



OHIO GRADUATION TESTS WORKBOOK  
**SCIENCE**



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# INTRODUCTION

## INFORMATION FOR FAMILIES

This guide is for students who have not passed a section of the Ohio Graduation Tests (OGT). Five guides are available: Reading, Writing, Mathematics, Science and Social Studies. They have been developed to help students take personal responsibility for their own learning. Each guide introduces students to a thinking strategy called mind mapping. This strategy helps students understand how they can think through test problems.

There are two purposes built into the guides. The first purpose is to help students develop a learning plan to work through test items that come from OGT practice tests. This plan helps students develop an understanding of test questions related to the state academic content standards and benchmarks.

Each guide walks students through the four stages in a learning plan:

- PLAN** – Students identify a coach and set up a meeting to review their OGT results. They see how well they performed on each standard and identify areas in need of improvement. Then they develop a schedule for working through the rest of the guide.
- DO** – Students work through several test items using the mind-mapping strategy. They see examples of mind mapping for some test items and try creating some on their own.
- STUDY** – Students are asked to think about what they have done. This is also called reflection. They complete a worksheet prior to setting up another meeting with their coach. During this meeting, students will review what they have discovered and set goals to improve their performance on the next test.
- ACT** – The coach helps the student develop an action plan to prepare for retaking an OGT.

The second purpose is to introduce students to a strategy that should help them improve their test-taking skills. The mind-mapping strategy has two parts. To make it work, students have to self-talk while they draw a picture of what they are thinking. The students are learning how to think about their thinking as they draw these visual maps.

If your student has decided to use this guide, there is a role that you can play. Praise your student for taking ownership. Support his or her learning. Help your student identify a coach who will be able to meet his or her learning needs. Encourage your student to stick with it! Monitor your student's work with his or her action plan. Your willingness to carry out this role is a critical factor in your student's success.

# INTRODUCTION

## INFORMATION FOR COACHES

This guide is for students who have not passed a section of the Ohio Graduation Tests (OGT). Five guides are available: Reading, Writing, Mathematics, Science and Social Studies. They have been developed to help students learn how to take personal responsibility for their own learning. Each guide also introduces students to a thinking strategy called mind mapping. This strategy helps students understand how they think through test problems.

The format of the guides requires students to select a coach who will guide them. If you have been asked to be a coach, then you have a major role to play in ensuring that your student has the support and encouragement necessary to be successful. You should thoroughly familiarize yourself with the guide, and be prepared to monitor and adjust material presented to fit your individual student. Be sure to look at the items recommended for coaches in the resource section of the guide.

By using this guide, you will help students develop a plan to work through test items from OGT practice tests. This plan helps students develop a deeper understanding of test questions related to the benchmarks in Ohio's academic content standards. As a coach, you will assist your student in working through the Plan-Do-Study-Act (PDSA) cycle. It is a scientific approach for developing improvement goals.

Each guide walks students through the four stages in a PDSA cycle. As a coach, you will assist your student to:

- PLAN** – Set up a meeting to review OGT results with your student. Guide your student in identifying his or her performance level for each content standard. Assist in specifically identifying the standards and benchmarks that are in need of improvement. Help develop a schedule for working through the remainder of the guide.
- DO** – Help your student work through several test items using the mind-mapping strategy. Your student will have a chance to view model examples of mind mapping for selected test items and then will try some on his or her own. As a coach, you will need to make a decision in terms of the level of support you will provide in this stage. Based upon the needs of your student, you may choose to work through each item example with your student, guide your student through a few examples and then let him or her proceed on his or her own or have your student tackle the entire section independently. Regardless of your decision, check in with your student to see how he or she is doing so that you can intervene if necessary.
- STUDY** – After your student finishes the DO section, help your student to think about or reflect upon his or her work by completing a worksheet prior to setting up another meeting with you. During this STUDY meeting, your student will review what he or she has discovered about his or her own learning. The next step is to guide your student in setting some future goals to improve his or her score when he or she retakes the test.
- ACT** – You will now help your student develop an action plan that will list steps to be taken in preparation for retaking the OGT. Continue to monitor and support your student through the action plan timeline.

(continued)

# INTRODUCTION

## INFORMATION FOR COACHES

The mind-mapping strategy in this guide is a method for organizing content knowledge visually. The strategy has two parts. To make it work, students need to self-talk while they draw a visual picture of what they are thinking. Each guide offers students the opportunity to learn how to use this strategy as they think through test items specific to the content area being studied. The strategy aims to help students improve their test-taking skills through enhancing their metacognitive processing. Students who are able to think metacognitively:

- Are aware of how their mind processes information;
- Are able to plan a course of action and select an appropriate strategy to work through the problem presented;
- Monitor their thinking as they apply the selected strategy; and
- Reflect on their thinking by evaluating the outcome of their action.

Robert Marzano (2003) references Paivio's (1990) "dual-coding theory" of information storage in his study of instructional strategies that result in higher levels of achievement for students. This research discovered that students store knowledge in two forms:

- Linguistically (language-based) – involves the senses of hearing and seeing and our ability to store actual statements in our long-term memory.
- Non-linguistically (visual imagery-based) – which is expressed through mental pictures or graphic representations of learning and understanding.

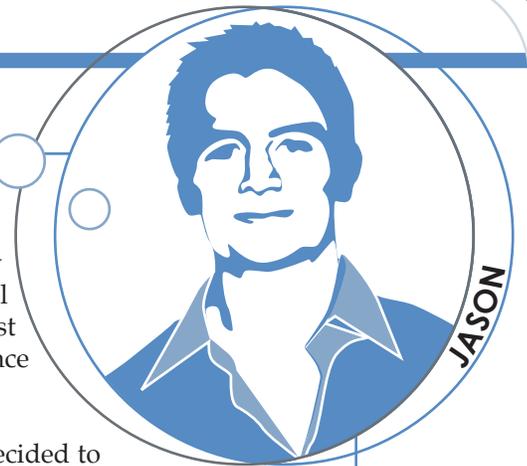
The more students use both systems of representation – linguistic and non-linguistic – while they are learning new concepts, the better they are able to recall knowledge and think about it in an efficient and effective manner.

You play a vital role in the life of the student you choose to coach through this learning model. Stay connected and consistently focus on the progress your student is making toward established goals. As you identify further learning needs, help locate and ensure that your student has access to appropriate instruction and intervention. Ability to pass the OGT is critical to a student's future and can be achieved if appropriate assistance is provided. Good luck – and enjoy the process!

# INTRODUCTION

## INFORMATION FOR STUDENTS SCIENCE

Hi, my name is Jason. I'm going to be your personal tutor. As you work through this guide, you will plan your own learning and learn how to use a strategy called mind mapping. This strategy will help you understand how your mind thinks through test questions and may help you score higher on your Science OGT the next time you take it.



Like you, I needed to do better on the Science OGT. I decided to take some real action steps to understand the science standards and benchmarks and to improve my test-taking skills. I'm going to walk you through the steps I took to prepare myself for retaking the Science OGT. These action steps helped me – I think they will help you, too.

Here's how this guide is set up. You will develop a Plan-Do-Study-Act (PDSA) to work through test questions from the OGT practice tests. This guide takes you through the four stages in a PDSA:

- PLAN** – You will choose a coach and set up a meeting to review your Science OGT results. Together, you will use your Score Report to identify the science standards that you did well with and those that need more work. Then you'll develop a schedule for working through the rest of the guide.
- DO** – You will work through several test questions using the mind-mapping strategy. You will see how I worked through test items and then you will try some on your own. It's important to remember that these will not be the questions you will see when you retake the test. However, we can learn by reviewing past questions and thinking about how to approach other questions that we will be given. I learned a lot about how I think and how to draw a map of what's going on in my head.
- STUDY** – After you finish the DO section, you will be asked to think about what you have done. You will set up another meeting with your coach. During this meeting, you will review what you have learned and set some goals based upon what you discovered about yourself.
- ACT** – Your coach will help you develop an action plan that will list steps to prepare yourself for retaking the science test. I shared my action plan so you will know how to do this. I'm working my plan right now so that I will be proficient or higher the next time I take the test.

This is my Plan-Do-Study-Act (PDSA) mind map. As you work through the guide, think about your work as building a pyramid where each new block is helping you to reach your ultimate goal – passing the Science OGT!



# INTRODUCTION

## PDSA MIND MAP SCIENCE

**Step 1:** Review the guide.

**Step 2:** Select a coach and set a meeting time.

**Step 3:** Gather your test results and work through the planning template.

**PLAN**

1

**Step 4:** Work through the test questions using mind mapping.

**Step 5:** Complete the reflection questions.

2

**DO**

**Step 6:** Think about your thinking by completing the reflection worksheet.

**Step 7:** Set a meeting with your coach and review your progress.

**STUDY**

3

**Step 8:** Develop an action plan.

**Step 9:** Tackle your action plan!

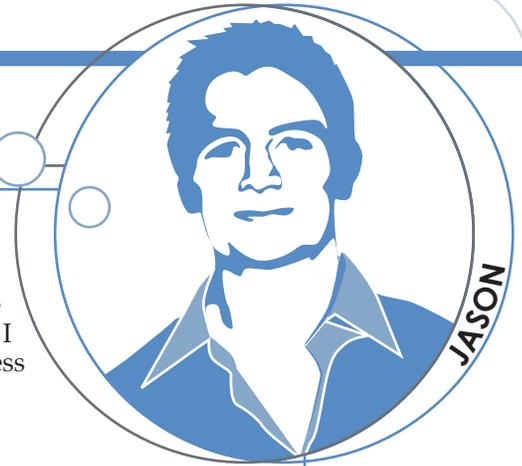
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**ACT**



# PLAN

## INTRODUCTION SCIENCE



The first stage in a Plan-Do-Study-Act (PDSA) is to build the PLAN. The PLAN should help us to learn more about the science standards and benchmarks. And it should also include some new ways for us to think about test questions. I used the PDSA learning plan to keep track of my progress as I worked through the guide.

There are three steps in the planning process:

**Step 1:** Review the guide.

**Step 2:** Select a coach and set a meeting time.

**Step 3:** Gather your test results and work through the planning template.

Here's what I did for each of the steps.

### Ideas to Consider:

*I read over each introduction section for Plan-Do-Study-Act.*

### Target Date for Completion:

*August 10*

1

## PLAN

Review the guide.

### Ideas to Consider:

*I used a brainstorming process to identify and help select a coach. I asked my best choice and set up a meeting time.*

### Target Date for Completion:

*Identify Coach, August 10  
Meeting, August 17*

2

## PLAN

Select a coach and set a meeting time.

### Ideas to Consider:

*Before meeting with my coach, I checked with the guidance counselor, science teacher and my parents to collect testing data, classroom grades and reports.*

### Target Date for Completion:

*August 17  
(Take this information to the meeting with my coach.)*

3

## PLAN

Gather your test results and work through the planning template.



# PLAN

## PLANNING PROCESS SCIENCE

1

### Review the guide.

Skim through the guide. Then go back and take time to read the introduction to each section. This will give you a good idea of how the guide is set up and what you will be doing in each stage of the PDSA.

A coach is someone that will agree to guide and work with you. It must be someone that you trust and with whom you feel comfortable. It should be someone who is available to meet with you on a regular basis. Your coach should have a good understanding of science content.

I built a chart and determined my criteria for selecting a coach. Then I thought about people I might ask. You can see my list included my older brother, Jake. He is a senior this year and he gets good grades in his science classes. My Dad came next. He knows a lot about science concepts. I also listed my science teacher, Mr. Bunting.

2

### Select a coach and set up a meeting time.

Once I had people identified, then I took one at a time and checked them against my criteria. You can look at my chart to get an idea of how I thought through each choice and finally decided to ask my Dad.

Name	Criteria				
	I trust this person.	This person understands science.	This person has time to meet with me.	This person would be willing to work with me.	This person is patient and understands how I learn.
Jake	✓	✓	He doesn't have much time with his schedule.	Probably not – hard to fit me into his busy life!	✓
Dad	✓	✓	✓	✓	✓
Mr. Bunting	✓	✓	He teaches during my study hall and coaches after school.	✓	✓



STEP 2 CONTINUED ON NEXT PAGE

# PLAN

## PLANNING PROCESS SCIENCE

Here's a chart for you to use. First, set your criteria and then try to come up with at least three people who might be good coaches. Check each person against your criteria and make a selection.

Name	Criteria				

Once you have decided on your coach, the next step is to ask. I asked my Dad and of course, he said yes. We set up a time to meet so that he could look over the guide and help me get started.



