the adoption of the Common Core Standards, the Maryland Department of Education launched a broad-based, year-long process to analyze the new standards and compare the alignment of the PK-12 State Curriculum to the Common Core State Standards. As a result, the Maryland Department of Education developed the Maryland Common Core Curriculum Frameworks. These Frameworks in English/Language Arts and Mathematics define the essential skills and knowledge that students need to know and be able to do in order to achieve the academic goals of the Common Core State Standards. The Frameworks are the foundation of Maryland's curriculum and have guided the development of curriculum resources. Maryland's College and Career-Ready Standards are based on the Common Core State Standards.

Maryland's Standards:

- Are evidence-based.
- Are aligned with college and work expectations.
- Are clear, understandable, and consistent.
- Include rigorous content and application of knowledge through high-order skills.
- Build upon strengths and lessons of current state standards.
- Are informed by other top performing countries, so that all students are prepared to succeed in our global economy and society.

Family Guide and the Maryland High School Assessments

Maryland High School Assessments

The assessed courses are Algebra I, English 10, Biology, and American Government. Students must pass the assessments in these courses to earn a Maryland high school diploma. The assessments ensure that graduates have mastered the basic skills they need to succeed after high school. The English 10 and Algebra I assessments measure student achievement of Maryland's College and Career-Ready Standards. The administration of High School Assessments in Government and Biology will continue. The skills and knowledge necessary to demonstrate understanding of each course's content are embedded in the Howard County Public School System (HCPSS) curriculum. The four courses associated with the assessments are typically taken during freshman and sophomore years.

The American Government assessment was suspended in 2011, but was restored in the spring of 2012 by Maryland legislative mandate. The Government HSA is a graduation requirement for students who enter Grade 9 in school year 2013-2014 and beyond.

High School Graduation Assessment Requirements

Course	Tester Status	SY 2014-2015	SY 2015-2016
Algebra I	Enrolled in Algebra I for the first time beginning in the Fall 2014	PARCC Algebra I or Algebra/ Data Analysis HSA/ Mod-HSA*	PARCC Algebra I
	Completed Algebra I prior to the Fall of 2014		
English 10	Enrolled in English 10 for the first time beginning in the Fall 2014	PARCC English 10 or English 10 HSA/ Mod-HSA*	PARCC English 10
	Completed English 10 prior to the Fall of 2014		
Biology	Enrolled in Biology for the first time beginning in the Fall 2014	Biology HSA/ Mod-HSA*	Biology HSA
	Completed Biology prior to the Fall of 2014		
American Government	Enrolled in American Government for the first time beginning in the Fall 2014	Government HSA/ Mod-HSA*	Government HSA
	Completed American Government prior to the Fall of 2014		

* Mod-HSA is for identified special education students only.

Passing Scores for Required High School Graduation Assessment Requirements

Algebra/Data Analysis HSA	PARCC Algebra I	English HSA	PARCC English 10	Biology HSA	Government HSA
412	To be determined Fall 2015	396	To be determined Fall 2015	400	394

Assessment Outcomes

- The following chart lists possible outcomes after taking the required state high school assessments.

Assessed Course	+	Required Assessment	=	Outcome
Pass		Pass		On track to receive Maryland High School Diploma
Pass		FAIL		Assistance and Re-take exam
FAIL		Pass		Re-take course
FAIL		FAIL		Re-take course and exam

Interventions and Online Courses

Interventions and Retaking Assessments

- Howard County Policy 8030 states that a student may retake a test in order to increase a test score if the student participates in an approved assistance program to strengthen areas of weakness. Students who fail a required state assessment must receive appropriate assistance before re-taking the exam. Howard County also offers a variety of interventions before and during the required state assessed courses. In addition, the school system has several different options for students to receive appropriate assistance. The chart below summarizes the interventions that are available. Contact your school counselor for additional information.