# PLAN

## PLANNING PROCESS SCIENCE

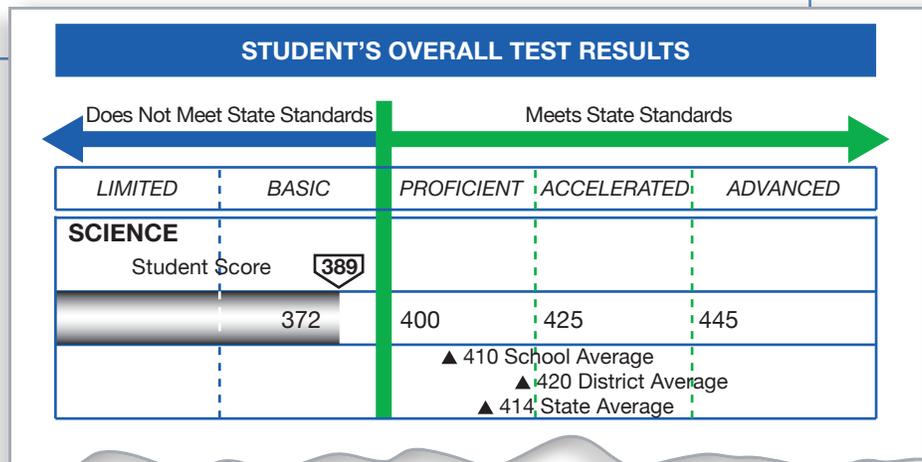
Now for step three, you need to gather your test results and use the Science Standards and Benchmarks Worksheet to self-assess your current knowledge of science content. This worksheet contains information on all the key science concepts that we need to know. It will help you to decide which benchmarks you feel you understand and which ones you don't.

Before I set up my meeting with my Dad, I talked with my science teacher, Mr. Bunting, about getting some information on how I had done in science class. I also talked with my guidance counselor who had records of my results from a ninth-grade practice test that we took at school.

3

**Gather your test results and work through the planning template.**

At our meeting, my coach (Dad), looked over this information with me. We then looked over the Ohio Graduation Tests Family Report that came to our home. It has information on how I did on each of the five OGT tests. First, we looked at my results and saw that I scored at the basic level in science and I need to be at proficient or above.



**STEP 3 CONTINUED ON NEXT PAGE**

# PLAN

## PLANNING PROCESS SCIENCE

Then we looked at my overall performance with the science content standards.

### STUDENT PERFORMANCE IN CONTENT STANDARDS

Ohio Content Standards for SCIENCE	Lower	About the Same	Higher	W
<b>Earth and Space Sciences</b> Evaluate human activities that can conserve or deplete Earth's finite resources. Use energy, matter, motion and force concepts to explain patterns in Earth's systems and history, and the composition and scale of the solar system and physical universe.		◆		
<b>Life Sciences</b> Describe how living systems function and interact with the physical environment, including the cycling of matter and the flow of energy in living systems. Understand characteristics, structure and function of cells, principles of heredity, biological evolution, and the diversity and interdependence of life.	◆			
<b>Physical Sciences</b> Apply the concepts of the structure and properties of atoms and molecules, and the principles of conservation of matter to explain identifiable physical properties of matter, materials and objects, physical and chemical changes and the formation and patterns of substances. Summarize how the concepts and principles of transfer and conservation of energy; motion and forces affecting motion; and the nature of waves and interactions of matter and energy describe and predict physical interactions and events in the natural world.		◆		
<b>Science and Technology</b> Suggest or choose alternative technological designs or devices, including explaining critical factors to consider in relation to short- and long-term use of the design. Describe examples of scientific and technological advances, including how they are related and may impact society.	◆			
<b>Scientific Inquiry</b> Design and evaluate scientific investigations. Use mathematics, scientific reasoning and communication skills to interpret, analyze and explain scientific conclusions and evidence from investigations.	◆			
<b>Scientific Ways of Knowing</b> Show how scientific knowledge must be based on scientific evidence to explain how scientific questions can be investigated, and how scientific ideas can be used to predict and logically explain natural phenomena and events. Recognize examples of scientific advancements and guidelines, and recognize how scientific ideas and skills apply to careers, daily work and society.	◆			



STEP 3 CONTINUED ON NEXT PAGE

# PLAN

## PLANNING PROCESS SCIENCE

Using everything we had learned about my performance, we worked through the entire worksheet. This took us about 45 minutes. Here's my self-assessment of the Earth and Space Sciences standard as an example:

Content Standard: Earth and Space Sciences		
Benchmarks:	Self-assessment:	
	Know this	Needs further study
<b>Explain</b> how evidence from stars and other celestial objects provide information about the processes that cause changes in the composition and scale of the physical universe.	✓	
<b>Explain</b> that many processes occur in patterns within the Earth's systems.	✓	
<b>Explain</b> the 4.5 billion-year-history of Earth and the 4 billion-year-history of life on Earth based on observable scientific evidence in the geologic record.	✓	
<b>Describe</b> the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources.		✓
<b>Explain</b> the processes that move and shape Earth's surface.	✓	
<b>Summarize</b> the historical development of scientific theories and ideas, and <b>describe</b> emerging issues in the study of Earth and space sciences.		✓



After we completed the benchmarks worksheet, Dad helped me build a timeline for completing the other sections of the guide. I wrote the dates into my PDSA plan.

We thought it might be a good idea to have Mr. Bunting take a look at the plan, too, because he might have some other ideas on what I need to work on. And I promised to check with my Dad every week.

**STEP 3 CONTINUED ON NEXT PAGE**

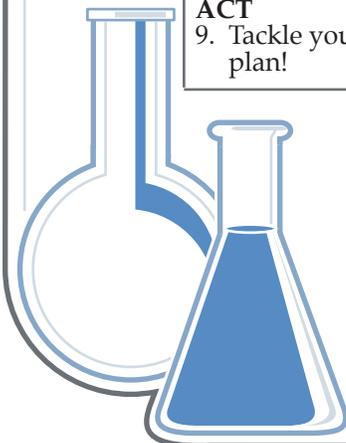
# PLAN

## PLANNING PROCESS SCIENCE

### Plan-Do-Study-Act

Jason's Science PDSA Schedule

PDSA Steps	Ideas to Consider	Target Completion Date	Date Completed
<b>PLAN</b> 1. Review the guide.	<i>I read over each introduction section for Plan-Do-Study-Act.</i>	August 10	✓
<b>PLAN</b> 2. Select a coach and set a meeting time.	<i>I used a brainstorming process to identify and help select a coach. I asked my best choice and set up a meeting time.</i>	August 10 Meeting set – August 17	✓
<b>PLAN</b> 3. Gather your test results and work through the planning template.	<i>Before the meeting with my coach, I checked with the guidance counselor, science teacher and my parents to collect testing data, classroom grades and reports.</i>	August 17 (Take this information to the meeting.)	✓
<b>DO</b> 4. Work through the mind-mapping test questions.	<i>My coach helped me develop a timeline and worked through a couple of the test questions with me to help me get started. Then I was on my own.</i>	August 30 (I planned for 45-60 minute work sessions.)	✓
<b>DO</b> 5. Complete the reflection questions for each test question.	<i>I completed all the reflection questions and checked with my coach when I had a problem.</i>		Had all the questions completed by August 29!
<b>STUDY</b> 6. Think about your thinking by completing the reflection worksheet.	<i>I spent time reviewing my maps and my responses to the reflection questions. I filled out the reflection worksheet.</i>	August 31	✓
<b>STUDY</b> 7. Set a meeting with your coach and review your progress.	<i>I called my coach and we set up another meeting to review my results.</i>	September 2	✓
<b>ACT</b> 8. Develop an action plan.	<i>Together we developed an action plan to put into place before I was scheduled to retake the OGT.</i>	September 2	✓
<b>ACT</b> 9. Tackle your action plan!	<i>I had six weeks to work on my plan. With lots of support, I did it. I felt ready to retake the test.</i>	Mid-October Ready for retake!	



# PLAN

## PERFORMANCE VERBS SCIENCE

With my learning plan completed, I decided to review the other items in the PLAN section of the guide before starting on the DO section.

First, I looked over the information on the different types of thinking that are in the science benchmarks. Teachers refer to these as performance verbs. The chart included in the guide reminds me of the types of verbs that I'll see in the test questions.

<i>Performance Verb</i>	<i>What it means</i>
<b>Analyze</b>	To think about the different parts of a problem or situation to figure out the traits of the whole (e.g., looking at several two-dimensional perspectives to decide a type of three-dimensional object).
<b>Compare</b>	To look at traits or qualities to find out what is alike and what is different. "Compare" is usually stated as "compare with." You are to highlight similarities, but differences may be mentioned.
<b>Describe</b>	To represent a thought or an idea, such as noting changes taking place over time.
<b>Evaluate</b>	To determine the value of something for a given purpose based on certain standards or criteria (e.g., explaining the pros, cons and/or results of a decision).
<b>Explain</b>	To make clear or give reason for something (e.g., explaining factors that cause a certain kind of reaction).
<b>Formulate</b>	To express a thought or an idea based on the review of information (e.g., coming up with a category to organize what seem to be objects or events that are not alike).
<b>Infer</b>	To extend information beyond what is directly stated (e.g., extracting data from a graph).
<b>Predict</b>	To use what is already known to make a statement about what will happen in the future.
<b>Summarize</b>	To condense information (e.g., stating the main points of an argument).
<b>Support</b>	To show evidence to back a conclusion or argument (e.g., citing people with similar points of view).
<b>Trace</b>	To describe a path or sequence (e.g., to explain the chronology of events).



# PLAN

## TEST-TAKING TIPS SCIENCE

I also reviewed the test-taking tips on the different types of questions just to refresh my memory.

- Get plenty of rest.
- Eat breakfast and dress comfortably on each day of testing.
- Be confident of your ability and give your best effort.

### General Test Tips

- Read the directions carefully.
- If the question is asking for facts, do not give your personal opinion on the topic.
- Make an outline before writing. This way your response will be more organized and fluid.
- Address all parts of the question.
- If you have time left at the end, proofread your work and correct any errors.

### Short- Answer and Extended- Response Tips

Unlike the Ninth-Grade Proficiency Tests, the Ohio Graduation Tests include more than just multiple-choice questions.

There are three different kinds of questions on the OGT:

### Types of Questions

- 1) Multiple choice;
- 2) Short answer; and
- 3) Extended response.

- Read the entire question before attempting to answer it.

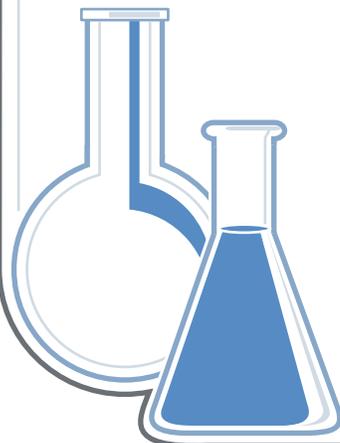
- First, try to answer the question without looking at the choices. Then, look at the choices to see if your answer is the same as, or close to, one of the choices.

- Read carefully any question using the words "not" or "except."

- Don't keep changing your answer. Usually your first choice is the right one, unless you did not read the question correctly.

### Multiple Choice Tips

Then it was time to move to the DO section. This is going to take some time. In fact, you might want to schedule the work over several days like I did in my plan. I decided to work on at least two questions per day and to set aside 45 to 60 minutes each time I worked. Find a quiet place to work and get yourself organized for learning. Take a deep breath and dive right in!



# PLAN

## PLAN-DO-STUDY-ACT CHART SCIENCE

### Plan-Do-Study-Act

Name: \_\_\_\_\_

PDSA Steps	Ideas to Consider	Target Completion Date	Date Completed
<b>PLAN</b> 1. Review the guide.			
<b>PLAN</b> 2. Select a coach and set a meeting time.			
<b>PLAN</b> 3. Gather your test results and work through the planning template.			
<b>DO</b> 4. Work through the mind-mapping test questions.			
<b>DO</b> 5. Complete the reflection questions for each test question.			
<b>STUDY</b> 6. Think about your thinking by completing the reflection worksheet.			
<b>STUDY</b> 7. Set a meeting with your coach and review your progress.			
<b>ACT</b> 8. Develop an action plan.			
<b>ACT</b> 9. Tackle your action plan!			



# PLAN

## CONTENT STANDARDS SCIENCE

### Science Standards and Benchmarks Worksheet

Name: \_\_\_\_\_

Performance Level: \_\_\_\_\_

Performance Level Needed: \_\_\_\_\_

Science Scale Score: \_\_\_\_\_

Score Needed: \_\_\_\_\_

Content Standard: Earth and Space Sciences	Self-assessment:	
	Know this	Needs further study
<b>Benchmarks:</b>		
<b>Explain</b> how evidence from stars and other celestial objects provide information about the processes that cause changes in the composition and scale of the physical universe.		
<b>Explain</b> that many processes occur in patterns within the Earth's systems.		
<b>Explain</b> the 4.5 billion-year-history of Earth and the 4 billion-year-history of life on Earth based on observable scientific evidence in the geologic record.		
<b>Describe</b> the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources.		
<b>Explain</b> the processes that move and shape Earth's surface.		
<b>Summarize</b> the historical development of scientific theories and ideas, and <b>describe</b> emerging issues in the study of Earth and space sciences.		



# PLAN

## CONTENT STANDARDS SCIENCE

### Science Standards and Benchmarks Worksheet (continued)

Content Standard: Life Sciences		
Benchmarks:	Self-assessment:	
	Know this	Needs further study
<b>Explain</b> that cells are the basic unit of structure and function of living organisms, that once life originated all cells come from pre-existing cells, and that there are a variety of cell types.		
<b>Explain</b> the characteristics of life as indicated by cellular processes and <b>describe</b> the process of cell division and development.		
<b>Explain</b> the genetic mechanisms and molecular basis of inheritance.		
<b>Explain</b> the flow of energy and the cycling of matter through biological and ecological systems (cellular, organismal and ecological).		
<b>Explain</b> how evolutionary relationships contribute to an understanding of the unity and diversity of life.		
<b>Explain</b> the structure and function of ecosystems and relate how ecosystems change over time.		
<b>Describe</b> how human activities can impact the status of natural systems.		
<b>Describe</b> a foundation of biological evolution as the change in gene frequency of a population over time. <b>Explain</b> the historical and current scientific developments, mechanisms and processes of biological evolution. <b>Describe</b> how scientists continue to investigate and critically analyze aspects of evolutionary theory.		
<b>Explain</b> how natural selection and other evolutionary mechanisms account for the unity and diversity of past and present life forms.		
<b>Summarize</b> the historical development of scientific theories and ideas, and <b>describe</b> emerging issues in the study of life sciences.		



# PLAN

## CONTENT STANDARDS SCIENCE

### Science Standards and Benchmarks Worksheet (continued)

Content Standard: Physical Sciences	Self-assessment:	
	Know this	Needs further study
<b>Benchmarks:</b>		
<b>Describe</b> that matter is made of minute particles called atoms and atoms are comprised of even smaller components. <b>Explain</b> the structure and properties of atoms.		
<b>Explain</b> how atoms react with each other to form other substances and how molecules react with each other or other atoms to form even different substances.		
<b>Describe</b> the identifiable physical properties of substances (e.g., color, hardness, conductivity, density, concentration and ductility). <b>Explain</b> how changes in these properties can occur without changing the chemical nature of the substance.		
<b>Explain</b> the movement of objects by applying Newton's three laws of motion.		
<b>Demonstrate</b> that energy can be considered to be either kinetic (motion) or potential (stored).		
<b>Explain</b> how energy may change form or be redistributed but the total quantity of energy is conserved.		
<b>Demonstrate</b> that waves (e.g., sound, seismic, water and light) have energy and waves can transfer energy when they interact with matter.		
<b>Trace</b> the historical development of scientific theories and ideas, and <b>describe</b> emerging issues in the study of physical sciences.		



# PLAN

## CONTENT STANDARDS SCIENCE

### Science Standards and Benchmarks Worksheet (continued)

Content Standard: Science and Technology		
Benchmarks:	Self-assessment:	
	Know this	Needs further study
<b>Explain</b> the ways in which the processes of technological design respond to the needs of society.		
<b>Explain</b> that science and technology are interdependent; each drives the other.		

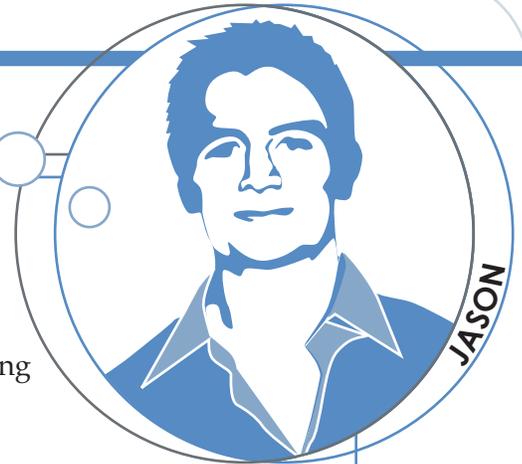
Content Standard: Scientific Inquiry		
Benchmarks:	Self-assessment:	
	Know this	Needs further study
<b>Participate</b> in and <b>apply</b> the processes of scientific investigation to create models and to design, conduct, evaluate and communicate the results of these investigations.		

Content Standard: Scientific Ways of Knowing		
Benchmarks:	Self-assessment:	
	Know this	Needs further study
<b>Explain</b> that scientific knowledge must be based on evidence, be predictive, logical, subject to modification and limited to the natural world.		
<b>Explain</b> how scientific inquiry is guided by knowledge, observations, ideas and questions.		
<b>Describe</b> the ethical practices and guidelines in which science operates.		
<b>Recognize</b> that scientific literacy is part of being a knowledgeable citizen.		



# DO

## INTRODUCTION SCIENCE



The second stage in a PDSA is to DO what you have planned.

There are two steps in the doing process:

**Step 4:** Work through the test questions using mind mapping.

**Step 5:** Complete the reflection questions.

You will spend some time working through test questions. I picked eight multiple-choice, three short-answer and two extended-response questions for you to practice.

For some items, I'm going to model the mind-mapping strategy by showing you my mind map and talking you through my thinking. For others, I've given you some key ideas to jump start your thinking and begin creating your own map. Go ahead and talk to yourself (out loud if you like) while you draw your map.

For other test questions, you are going to be on your own. After you finish your work, you can take a look at my mind maps. These are in the back of the guide in the Reference section. Your mind map may look different than mine. In fact, you might have solved the problem in a different way and that is okay. The important thing is that you should have the same right answer.

I've listed the science standard and benchmark for each question. Do your thinking and mapping for each question and don't forget to complete the reflection box. This is going to be very important to you when you move into the STUDY stage of the PDSA. Your reflections will help you develop your next action plan.

Are you ready? Take your time. There is no clock ticking. You can spend as much time as you need on each test question. Good luck and have some fun!



**Standard:** Physical Sciences

**Benchmark B:** Explain how atoms react with each other to form other substances and how molecules react with each other or other atoms to form even different substances.

Use the partial periodic table to answer question 26.

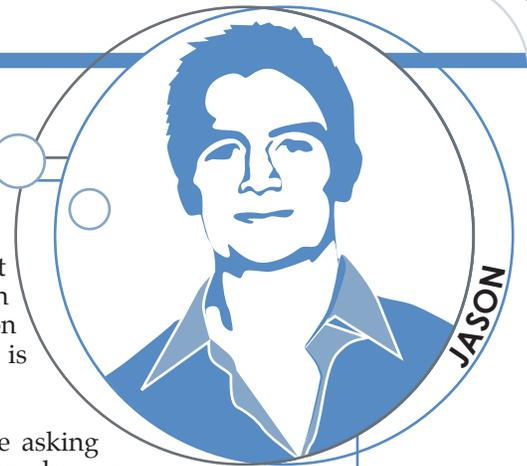
6 <b>C</b> Carbon 12.0107	— Atomic Number
6 <b>C</b>	— Symbol
Carbon	— Name
12.0107	— Average Atomic Mass

**Partial Periodic Table of the Elements**

	IA 1								VIIIA 18
1	1 <b>H</b> Hydrogen 1.00794								2 <b>He</b> Helium 4.0026
2	3 <b>Li</b> Lithium 6.941	IIA 2	4 <b>Be</b> Beryllium 9.0122	IIIA 13	IVA 14	VA 15	VIA 16	VIIA 17	10 <b>Ne</b> Neon 20.1797
3	11 <b>Na</b> Sodium 22.9898		12 <b>Mg</b> Magnesium 24.3050	5 <b>B</b> Boron 10.811	6 <b>C</b> Carbon 12.0107	7 <b>N</b> Nitrogen 14.0067	8 <b>O</b> Oxygen 15.9994	9 <b>F</b> Fluorine 18.9984	18 <b>Ar</b> Argon 39.948
4	19 <b>K</b> Potassium 39.0983		20 <b>Ca</b> Calcium 40.078	13 <b>Al</b> Aluminum 26.98154	14 <b>Si</b> Silicon 28.0855	15 <b>P</b> Phosphorus 30.9738	16 <b>S</b> Sulfur 32.065	17 <b>Cl</b> Chlorine 35.4527	

26. The noble gas neon is used for filling neon signs. Like other noble elements, it has a full octet (complete outer energy level) of electrons, which makes the gas
- A. freeze at room temperature.
  - B. react with other gases in the air.
  - C. unlikely to combine with other elements.
  - D. solidify at standard pressure and temperature.





Let's see. I know from taking many tests in the past, that it is important to start by looking at what information I can find in the question itself. I need to read the question carefully so I can determine exactly what it is asking.

After reading the question, I see that they are asking me to analyze the information given and then draw my own logical conclusions from the information. In addition, I notice that this question also contains a diagram that may help me gather important information.

1

After reading the question again, I notice that it is all about neon gas. The question even tells me that neon is used to fill neon signs. I have seen neon signs before so I already have some ideas about neon. I know, for example, that neon signs don't freeze at room temperature because I have seen them working even in the winter.

2

Therefore I can already eliminate choice **A** without even considering the other information given.

3

Now it's down to choices **B**, **C** or **D**. Looking at choice **D**, I notice the words solidify and standard pressure and temperature. I think that standard means regular or normal. Although I'm not sure what standard pressure means, I know that I have seen neon signs working in winter and summer temperatures. I know that the neon gas inside a sign won't solidify or turn into a solid at those temperatures.

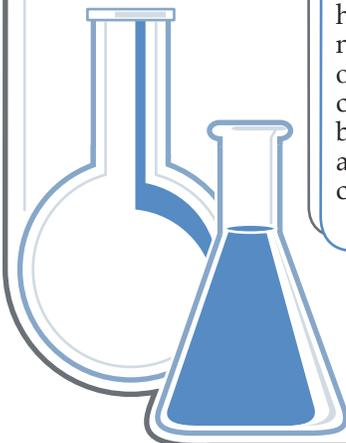
If the gas did solidify, the signs probably would not work. I'm thinking it can't be choice **D**.

4

So that narrows my answer choices down to **B** or **C**. Both of those have something to do with neon either being likely or unlikely to react or combine. I think my best bet is to look at the diagram and see what information I can gather from it.

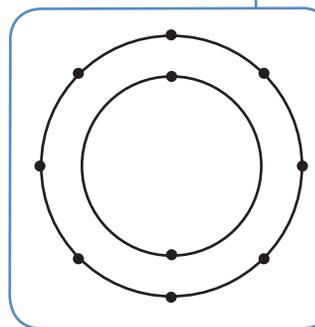
First I take a look at the very top at the carbon atom. This gives me some basic information about the elements in the periodic table below. As I look at the enlarged section of the periodic table, I can locate neon on the far right side. The box tells me that neon's atomic number is 10. As I look down the right column on the periodic table, I also notice that the atomic numbers of those elements increase by eight as you move down from one row to the next. I think I remember that the atomic number tells me how many electrons the element contains if the atom has no charge.

•NEXT PAGE➡



5

Now that I know neon's atomic number is 10, I'll take one more look at the question. The question says that neon is a noble element with a full octet of electrons or complete outer energy level. I know that the prefix "oct" in words like octopus and octagon means eight. So, I can picture what the neon atom might look like. I remember the first shell of an atom is full if it contains two electrons. This makes perfect sense with neon. Since I know there are two electrons in the first shell and the question tells me there are eight electrons in the outer shell, the total number of electrons as the diagram shows for neon is in fact 10, which matches my thinking about what the atomic number means.



Thinking back to what I know about atoms again, I know that the second shell around an atom is full if it has eight electrons. Since this outside shell is full, I have to assume that the atom is full and it won't try to combine or share electrons with any other atoms. Looking at choices **B** and **C**, I now have to determine if neon is likely to react with other gases in the air or unlikely to combine with other elements. Since the outer shell of neon is full and therefore less likely to share, take or give away electrons, that seems like the same thing as being unlikely to combine.

6

I can eliminate choice **B** because I have figured out that neon is not likely to react with other gases.

7

Because all of neon's energy levels are full, I can draw a logical conclusion that neon is indeed unlikely to combine with other elements.

Choice **C** is correct!