Before Course	During Course	After Course (Appropriate Assistance)
Middle School Interventions	Co-taught Seminar Courses	Summer School
Summer School Prep Course	Co-teaching in general education classes	Mastery Courses
	Tutorial classes for extra assistance and support	After school intervention programs and tutoring
	After-school intervention programs and tutoring	Saturday Bridge Academy

AP Substitute Exams for the required Maryland State Assessments

- To encourage more rigorous coursework and eliminate duplicate testing, MSDE accepts scores of 3, 4, and 5 on identified Advanced Placement (AP) exams (see below) in place of passing scores on the corresponding state assessments.

MD HSA	Advanced Placement exam (acceptable scores: 3, 4, 5)	Student Requirements
Algebra/Data Analysis	• Calculus AB • Calculus BC • Statistics	• Take AP course and test • Earn acceptable score • Substitute acceptable AP score for the required state assessment passing score
English	• English Language • English Literature	
Biology	• Biology	
Government	• U.S. Government and Politics	

Bridge Plan for Academic Validation

- The Bridge Plan for Academic Validation provides eligible students an additional opportunity to meet the testing requirement that will lead to a Maryland High School Diploma. Students must demonstrate defined knowledge and skills to graduate, either through the traditional testing program, which includes passing or earning the required combined score, determined by fall 2015, or the Bridge Plan program. An HCPSS student who thinks (s)he qualifies for this option is encouraged to explore the Bridge Plan for Academic Validation option with a school counselor.
- The Bridge Plan has been approved by the Maryland State Board of Education and is included in the Code of Maryland Regulations (COMAR).

Frequently Asked Questions Regarding the HSA

Do middle school students taking high school level courses take the required state assessments?

Middle school students taking high school level courses must take the appropriate required assessments. All middle school students are required to pass any state assessment they take in middle school. Students who take and pass a required state assessment in middle school will have those scores count toward their graduation requirements.

Are English language learners required to take the required state assessment?

Maryland, like other states, gauges students' progress in acquiring English fluency throughout their education. Schools enroll English Language Learners (ELL) in credit-bearing courses when it is determined they can be successful in them. ELL students will take the required state assessment when they are enrolled in the appropriate course.

How does Howard County's instructional program prepare my child for the required state assessment?

All tested courses have the state's Core Learning Goals embedded within the Howard County essential curriculum. The Howard County curriculum extends the Core Learning Goals to content that is beyond the core; however, all content needed for the required state assessment is contained within the essential curriculum.

What accommodations are used for students in Special Education?

Any accommodation provided in daily instruction and on classroom assessments, as documented in the student's IEP, must also be provided on the required state assessments.

Do other students qualify for accommodations?

Maryland allows testing accommodations for students who need them. The accommodation(s) must be documented in the student's IEP, 504 plan, or ELL plan.

When will my child take the required state assessments?

Students will take the required state assessments at the end of designated courses.

What is the passing score on the required state assessments?

The passing score for HSA algebra/data analysis is 412, for biology 400, for HSA English 396 and for Government 394. The passing score for PARCC Algebra I and PARCC English 10 will be determined in the fall of 2015.

How will parents receive test results?

Parents will receive their child's test score report from the Howard County Public School System approximately 10 weeks after the tests are administered. If additional information is requested, the parent can contact the school or the school system's accountability coordinator.

If students fail an assessment, will they be able to retake it during the school year to ensure they graduate on time?

Most students take the state required assessments either in ninth or tenth grade. They will have the opportunity to receive extra help and retake any failed tests before graduation.

When is mandatory assistance provided?

Schools will provide appropriate assistance to students who fail an assessment. Students can retake an assessment only after they participate in appropriate assistance.

What are alternative ways to meet the state required high school graduation assessment requirements?