**Reflection Questions**

1. How did eliminating two of the wrong answers just from the information provided in the question help Jason get closer to the correct answer?  
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2. How can you apply this strategy to other test questions?  
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**Standard:** Life Sciences

**Benchmark B:** Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development.

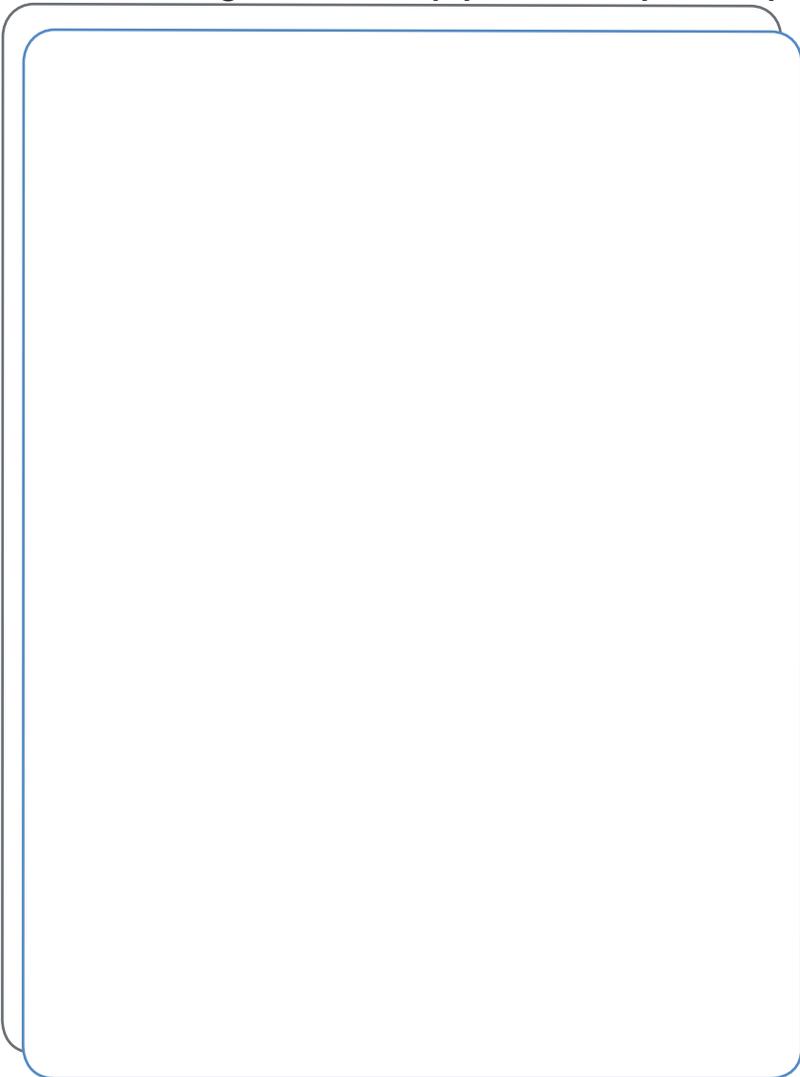
19. What energy transformation occurs in green plants during photosynthesis?
- A. Thermal energy is converted to electrical energy.
  - B. Thermal energy is converted to light energy.
  - C. Chemical energy is converted to mechanical energy.
  - D. Light energy is converted to chemical energy.



Use the Talking Points to help you create your map.

**Talking Points**

- What key ideas are in the question?
- What do you already know about these key ideas?
- What do you already know about the five different types of energy listed in the answer choices?
- Does your knowledge about photosynthesis include any of the energy conversions listed in the four answer choices?



1. What key words did you identify in the question? How did your knowledge of these key words help you create a mind map and then select the correct answer?

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2. Is vocabulary important in all questions?

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3. What are some of the strategies you used to learn new vocabulary words? Take a look at Jason's thought process in the Reference section of this guide.

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**Standard:** Science and Technology

**Benchmark A:** Explain the ways in which the processes of technological design respond to the needs of society.

2. Architects are working with engineers to build a lecture hall. How can they design it so that echoes are reduced and speech is not heard as garbled sounds?
- A. build smooth marble walls, ceilings and polished floors
  - B. construct many flat walls, angled ceilings and smooth floors
  - C. use an ultramodern design of metal walls, pillars and seats
  - D. build walls out of porous materials, upholster the seats and add carpets



Use the Talking Points to help you create your map.

### Talking Points

- What two things does the design need to accomplish?
- What do you already know about sound?
- What do you know about echoes?
- Given your knowledge about echoes, are there building materials that help create or reduce echoes?
- Can you sort through the answer choices and eliminate those that create echoes so you can select the answer that would reduce echoes?

1. What did you discover about your thinking while you created your mind map for this question?

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2. Take a peek at Jason's mind map for this question in the Reference section of this guide. Did you use some of the same mapping steps that he did? What was the same? What was different?

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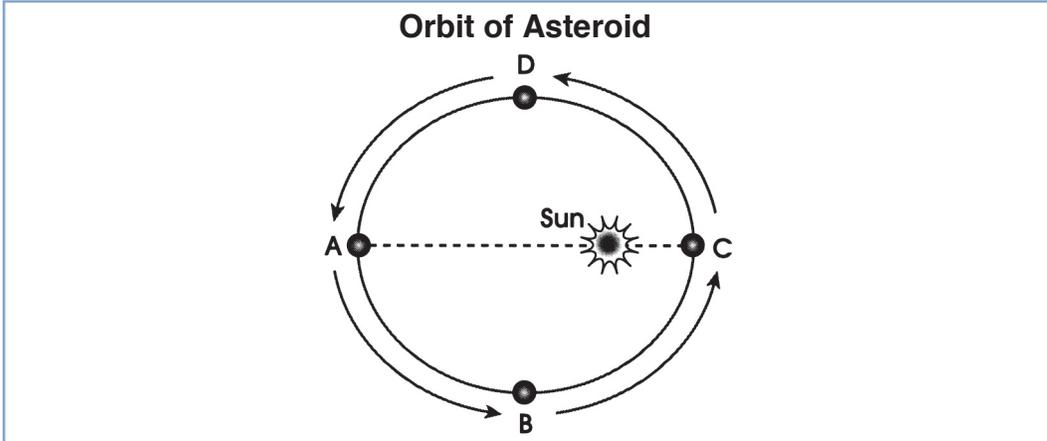
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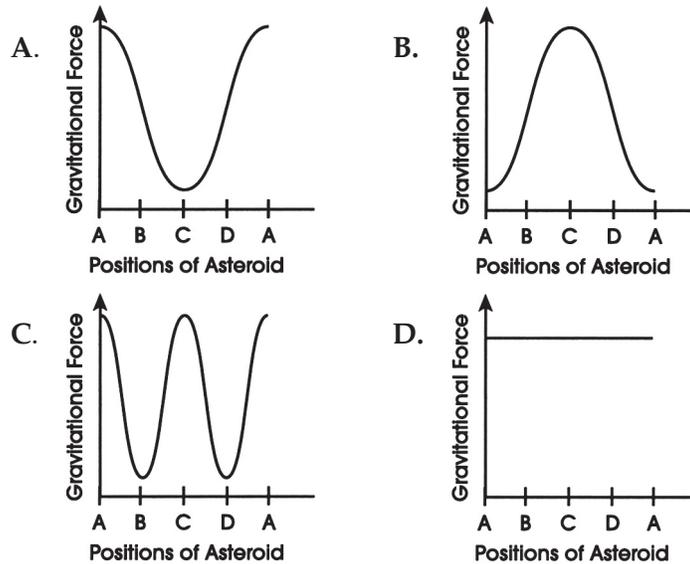
**Standard:** Earth and Space Sciences

**Benchmark C:** Explain the 4.5 billion-year-history of Earth and the 4 billion-year-history of life on Earth based on observable scientific evidence in the geologic record.

15. Points A, B, C and D in the drawing below represent an asteroid's position during its orbit around the sun.



Which graph shows how the gravitational force between the sun and the asteroid varies with the asteroid's distance from the sun?



**Jot down some talking points before you do your map.**

**Talking Points**

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1. What mind-mapping steps did you take to determine your answer on this question?  
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2. Take a look at how Jason mapped his thinking in the Reference section. At what point in the mind map did he combine the information that comes directly from the text with the information he already knew?  
\_\_\_\_\_  
\_\_\_\_\_
3. Did you use this same strategy? Is keeping those types of information separate at the beginning of the mind-mapping process an effective strategy?  
\_\_\_\_\_

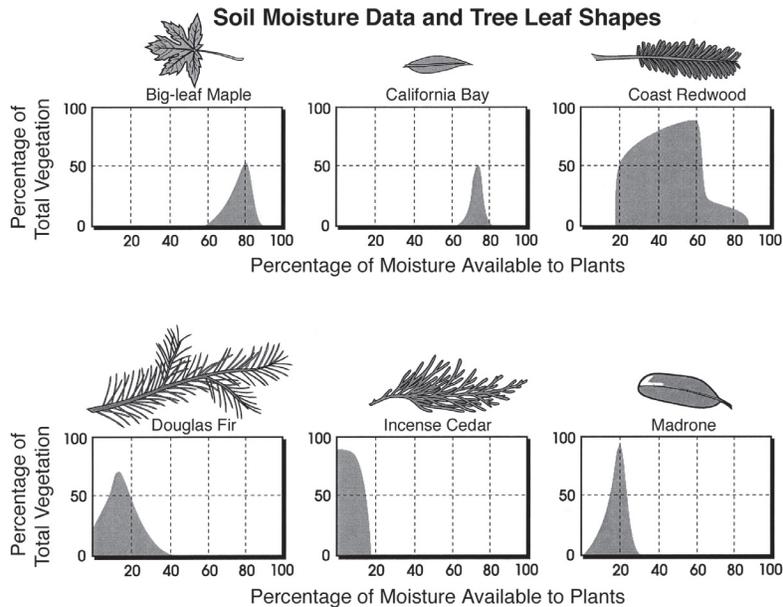


**Standard:** Scientific Inquiry

**Benchmark A:** Participate in and apply the processes of scientific investigation to create models and to design, conduct, evaluate and communicate the results of these investigations.

**Plant Distribution**

The distribution of plant species depends on many factors, including climate, topography, soil conditions and biological interactions. Data on moisture availability were collected along the coast of Northern California. In this area, each plant community has a dominant tree. The graphs below illustrate a dominant tree's percentage of the total vegetation compared to the percentage of soil moisture available. Each tree species studied has a distinct preference for a certain kind of habitat.



8. An ecologist observes that an area in California has experienced an increase in average soil moisture content. The area was once dominated by incense cedar but is now home to a greater variety of trees. Which types of trees would the ecologist most likely observe in this area if the soil moisture content has risen to 30%?

- A. madrone and California bay
- B. Douglas fir and madrone
- C. incense cedar and big-leaf maple
- D. coast redwood and big-leaf maple



**Jot down some talking points before you do your map.**

**Talking Points**

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1. How did you decide what information in the graphs was important for answering this question?  

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2. Review Jason's mind map in the Reference section. He used a possible/not possible strategy. Is this an effective way to think about this particular problem? Explain why or why not.  

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**Standard:** Physical Sciences

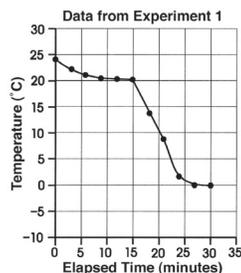
**Benchmark F:** Explain how energy may change form or be redistributed but the total quantity of energy is conserved.

**Temperature Experiment**

Students pour 250.0 g of water into an open insulated container. The initial temperature of the water inside the container is recorded. The temperature of the contents of the container is recorded every 3.0 minutes. When 73.0 g of ice (at melting point) is added to the container, the students continue to collect temperature data and the mixture is gently stirred. The data from Experiment 1 are listed in the chart below. The data are also plotted on the following graph.

**Chart for Experiment 1**

Elapsed Time (minutes)	Temperature of System (°C)	Observations
0	24.3	water added
3	22.1	
6	21.0	
9	20.5	
12	20.3	
15	20.2	ice added
18	13.7	
21	8.2	
24	2.2	
27	0.0	
30	0.0	ice still present



5. When the ice was added to the water in the container, several energy transfers occurred. Considering only the contents of the container, what would be a likely sequence (order) of energy transfers?
- A. Water transferred energy to the ice as the ice melted.
  - B. Water transferred energy to the air as the ice increased in temperature.
  - C. Ice transferred energy to the air which then lowered the temperature of the water.
  - D. Ice transferred energy to the water which lowered the temperature of the water.