Within the Howard County Public School System, students have the following alternatives to passing the required state assessments:

- Advanced Placement (AP) test substitution allows students to use an approved score on the state assessed-related AP test in place of taking the required state assessment.
- The Combined-Score Option allows students to offset a lower performance on one test with higher performance on another.
- The Bridge Plan for Academic Validation is available for students who have been unable to pass one or more state assessments, despite assistance. Students must meet three general eligibility criteria: taken and failed the test twice, participation in appropriate assistance, and satisfactory progress toward graduation. Students eligible for participation will meet with school staff to determine the projects to be included in the student's Academic Validation Project Package.

Maryland High School Graduation Requirements

Credit Requirements: Students must earn a minimum of 21 credits to graduate. Credits can be earned in the following areas:

CORE REQUIREMENTS			OTHER REQUIREMENTS	
Subject Area	**Current Specific Credit Requirements**	**State Assessed Course**	**Subject Area**	**Current Specific Credit Requirements**
Mathematics^	3 credits*, including: • 1 credit in Common Core Algebra I • 1 credit in Common Core Geometry	Algebra I	Fine Arts	1 credit
			Physical Education	1/2 credit, including: Lifetime Fitness
English	4 credits, including: • 1 credit in Common Core English 9 • 1 credit in Common Core English 10 • 1 credit in Common Core English 11 • 1 credit in Common Core English 12	English 10	Health	1/2 credit, including: Health Education or Current Health Issues
			Technology Education	1 credit
Science	3 credits, including: • 1 credit in Biology • 2 additional credits including laboratory experience, in any or all of the following areas: » Earth Science » Environmental Science » Life Science » Physical Science	Biology	Program Choice	2 credits in World Language** OR 2 credits in American Sign Language*** OR 2 credits in an approved Advanced Technology Program OR 4 credits in a Career Academy (State-approved Career and Technology Education Completer Program)
Social Studies	3 credits, including: • 1 credit in U.S. History • 1 credit in Local, State and National Government • 1 credit in World History	American Government ****	Electives	1-3 credits to include courses beyond requirements.

^ Beginning with students entering Grade 9 in the 2014-2015 school year, students are required to enroll in 4 math classes.

* Students who successfully completed high school level mathematics in middle school still need to earn 3 credits in mathematics, preferably in higher level courses. The University System of Maryland has changed its admission policy to require four consecutive years of high school math for students who entered Grade 9 in fall 2011 or later. Please check with each of your prospective colleges or universities for their specific entrance requirements.

** Students who received credit for Spanish I or French I based on work in middle school still need to earn at least 2 credits in World Language for this program choice option.

*** Students must complete both ASL I and II to meet the requirement. These courses may not meet all colleges' entrance requirements.

**** This exam will count as a graduation requirement for students who enter Grade 9 in school year 2013-2014 and beyond.

Biology Course Description

Biology

Science literacy is vital for all citizens as science connects to virtually every aspect of our modern lives. From making decisions on personal matters to engaging confidently in global policy discussions, our understanding of scientific knowledge and where that knowledge originates is fundamental. Research on student learning in science continues to emphasize that students should engage actively in science over multiple years in school. Science learning cannot focus only to the content or the processes of science but must emphasize the interrelationship among three key dimensions of science. The *Framework for K-12 Science Education*, published in 2011 by the National Research Council of the National Academies, defines these three key dimensions as:

- Scientific and engineering practices. Scientists engage in a variety of practices such as asking questions, planning and carrying out investigations, and engaging in argument from evidence. It is through these scientific and engineering practices that scientific knowledge among scientists is built. Importantly, it is through participation in these science practices that students in all grade levels build a deeper understanding of science content.
- Crosscutting concepts. Science knowledge is not a collection of discrete or unrelated facts. Conversely, our understanding of the natural world can be organized within several big ideas such as "cause and effect" or "patterns." The seven crosscutting concepts defined within the *Framework for K-12 Science Education*, provide a conceptual organization for students' developing understanding of their natural world.
- Disciplinary core ideas. The core ideas of science define the content of the scientific disciplines. Whether in the life, physical, or earth and space sciences, students' knowledge of the core content of science should deepen over time. Their level of understanding hinges on their opportunities to engage in meaningful learning experiences that encourage the application of their understanding.