**Jot down some talking points before you do your map.**

**Talking Points**

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1. What different types of information did you gather from the text of the question compared to the information you got from the chart?  
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2. Why was it important to keep track of both sources of information?  
\_\_\_\_\_  
\_\_\_\_\_
3. How did this help you in mapping your knowledge?  
See Jason's map in the Reference section.  
\_\_\_\_\_  
\_\_\_\_\_

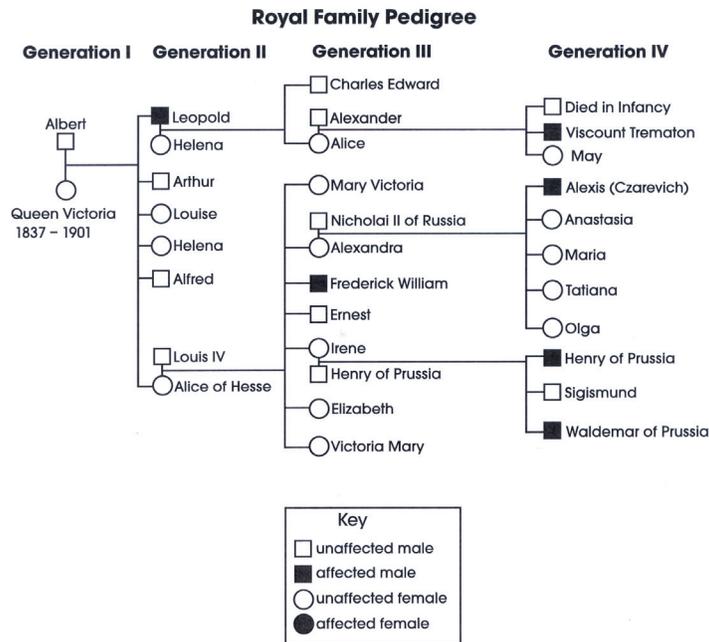


**Standard:** Life Sciences

**Benchmark C:** Explain the genetic mechanisms and molecular basis of inheritance.

### Hemophilia in the Family

Hemophilia is a disease characterized by excessive bleeding because the blood clots very slowly. This phenotype results from a sex-linked recessive allele which is located on the X chromosome. A male (XY) can only receive the hemophilia allele from his mother (XX). Since males have only one X chromosome, they have a 50% chance of having hemophilia if their mother is a carrier. The following diagram shows part of the British royal family's pedigree. All hemophilic males are represented by shaded squares and normal males by unshaded squares. Females are represented by circles, and female carriers of hemophilia are not identified.



31. Which set of grandparent-parent-child relatives must have all had at least one hemophilia allele on an X chromosome?
- A. Albert-Helena-Alice
  - B. Louis IV-Irene-Sigismund
  - C. Leopold-Alice-Viscount Trematon
  - D. Queen Victoria-Leopold-Charles Edward



**Jot down some talking points before you do your map.**

**Talking Points**

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1. What was the most difficult thing about getting started with your mind-mapping?  

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2. Take a look in the Reference section to see how Jason developed his mind map to sort out the affected individuals. Were you able to create a chart or table that is simpler? In what way?  

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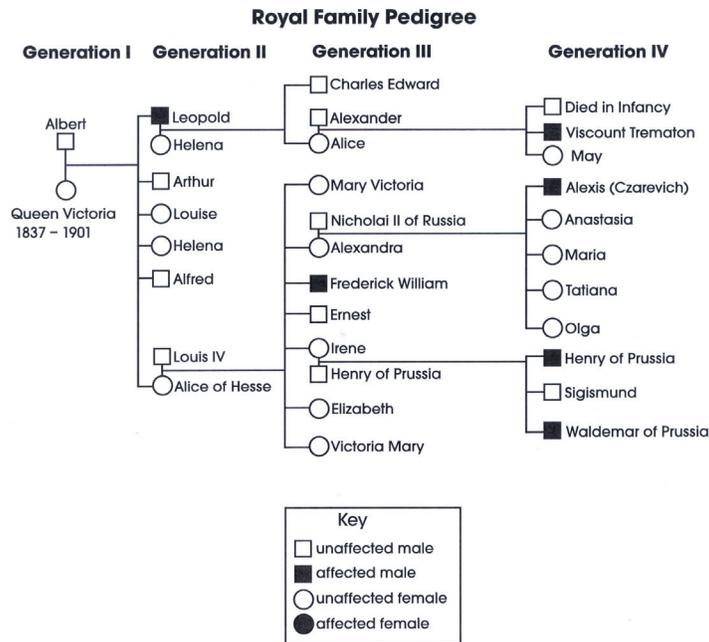


**Standard:** Life Sciences

**Benchmark C:** Explain the genetic mechanisms and molecular basis of inheritance.

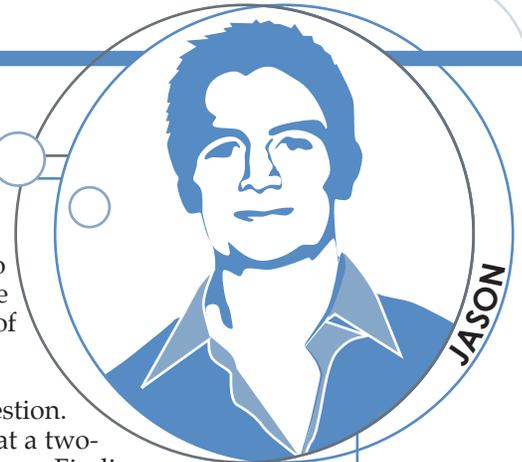
**Hemophilia in the Family**

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30. Some human traits are sex-linked but are inherited on the Y chromosome, unlike hemophilia, which is inherited on the X chromosome. If a man carrying a dominant allele for a disease gene on his Y chromosome has eight children, four boys and four girls, predict the gender and proportion of his offspring that will have the disease gene. Explain how this type of inheritance differs from sex-linked inheritance from a father affected with an X-linked disease. Respond in the space provided in your **Answer Document**. (2 points)





Questions 30 and 31 come from the same information about hemophilia. Two paragraphs of text, a diagram and a key are given. Question 30 may or may not need all of that information.

I notice right away that this is a two-point question. I know from taking practice tests in the past that a two-point question typically requires a two-part answer. Finding the two different parts of the question I need to answer can be half the battle!

1

I'll begin by reading the question. At first it seems somewhat confusing. I think I'll look at each sentence individually to help me figure out exactly what the question is asking. The first sentence says, "Some human traits are sex-linked but are inherited on the Y chromosome, unlike hemophilia, which is inherited on the X chromosome."

2

This sentence is asking me to think about gender-linked inheritance.

3

I think the next sentence contains the first part I need to answer.

The sentence asks me to "predict the gender and proportion" of the offspring a disease-carrying father would produce if the disease was carried on his Y chromosome.

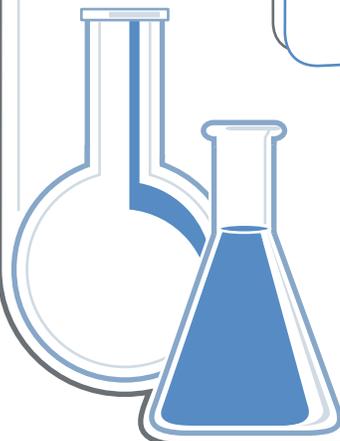
4

The final sentence is the second part that I need to respond to.

It is asking me to compare how this type of Y-linked inheritance would be different from a scenario where the father was affected with an X-linked disease.

I figured out what two parts I have to answer, so now I can score two points!

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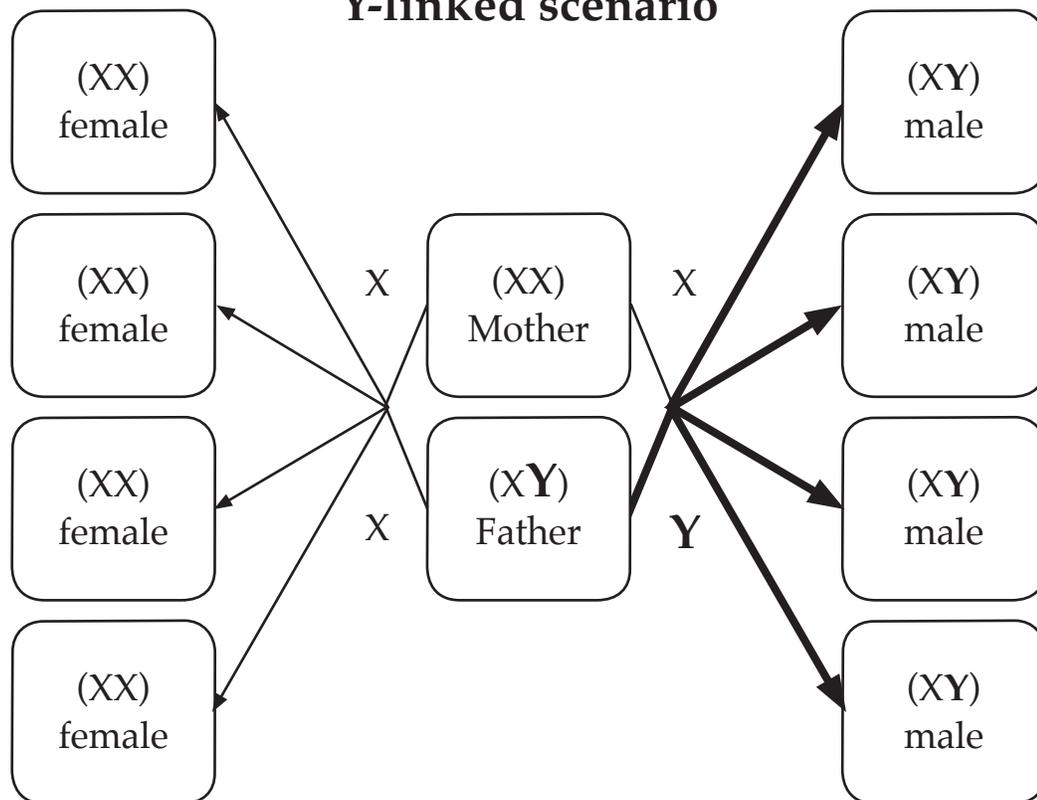


I think the easiest way for me to figure out both answers is to draw two different mind maps. The first map will show the Y-linked scenario, where the disease is carried on the father's Y chromosome. The second will show the X-linked scenario, where the disease is carried on the father's X chromosome. By creating these mind maps, I can sort out a lot of information and determine exactly which offspring are affected.

5

I'll start my Y-linked mind map by drawing the mother (XX) and father (XY) in the middle. Together they produce four male offspring and four female offspring. I'll draw the male offspring on one side of the mother and father and the female offspring on the other. Using my mind map, I can show the chromosome combinations each child receives from his or her parents. I'll draw and darken the disease-carrying Y chromosomes on my mind map so it will be easier to tell which children are affected. From my map, I can tell that none of the female offspring will be affected because they have two X chromosomes and no Y chromosome. The map also shows me that in the Y-linked scenario all of the male offspring will be affected because the disease is carried on the Y chromosome.

### Y-linked scenario

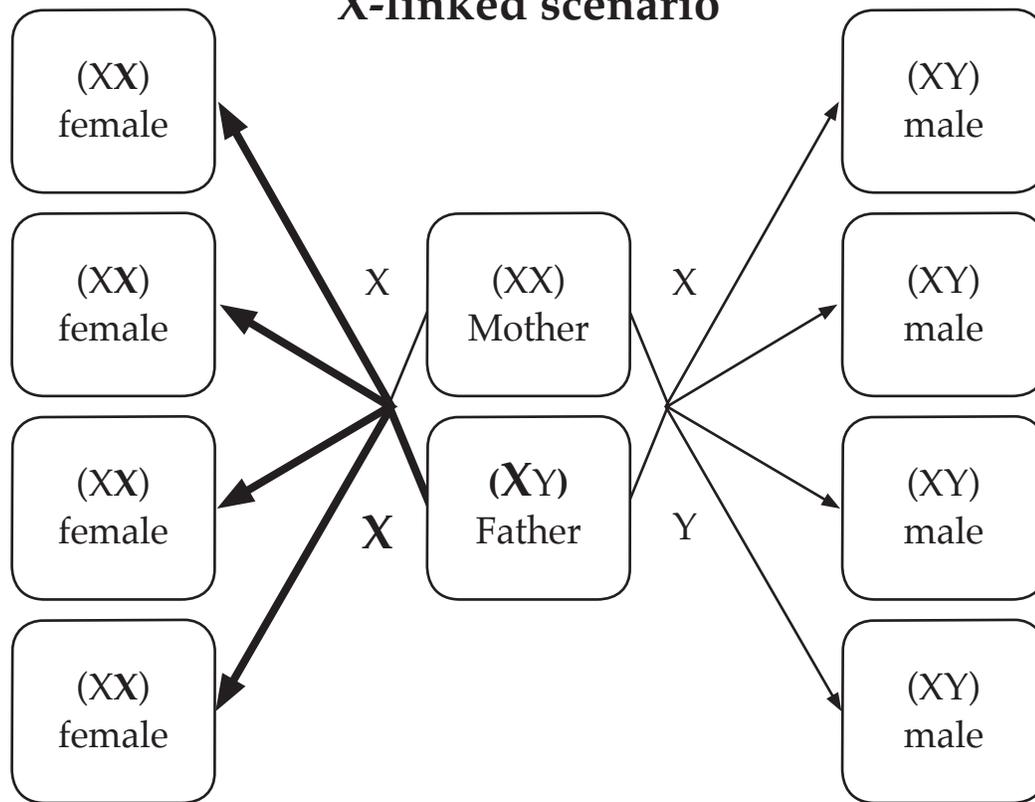


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6

Now I'll move on to my second map – the X-linked map. I'll lay out the map the same way with the mother and father in the center, the male offspring on one side and the female offspring on the other. This time I'll darken the X chromosomes so that I can see which offspring will carry the disease in this scenario. From this map, I can see something very different from my first map. All of the female offspring will now carry the disease because they will definitely receive an X chromosome from both their mother and their father. The X chromosome from their father carries the allele for the disease and will therefore be passed onto them. The male offspring, on the other hand, will receive a Y chromosome from their father, which in this scenario does not carry the disease allele. None of the male offspring will carry the allele for the disease and all of the female offspring will be carriers.