Importantly, the three dimensions of science should never be taught in isolation. Instead, they should be regularly integrated throughout instruction and assessment. Science is a body of knowledge, a way of thinking, and a way of constructing an understanding of our natural world. Science literacy is achieved by helping students make sense of their world.

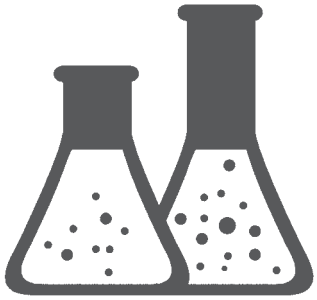
In Biology, students study a variety of life processes and learn how different organisms meet the challenges of living in their environment. Students learn to use laboratory equipment and materials to collect data and then use a variety of data analysis skills to interpret the data. Major biological concepts for student focus include homeostasis, energy transfer and use, the relationship between structure and function, and change over time. Additionally, students' experience in Biology supports their developing environmental literacy. In particular, students' study of ecology opens opportunities for them to engage in local action that protects, sustains, or enhances the natural environment.

Course content and skills are assessed through a wide range of evaluative measures including tests with objective and written responses, laboratory reports, simulations, research projects, class presentations and home assignments.

Practices of Science and Engineering

Throughout high school, science students will develop their skills in the practices of science. Each year, students will have many opportunities to apply these skills in laboratory and field investigations as well as long-term projects. These practices, as described in *A Framework for K-12 Science Education*, include:

- Ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and that can be empirically tested.
- Use and construct models as helpful tools for representing ideas and explanations, including diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.
- Plan and carry out systematic investigations.
- Produce data that must be analyzed in order to derive meaning using a range of tools to identify the significant features and patterns in the data, identify sources of error in the investigations, and calculate the degree of certainty in the results.
- Represent physical variables and their relationships using the fundamental tools of mathematics and computation for a range of tasks such as constructing simulations; statistically analyzing data; and recognizing, expressing, and applying quantitative relationships.
- Construct theories that provide explanatory accounts of the world.
- Reason and argue based on evidence to identify the best explanation for a natural phenomenon or the best solution to a design problem.
- Communicate clearly and persuasively.



Chemistry Of Life

A. Describe the unique characteristics of chemical compounds and macromolecules utilized by living systems.

B. Discuss the structure and function of enzymes.

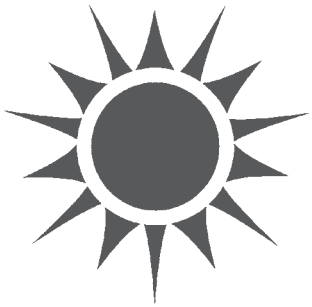
Biology Course Description

Cells and Homeostasis

A. Discuss cell structure and function in unicellular and multicellular organisms.

B. Describe how communication and regulation are accomplished within multicellular organisms.

Apply the concept of homeostasis to understanding how living systems respond to a wide range of environmental conditions.



Energy For Life

A. Discuss the transfer and use of matter and energy in photosynthesis and chemosynthesis.

B. Discuss the transfer and use of matter and energy in cellular respiration.

C. Describe the role of organ systems in the transfer and use of matter and energy by multicellular organisms.

Nucleic Acids And Protein Synthesis

A. Explain the connections among genes, chromosomes and DNA.

B. Explain cell cycles.

C. Explain how a genetic trait is determined by the code in a DNA molecule.

Genetics

A. Illustrate that the sorting and recombination of genes during sexual reproduction has an effect on variation in offspring.

B. Analyze and explain selected patterns of inheritance.

C. Describe the effect of gene alteration on an organism.

D. Describe the role of genetic counseling and biotechnology in society.

Evolution, Diversity And Classification

A. Explain evidence that illustrates that living things have changed over time.

B. Analyze and explain the mechanisms of evolutionary changes (i.e., genetic variation, environmental changes and natural selection).