### X-linked scenario



NEXT PAGE 

7

Now I can write my two-point response. I need to be sure to include the gender and proportion of offspring with the disease in each of the two scenarios. I think it would be easier for me to develop my answer in two separate paragraphs. I can describe the Y-linked scenario in the first paragraph and the X-linked scenario in the second paragraph.

**If the disease was carried on the fathers "Y" chromosome, then the 4 female offspring would have a 0% chance of receiving the disease, because female's have "XX" chromosomes and no "Y." The male offspring would have "XY" chromosomes which means that all the male's would carry the allele for the disease, because they are now carrying the affected father's "Y" chromosome.**

**If the disease were located on the father's "X" chromosome, then all female offspring would carry the disease, and all males would be unaffected. Since one chromosome comes from each parent, an "X" chromosome will definitely come from the mother, and if an "X" (affected) chromosome comes from father, it is a female. If the father gives the "Y" chromosome, it is a male and unaffected.**

8

Here are some other responses written by other students.

I should get two points on this one!

**Men have an x and a y chromosome and women have 2 x chromosomes. If the male carries this disease dominantly, his sons will get it because it is only found in men.**

This one got only one point.

**If the father has an x-linked disease there is a 50% chance to give it to his children. The girls are more likely to get it because their xx.**

This one got zero points.

Reflection Questions

1. A sample student response that scored one point reads, "Men have an X and a Y chromosome and women have two X chromosomes. If the male carries this disease dominantly, his sons will get it because it is only found in men." How could you add to or change this response to answer both parts of the question and receive two points instead of one?

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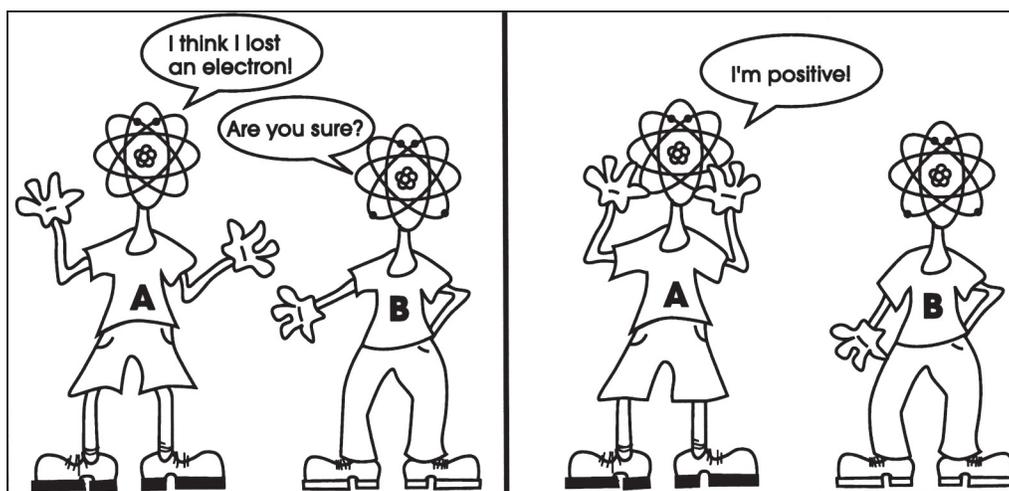
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**Standard:** Physical Sciences

**Benchmark A:** Describe that matter is made of minute particles called atoms and atoms are comprised of even smaller components. Explain the structure and properties of atoms.

Use the cartoon to answer question 12.



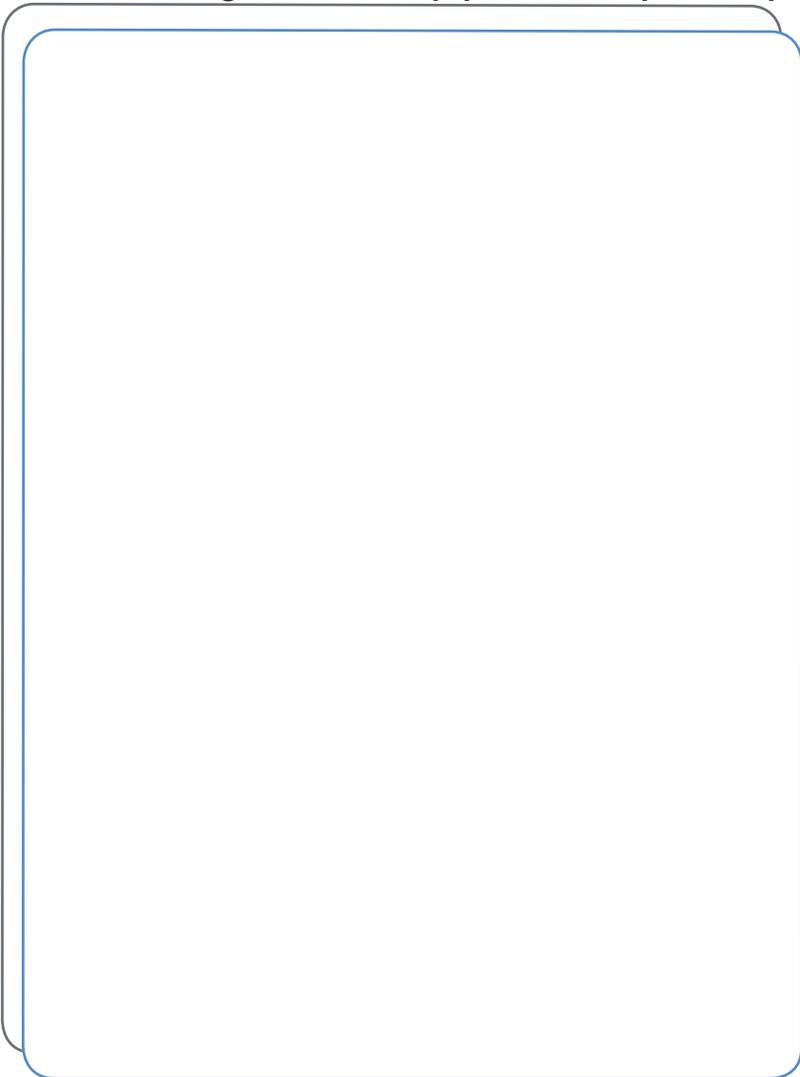
12. Explain the response of atom A in terms of protons and electrons. Describe how protons and electrons affect charge. Respond in the space provided in your **Answer Document**. (2 points)



Use the Talking Points to help you create your map.

**Talking Points**

- Since this question is worth two points, what are the two different things the question asks?
- Which atom's response from the comic strip do you need to explain?
- What is the charge of a neutral atom?
- What is the charge of an electron and of a proton?
- What would happen to the charge of an atom if it lost an electron?



1. How did thinking about the charge of electrons and protons help you to answer this question?

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2. Is there content related to this question that you may need to study further? If so, what and how will you plan for your learning needs? See Jason's thoughts in the Reference section.

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**Standard:** Scientific Ways of Knowing

**Benchmark A:** Explain that scientific knowledge must be based on evidence, be predictive, logical, subject to modification and limited to the natural world.

36. Our country depends on energy use. Choose one alternative energy source from among wind power, nuclear power, geothermal power and biomass. Identify your choice and describe one potential benefit and one potential disadvantage if its use is significantly increased. Respond in the space provided in your **Answer Document**. (2 points)



Use the Talking Points to help you create your map.

### Talking Points

- After reading the question, can you determine all of the things that must be included in your answer to receive two points?
- Which of the energy types listed in the question are you most familiar with?
- Using the most familiar energy source, can you now list all of the advantages and disadvantages to using it?
- How can you narrow down your list of advantages and your list of disadvantages to the one answer for each that is strongest?
- What three pieces of information do you need to include in your answer to receive two points?

1. How could you take the following one-point answer and turn it into a two-point answer? "I think we should use nuclear power because we have a lot of it."

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2. What is the most challenging problem you face when responding to a two-point question? Take a look at Jason's thought process in the Reference section.

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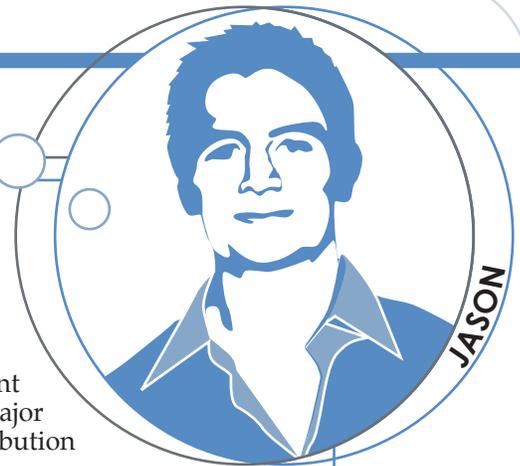


**Standard:** Science and Technology

**Benchmark B:** Explain that science and technology are interdependent; each drives the other.

24. Biotechnology is the science of manipulating biological components to develop products that may be beneficial to humans. Identify two different industries in which biotechnology has made major contributions. Describe one contribution for each industry. Respond in the space provided in your **Answer Document**. (4 points)





Question 24 is about biotechnology and is worth four points. That's the same number of points as four separate multiple-choice questions. This one deserves extra effort.

To get all four points, I need to *identify* two different industries in which biotechnology has made major contributions. Then I need to *describe* one contribution for each industry.

That doesn't sound too bad, as long as I know about *biotechnology*. Luckily, the question tells me that biotechnology is the science of manipulating biological components to develop products that may be beneficial to humans. Even if that information wasn't provided, I would have a good idea that it has something to do with biology and technology, because of the word itself.

1

Some of the industries that I can think of that utilize biotechnology are health, pharmaceutical, food and agriculture — although I'm sure there are others.

2

Since I know most about the health and food industries, it seems like a good idea to focus my energy on them.

Now that I have *identified* two industries in which biotechnology has made major contributions, all I have to do is *describe* one contribution for each industry.

3

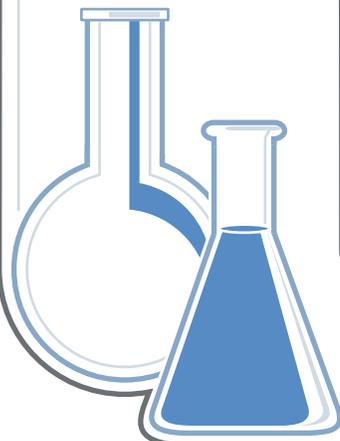
In the health industry, I know there have been many benefits from biotechnology. Some of these include cures for sickness and illness, saving lives, producing many kinds of medicine, radiology to fight cancer, growing skin tissues, and the development of prosthetic limbs and artificial organs.

I know some people who have gone through radiation treatment to fight cancer, so I'll use that example.

4

In the food industry, there have also been many benefits from biotechnology. Some that I can think of are producing new kinds of food which are healthier, finding ways to make our food better, and using new genes to grow better crops that can produce faster and are more weather resistant. I think we can even thank biotechnology for seedless watermelons!

It seems that all the benefits I just mentioned can be summed up as figuring a way to grow foods, so that's the contribution I'll describe.



•NEXT PAGE▶▶▶

5

Two industries in which biotechnology has made major contributions is in the health industry and food industry. A contribution in the health industry is radiology for cancer and in the food industry, scientists have figured a way to grow foods.

I should get three points on this one.

6

Here are some responses written by other students.

Two industries that may benefit from biotechnology are the food industry and the medicine industry. The food industry benefits because "positive" (good) genes from some food products can be inserted into the genes of other food products to achieve an even better product. The medicine industry benefits because certain bacterial genes that code for disease-fighting proteins can be inserted into animal genes, or human genes.

This one got four points!

The first and most important is the medicine industry. They make or produce many kinds of medicine. A second industry is the food industry. We've found many ways to make our foods better.

This one got two points.

It has developed cures and new resources for energy or recycling. It has made electric cars. And for recycling it has made more options to use recyclable materials, or how to dispose of them.