C. Explain the relationship between biodiversity and evolution.

D. Estimate degrees of kinship among organisms or species.

Ecology

A. Analyze the relationships among organisms and between organisms and abiotic factors (ecosystem; biomes; abiotic/biotic factors: space, soil, water, air, temperature, food, light, organisms; relationships: predator-prey, parasite-host, mutualism, commensalism, saprophytism).

B. Describe the flow of matter and energy between living systems and the physical environment.

C. Analyze the interrelationships and interdependencies among different organisms and explain how these relationships contribute to the stability of the ecosystem.

D. Investigate how natural changes in environmental conditions and human activity will affect individual organisms and the dynamics of populations.

E. Illustrate how all organisms are part of and depend on two major global food webs.

Sample Test Questions

Sample Selected Responses

A researcher recently discovered a species of bacteria. DNA sequences were obtained from it and from several other species of bacteria. The DNA sequences came from the same part of the bacterial chromosome of each species.

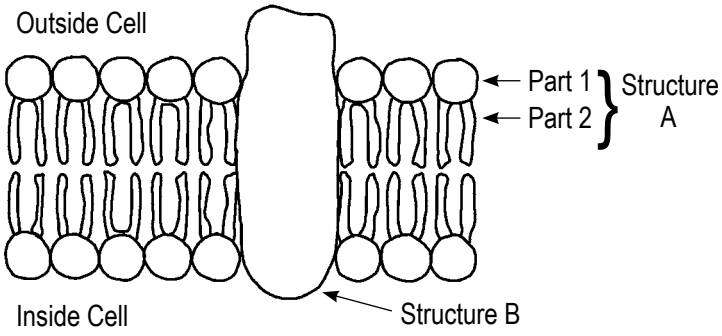
	DNA Sequence		
Unknown Species	ACT	GCA	GCC
Species I	ACA	GCG	CCG
Species II	ACT	GCT	GGC
Species III	ACA	GCC	GGG
Species IV	ACT	GCA	GCG

According to the data above, the unknown bacteria are most closely related to which species?

A. Species I
B. Species II
C. Species III
D. Species IV

Use the figure of a cell membrane below to answer the following:

Cell Membrane

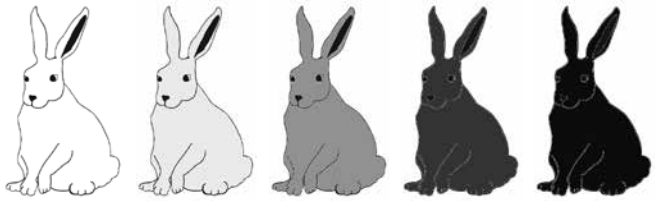


What kind of molecule is Structure A?

A. an amino acid
B. a phospholipid
C. a carbohydrate
D. a nucleic acid

Individuals within a population of rabbits have different colors of fur as shown in the diagram below.

Distribution Of Rabbit Fur Color

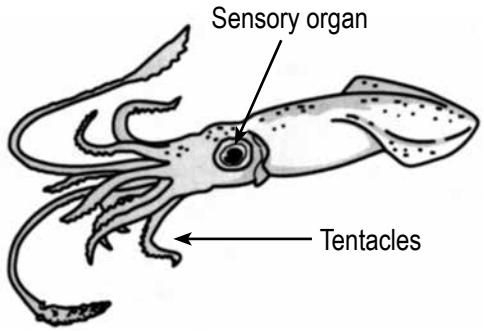


The difference in the fur color of the individual rabbits is described as:

A. speciation
B. variation
C. evolution
D. succession

Anatomy of a Squid

Squid are marine animals that have a complete circulatory system and reproduce sexually. A diagram of a squid is shown below.



Which of these is not a purpose of a squid's sensory organs?