This one got zero points.

Reflection Questions

1. Jason received three points out of four possible points because his description of one contribution for the food industry was not specific enough. How would you edit his response to be more specific about a contribution for the food industry and change his score to four points?

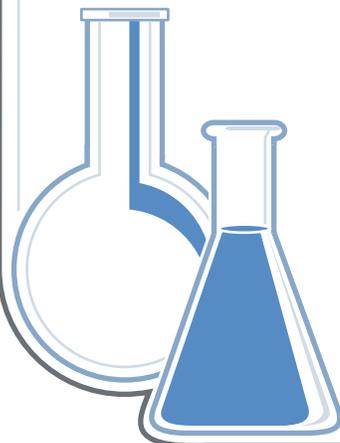
\_\_\_\_\_

\_\_\_\_\_

2. What is the most challenging thing about writing a four-point extended response? What are some things that you could do to improve your scores on these items?

\_\_\_\_\_

\_\_\_\_\_



**Standard:** Earth and Space Sciences

**Benchmark E:** Summarize the historical development of scientific theories and ideas, and describe emerging issues in the study of Earth and space sciences.

18. Earth's crust is divided into many crustal plates. Their activity is described as plate tectonics. List two effects of plate tectonics and explain how plate tectonics causes each effect. Respond in the space provided in your **Answer Document**. (4 points)



Use the Talking Points to help you create your map.

**Talking Points**

- What is the question asking?
- What are the four different components that you must include in your answer to score four points?
- What are the effects of plate tectonics?
- How do plate tectonics cause these effects?

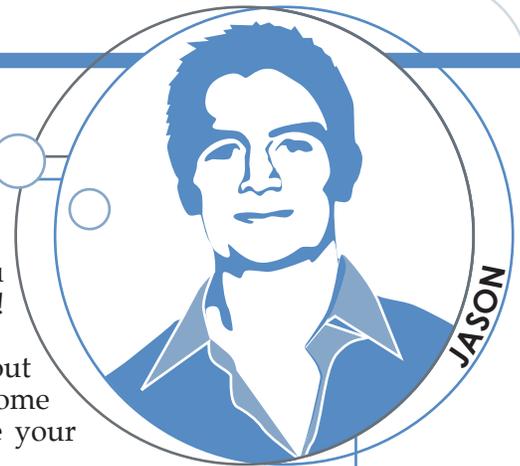
1. After you complete your response, compare it to Jason's response provided in the Reference section. How would you score your response? What could you do to raise your score if you did not give yourself a three or four?

2. What are some strategies that you could use on a regular basis to improve your writing skills for responding to four-point questions?



# STUDY

## INTRODUCTION SCIENCE



How did the mind-mapping strategy work for you? I know it was hard work, but if you have reached this point, then I know you kept going!

Hopefully, you feel that you have learned more about the way you think through test questions and have some new ways to approach questions when you retake your science OGT.

This next stage is about reflection and studying your learning results. There are two steps in the STUDY stage:

**Step 6:** Think about your thinking by completing the reflection worksheet.

**Step 7:** Set a meeting with your coach and review your progress.

To help you with Step 6, you will need your reflection question responses from your mind mapping and your standards and benchmarks worksheet from your planning. These items will help you to complete the reflection worksheet that is included in this section.

Respond to each of the sections on the reflection worksheet before setting up a meeting with your coach to review your progress (Step 7).



# STUDY

## REFLECTION WORKSHEET SCIENCE

### Reflection Worksheet for Science Guide

Use the spaces below to identify content that is challenging for you.

- Review the questions in the DO section and identify specific questions that were difficult to answer. Check the benchmark related to the question and indicate below the topics that you still need to study.
- Check the standards and benchmarks worksheet (from the PLAN section) and identify other benchmarks that you are unsure of.

Standards to Review:	Topics for Study:
Earth and Space Sciences	(Example: processes that move and shape the earth's surface.)
Life Sciences	(Example: genetic mechanisms and molecular basis of inheritance.)
Physical Sciences	
Science and Technology	
Scientific Inquiry	
Scientific Ways of Knowing	



# STUDY

## REFLECTION WORKSHEET SCIENCE

### Reflection Worksheet for Science Guide

(continued)

Use the spaces below to describe how you think through and respond to the different types of questions on the OGT.

- What strategies help you work through each of these types of questions?
- What type of questions seem to be the most difficult for you to think through?

Multiple Choice	Short Answer	Extended Response
(Example: The talking points worked well.)	(Example: Highlighting what the question is asking made answering the question easier.)	(Example: Mind-mapping before writing the response helped create a better answer.)



# STUDY

## REFLECTION WORKSHEET SCIENCE

### Reflection Worksheet for Science Guide

(continued)

How did the self-talking and mind-mapping strategy work for you?

- Did the strategy help you think through the questions more completely?
- Did you find that self-talking helped you work through your thinking?
- What type of mind maps did you use most often?

What worked for you?	What didn't work for you?

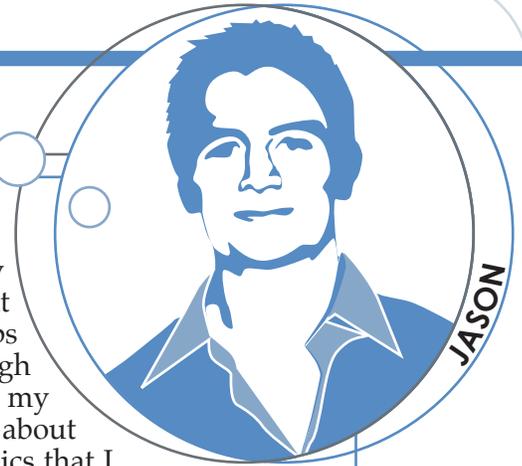
Brainstorm a list of actions that you might take to prepare yourself for retaking the science test. List resources that might help you prepare to be successful.

Action Steps to take ...	Resources that would help ...
(Example: Find a study buddy; set up tutoring sessions with a teacher.)	(Example: Use the Web sites listed in the Reference section to copy and practice other test questions.)



# STUDY

## SCIENCE



After I completed my reflection worksheet, I set up a meeting with my Dad to review my progress. This meeting took about an hour. We spent about half of that time looking over my mind maps and I shared what I had learned about myself through the reflection responses. He was impressed with my reflection worksheet because I took the time to think about what I had learned. I also identified most of the topics that I need to work on.

He helped me think of some additional ideas that I could use to develop a plan of action for preparing for the OGT. He found some resources for me on the Internet to use. And he had talked with the school counselor about some extra help that might be available for me at my high school. We were ready to build an action plan – the last stage in the PDSA.



# ACT

## INTRODUCTION SCIENCE

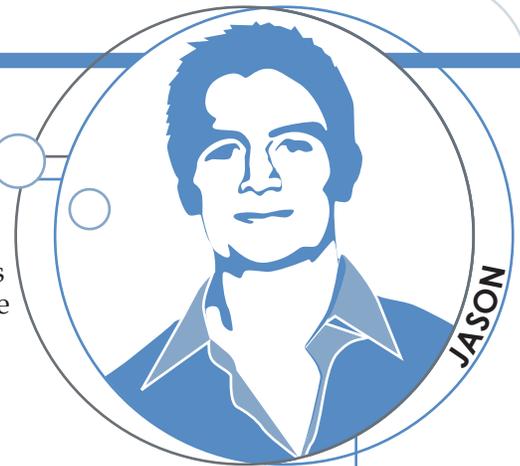
One last task to complete, but it's a very big one! Based upon your strengths and needs, it's time to develop an action plan for retaking the science OGT.

There are two steps in this stage:

**Step 8:** Develop an action plan.

**Step 9:** Tackle your plan!

Your coach will help you write your plan. I'm going to share with you what my Dad and I worked out for my plan.



After we examined my work with mind mapping and discussed what standards and benchmarks I still needed to study further, we began to put together an action plan.

Here's what we came up with for me ...



# ACT

## ACTION PLANNING SCIENCE

### Action Planning for Science OGT Retake

#### My personal goals

1. Meet the state requirement for graduation by obtaining a proficient rating on my Science OGT.
2. Stick to my action plan.
3. Contact my coach if I run into any trouble while working with my plan.

What I will do ...	When I will do it ...	Help I will need ...
Meet with my science teacher to see about tutoring sessions for the standards and benchmarks I need help with. Ask for materials to help me study.	September 2 Set up a meeting to discuss tutoring opportunities.	-Mr. Bunting (teacher) -My Standards and Benchmarks Worksheet and my Reflection Worksheet -Materials recommended
Sign up for tutoring or extra help sessions at the high school.	As soon as possible and participate in all sessions until time for the retake.	-Parents (for transportation) -My boss (check for work schedule conflicts)
Study 45-60 minutes extra every weekday (either through tutoring, extra help session at school, or on my own by practicing test items copied from the Ohio Department of Education Web site for the OGT).  Use mind-mapping strategy in my study sessions.  Log my progress in a study journal.	Every weekday – Monday through Friday	-Personal commitment -Coach's support and encouragement -Study journal
Check out other resources on the Ohio Department of Education Student Web site for other practice options. Build a plan to use these resources during my study periods.	Second week in September	-Guidance Counselor -Web site
Check into hooking up with a study buddy to help keep me on track with my daily studying.	Second week in September	-Mr. Bunting (for suggestions for study buddy) -Guidance Counselor
Contact my coach every week.	Every Wednesday night at 6:30 PM.	-My coach



# ACT

## ACTION PLANNING SCIENCE

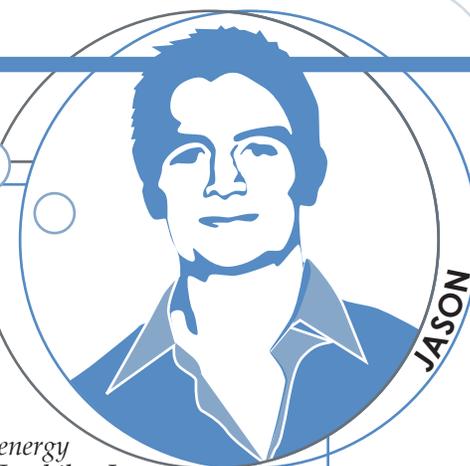
### Action Planning for Science OGT Retake

**My  
personal  
goals**

Here's a blank action planning template for you to fill out. After you develop it, make a copy for your coach and plan to keep him or her informed of the progress you are making.

What I will do ...	When I will do it ...	Help I will need ...





Looking at this question, the first thing I notice is that there is no additional information such as a chart or graph to help me with this question. I'll start by reading the question and see what key words I can find.

The important words I notice in the question are *energy transformation*, *green plants* and *photosynthesis*. Luckily, I think I remember just enough about each of these topics to be able to use the process of elimination to figure this one out.

1

Hmm ... what do I know about energy transformation? I remember that energy can be transferred. Looking at the possible answer choices I can see that I need to figure out what *type* of energy is being transferred during photosynthesis.

As I look at the possible answer choices, I see two different types of energy listed for each answer. The types of energy include thermal, electrical, light, mechanical and chemical energy. I need to think about what I already know about these types of energy.

Thermal reminds me of thermos or thermometer and probably has something to do with temperature.

Electrical has something to do with electricity.

Light is an easy one – light.

Chemical energy happens when two substances combine to make something new. That must be what happens when the plant is making food.

I'm not sure what mechanical energy is, but I know a mechanic fixes things that move. So I'll guess that this type of energy has something to do with energy related to motion.

2

3

Now it's time to think about what I already know about green plants and photosynthesis. I know that photosynthesis is a chemical process where a plant makes its own food. I don't remember exactly how photosynthesis works, but I do know that green plants need light in order for photosynthesis to occur. Therefore, I should take a look at the possible answer choices and see which ones include light and something about chemical energy.

That would be choice D!

NEXT PAGE



4

Choice **D** includes converting light energy to chemical energy. That makes sense to me because I know that most plants need light to make food. Plants use light energy to make their food. The change that happens inside the plant must be a chemical change because new substances (the food) are produced.

Therefore, the correct answer must be **D!**

5

Using my good test-taking strategy, I'll look at the other answer choices, just to be sure.

Choice **A** says that thermal energy is converted to electric energy. I can quickly cross this choice off because I know for sure that plants don't use thermal energy during photosynthesis.

Therefore, choice **A** is incorrect.

6

Choice **B** states that thermal energy is converted to light energy. So that would mean that the plant uses thermal energy and turns it into light.

Light is not a product of photosynthesis so this can't be right.