A. finding mates
B. avoiding predators
C. locating prey
D. excreting waste

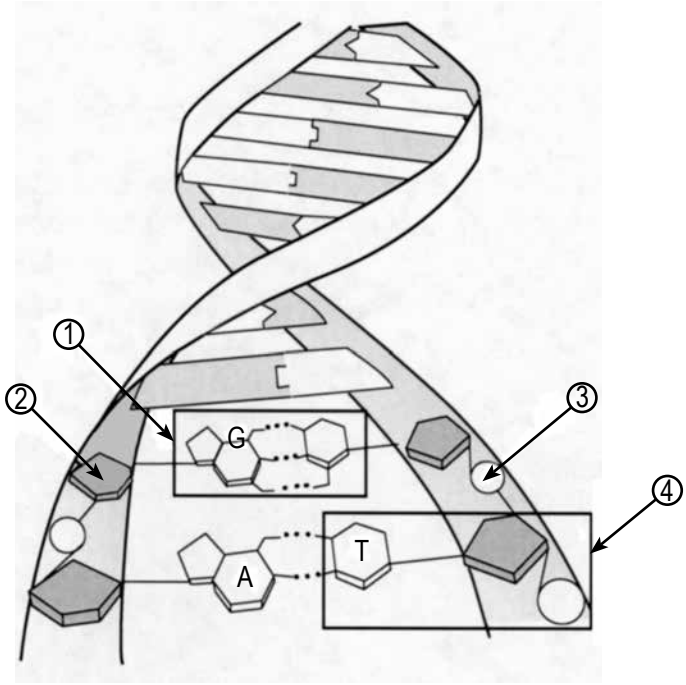
Sample Test Questions

DNA

One kind of chromosomal mutation can occur during meiosis when a pair of chromosomes that carry genes for the same trait fail to separate. Which of these represents the sex chromosomes of a male organism when this type of chromosomal mutation has occurred?

A. XXY
B. XX
C. XY
D. XXX

Use the diagram below to answer the question.



Which of these is a nucleotide?

A. 1
B. 2
C. 3
D. 4

One parent is homozygous dominant for brown hair (BB). The other parent is heterozygous for brown hair (Bb).

What is the probability that the offspring will have brown hair?

A. 100%
B. 75%
C. 50%
D. 25%

Bacteria

Evidence suggests that bacteria supplied with a cup of sugar could run a 60-watt light bulb for 17 hours.

Which of these was most likely used to affirm this scientific idea?

A. formulate a hypothesis
B. identify the problem
C. conduct an experiment
D. write a conclusion

Most bacteria do not have the ability to break down oil that is accidentally spilled into the ocean by tankers. However, scientists can insert a gene into the DNA of a bacterium to give it the ability to break down the oil. This technology is an example of

A. crossing-over
B. DNA replication
C. gene splicing
D. translation

Insects

Some adult insects are unable to swim but are able to walk on top of water. What characteristic of water enables these insects to walk on top of water?

A. pH
B. surface tension
C. solvent properties
D. atomic bonds

Plant Growth Rates

A group of students conducted an experiment to study the growth of bean plants. An equal number of bean plants of similar size were planted in containers A and B. Each day for five days, Container A received water only, while Container B received an equal amount of weak fertilizer solution. The table below shows the average height of the plants in each container for each day of the experiment.

Day	Container A: Water Only	Container B: Water plus Fertilizer
1	2.0	2.0
2	2.2	2.3
3	2.3	2.8
4	2.5	3.2
5	2.6	3.8

Which of these is being tested in this experiment?

A. effect of water on plant height
B. effect of fertilizer on plant height
C. maximum height the plants will grow
D. number of days the plants will grow

Sample Test Questions

Sample Technical Passage With Selected Response

Use the technical passage, *Scientists Explore an Aspect of Fish Migration*, to answer the question below:

Scientists Explore An Aspect Of Fish Migration

Toxic pollutants from agriculture and industry have been found worldwide, even in areas that are far from pollution sources. Until now, scientists have blamed air currents for spreading toxins far from their sources. However, a recent study indicates that fish can transport toxins over long distances.

Scientists developed this hypothesis when toxins were mysteriously found in a remote lake in Sweden. A team of scientists from Lund University hypothesized that salmon accumulated and stored toxins in their fatty tissues when they were in the Baltic Sea. The salmon migrated upstream, spawned and then died in the lake, releasing toxins as their bodies decomposed.

To test this hypothesis, the scientists traveled to Alaska, where they carried out an experiment in two neighboring lakes, Lower Fish Lake and Round Tangle Lake. Lower Fish Lake is open to migrating salmon, while Round Tangle Lake is closed to migrating salmon because of numerous waterfalls and rapids. A small fish, the arctic grayling, lives in both lakes. Fish eggs are a large part of its diet. When the scientists examined the arctic grayling from both lakes, the arctic grayling in Lower Fish Lake had more than twice the concentration of toxins in their bodies as the arctic grayling in Round Tangle Lake. Since both lakes are exposed to similar levels of air pollution, the difference in toxin levels found in the arctic grayling must be due to other factors.

In a related experiment, scientists caught salmon throughout their migration and tested their fatty tissues for toxins. Even though the fatty tissue deposits were gradually used up, toxin levels remained about the same throughout the 400-kilometer journey up the Copper River from the Gulf of Alaska to Lower Fish Lake. Instead of metabolizing the toxins, the salmon stored them in other body tissues that also contain fat, and in their eggs.

Both of these studies support the hypothesis that migrating salmon can transport pollutants to new areas.

According to the passage, what question is being asked by Lund University researchers?

A. What are the migrating habits of salmon in Alaska and Sweden?

B. Are increasing levels of air pollution affecting salmon migration?

C. What are the diets of the arctic grayling and the migrating salmon found in the two Alaskan lakes?

D. Are migrating salmon responsible for transporting toxins from the sea to freshwater lakes?

What Can You Do To Help?

Your involvement in your child's educational development is very important for academic achievement. Tests represent only ONE aspect of your child's development. Awareness, support, and praise of your child's accomplishments in all academic areas are extremely helpful.

GENERAL TEST-TAKING TIPS FOR PARENTS

Your child should:

- Get a good night's sleep the night before the test.
- Eat breakfast the morning of a test.
- Have a happy morning - avoid family conflict.
- Practice at home with timed activities - doing homework, playing a game, doing a chore.
- Arrive at school on time in order to relax prior to testing time.

ENCOURAGING ACHIEVEMENT

- Set high expectations for your child.
- Make it clear that school is your child's first priority.
- Provide a quiet place for your child to study.
- Help your child with homework.
- Show interest in your child's schoolwork.
- Limit the amount of television your child watches.
- Encourage your child to take challenging courses.

TAKING THE TEST

Encourage your child to:

- Stay positive.
- Think of the experience as a challenge.
- Read directions carefully.
- Look at the wording of the question to determine what is being asked and to find key words.
- Attempt every question - do not give up.
- Go back and check work.
- Write in complete sentences and be detailed when explaining thinking.

Answer each part of every question fully.

For More Information

www.hcpss.org

This is the homepage for the Howard County Public School System. Click on Test Scores for information about assessments.

www.marylandpublicschools.org/msde

This is the homepage for the Maryland State Department of Education. Click on Parents to find information about helping your child.

www.mdk12.org

The School Improvement in Maryland web site contains practical information and tools to help educators and parents better understand state tests. Here you can find background information about the HSA and the Maryland School Assessments.

www.hsaexam.org

The High School Assessment web site contains information on the specific High School Assessments, how students are assessed, and examples and sample tests in algebra/data analysis, biology, English, and American government.

www.mdreportcard.org

This site is the online version of the Maryland School Performance Report, including scores on state tests.

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The "What Your Child Will Learn" Family Guides are available on the HCPSS website at www.hcpss.org/academics/learnguides.shtml **SMT.10.14**