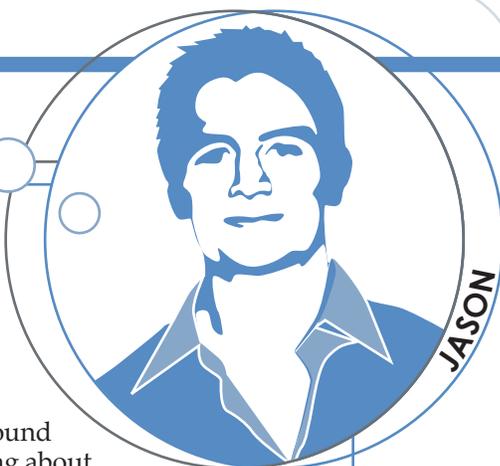
Therefore, choice **B** is incorrect.

7

Chemical and mechanical energy are used in choice **C**. I'm thinking that some type of chemical reaction must happen inside the plant to help it make its food so I can't eliminate chemical energy. I remember that mechanical energy has to do with moving objects so that doesn't make sense because plants don't create mechanical energy during photosynthesis.

Choice **C** is incorrect.  
I'm sticking with choice **D!**





Here's a question about sound. For this question I have to choose the best design to build a lecture hall. The question tells me that the design needs to reduce echoes. It also needs to make sure that voices are heard clearly. Let's see, what do I know about sound?

I remember that sound is energy and that sound travels. That's easy to prove to myself by thinking about the trains that I hear from my house every night. Even though the train tracks are at least a mile away, the sound travels that distance to my house. I also know about echoes. I've heard them, I've made them and I think I understand them.

1

I'm not sure I've ever heard or read anything about making speech not garbled, so I'm going to see how far I can get on this question just with what I know about echoes.

2

An echo happens when I first hear a sound and then that sound bounces off something and comes back to my ears again so that I hear it more than once. I remember reading and talking about sound being more likely to bounce off a smooth, hard surface than a soft or rough one. I have heard echoes when there is something big for sound to bounce off, like a canyon wall, a large building or a gymnasium wall.

3

So let me look at the possible answers. Choice A says smooth walls and polished floors. This one is easy to eliminate. I need to pick a design that reduces echoes. I know sound bounces off smooth surfaces, so it can't be choice A.

Therefore, choice A is incorrect.

NEXT PAGE 



4

Choice **B** says flat walls and smooth floors. There's that smooth word again. Even though I'm not sure about the effect of angled ceilings, I'm going to eliminate this answer from my choices, too.

Therefore, choice **B** is incorrect.

5

That narrows my possible answers to choices **C** and **D**. Choice **C** includes ultramodern design, which sounds good, but I've never heard of anything like that before. The same answer states a design of metal walls. Metal walls – hmm ... that's probably smooth. I'm going to pass this one for a second and look at choice **D**.

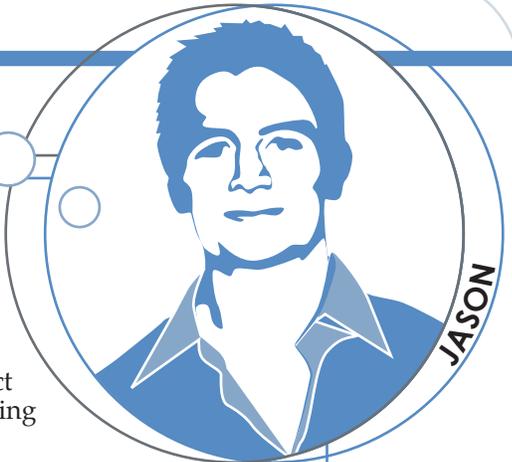
6

Choice **D** states "build walls out of porous materials, upholster the seats and add carpets." Porous means full of holes. That seems kind of rough. Carpets on the floor would cover up smooth floors and make them softer. And upholstering the seats would also make them softer.

It comes down to metal walls, pillars and seats or porous materials, carpet and covered seats. Seems almost too easy. Here's the clincher: Choice **D** seems like a description of our school's auditorium. My guess is that the architects of our auditorium knew something about building rooms where people could hear sounds easily.

Choice **D** it is!





Question 15 has very little text, but includes a drawing of the sun and orbit of an asteroid. The choices are in the form of four different graphs. The question is about the gravitational force between the sun and the asteroid. Although I probably can't give the exact definition of an asteroid, I know it is something moving in space, and apparently it orbits the sun.

The question and diagram both mention something about the asteroid being at different positions. In the diagram, I can clearly see that the asteroid is sometimes closer and sometimes farther away from the sun. The question also mentions something about the asteroid's distance from the sun. As far as I can tell, I need to interpret the diagram and use that information to match it to the correct graph.

1

I think the best place to start is with what I know about gravity. Basically, I remember two things – and something about Newton. I definitely remember the strength of gravity between two objects depends on the mass of the objects and the distance between them. There would be greater gravitational force between the sun and Earth, for example, than between the moon and the Earth, because the sun has much more mass.

And Newton, well – I remember something about an apple hitting him on the head. I'm not sure that's going to help me today.

2

Thinking about the two things I know about gravity, I don't think that mass is going to be too important for this question, because the masses of the sun and the asteroid do not change. Only the position of the asteroid changes during its orbit. In this case, as position changes, the distance between the sun and the asteroid changes.

3

Based on what I already know, I can determine from the diagram that the gravitational force on the asteroid will be greatest at position C because that is where the asteroid is closest to the sun. The gravitational force is weakest at position A because that is where the asteroid is farthest away from the sun. Positions B and D appear to be the same distance from the sun, with less gravitational force than position C and greater gravitational force than position A.



· NEXT PAGE →

4  
As long as I can match that up with one of the graphs, I should be okay with this question. The vertical axis of each graph represents the gravitational force, and the horizontal axis represents the positions of the asteroids, which I need to keep reminding myself represent distance. As the position changes, the distance changes. The horizontal axis of each graph starts off with position A and then goes in order: position B, position C, position D and back to position A. That matches the arrows in the drawing of the orbit.

I need to find the graph where the gravitational force is greatest at position C, weakest at position A, and somewhere in between but equal to each other for positions B and D.

5  
The easiest one to eliminate is choice D, since the gravitational force is the same all the way across.

Choice D is incorrect.

6  
Choice C looks good at first, because it shows positions B and D as having the same gravitational force. But it also shows the gravitational force for position A and position C as being the same, so that's not the right answer either.

Choice C is incorrect.

7  
That brings it down to choices A or B, which happen to be opposites.

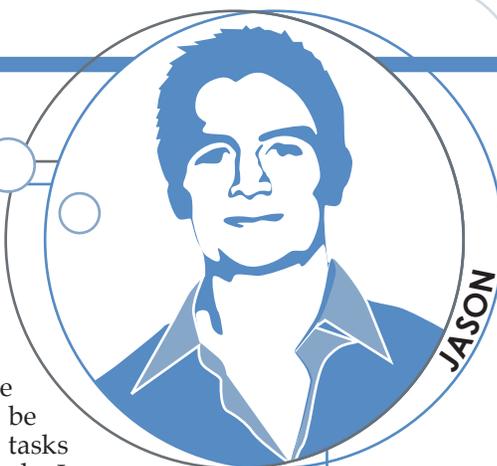
Now it's obvious. Answer A is the opposite of what I'm looking for. It shows the gravitational force being greatest at position A and weakest at position C. Although positions B and D look good, this is not the correct answer either. A really close look at choice B should show everything I'm looking for, since I've eliminated the other three answers.

Choice A is incorrect.

8  
Choice B shows the gravitational force being greatest at position C and weakest at position A, which is exactly what I'm looking for. It also shows positions B and D as being equal.

This one is definitely B!





This is one of four questions from the same text and graphs entitled "Plant Distribution." I notice right away that there is a lot of information provided in the graphs. Because these graphs are used for four different questions, I have a feeling that some of the information in the graphs may not necessarily be important to this particular question. One of my tasks will be to determine what information in the graphs I can use to help me find the correct answer. I think the text above the graphs as well as the graphs themselves may be a good place to start.

1

2

First, I'll take a look at the text and graphs to see if I can determine exactly what information they are giving me. As I read through the text, I notice some unfamiliar words such as topography but as I continue reading I pick out some key words that I do recognize. The phrases "data on moisture" and "tree species" seem to be important for understanding the graphs. From these key phrases and by looking at the graphs, I can figure out that the graphs show six different types of trees.

I also notice by looking at the labels on the horizontal and vertical sides of the graphs that the graphs show how much moisture is available compared to the percentage of total vegetation (trees and other plants). From the graphs, I can also figure out how much moisture different types of trees prefer.

3

Now that I know what information is given in the graphs, I'll take a closer look at the question. The question talks about an area in California that has had an increase in moisture. The question also states that this area once had mostly incense cedar trees but now it has more of a variety of plants. This might indicate some type of change has occurred. I better keep reading and see if I can figure out what that change might be.

· NEXT PAGE →



4

I kept reading and realized that an increase in moisture has caused new types of trees to grow in this area. The question asks me to determine what kind of new trees might be growing in this area if the moisture has now risen to 30 percent. It is important that I realize that the moisture has risen **to** 30 percent, not **by** 30 percent, so I can gather the correct information from the graphs.

5

To figure out which type of plants might grow in an area of 30 percent moisture, I'll turn back to the graphs. I think I'll make a possible / not possible chart to help me organize the information in the graphs. I'll look at each tree graph at the 30 percent moisture mark and record whether or not it is likely that type of tree would grow in the area.

My possible/not possible chart shows that it is not possible for big-leaf maple, California bay and incense cedar trees to grow in an area with 30 percent moisture. I can also determine that coast redwood, Douglas fir and madrone could possibly grow there.

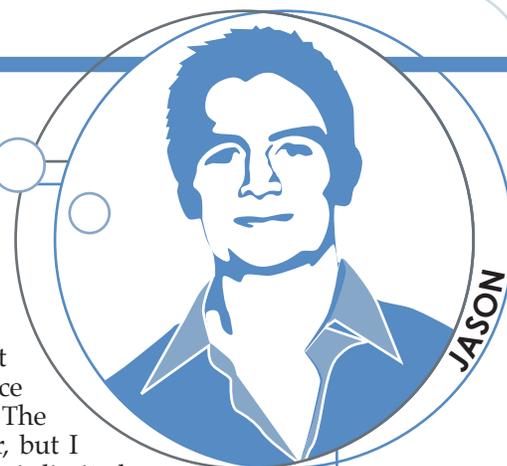
Possible	Not Possible
coast redwood	big leaf maple
Douglas fir	incense cedar
madrone	California bay

After organizing my information, I turned back to the possible answer choices. Each answer choice has two trees listed so I need to look for a choice that contains both trees in my possible chart.

<p><b>A:</b></p> <p>madrone (possible)</p> <p>California bay (not possible)</p>	<p><b>B:</b></p> <p>Douglas fir and madrone are both possible!</p>	<p><b>C:</b></p> <p>incense cedar (not possible)</p> <p>big leaf maple (not possible)</p>	<p><b>D:</b></p> <p>coast redwood (possible)</p> <p>big leaf maple (not possible)</p>
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Well, that worked out well – I know that choice **B** is the correct answer!





This is one of four questions from the same text, chart and graph about a temperature experiment. There sure is a lot to read and interpret. That may mean there is enough information to help me select the correct answer. When I look at the actual question, I notice some key phrases that I need to pay attention to. The question is mainly asking about energy transfer, but I also have to predict the likely sequence. All of this is limited to the contents of the container.

1

2

My first step is to think about the several energy transfers that occur. I've studied energy transfer in the past, but I don't really remember all of the specifics. I know more about energy transfer in animals and plants.

I remember which way energy is transferred in a food chain, but I don't think that will help me here. The experiments I remember about energy transfer used a heat source and thermometers. But I forget whether heat is transferred from colder objects to warmer ones or from warmer objects to colder ones.

3

I'm kind of stuck there, so I'll look more closely at the question and information provided. Since the question says "considering only the contents of the container," I only need to worry about the ice and the water. That might help me figure out which choices are not correct. Choices **B** and **C** talk about air. If I'm correct about water and ice being the only contents of the container, then choices **B** and **C** can't be right. I'm going to mark them both off.

Choices **B** and **C** are incorrect.



• NEXT PAGE ➡

4

Now I'm right back where I started, except I've got a much better chance of selecting the correct answer because I've eliminated two of the choices.

The two remaining choices are opposites. Either energy is being transferred from the water to the ice or from the ice to the water. That goes back to where I was stuck.

Maybe the chart or graph will help.

The graph and chart tell me that ice was added to the water after 15 minutes. I can clearly see that the temperature went down until minute 27 and then leveled off.

5

Let's see, the thermometer was in the water. It's not stuck in the ice, so really it is the temperature of the water that the graph represents.

Hmm ...

the water is getting colder after the ice is added. That makes sense. I add ice cubes to a glass of water to make it colder. But what does that tell me about the transfer of energy?

6

Okay, the water is getting colder, so does that mean it must be losing some of its energy? It seems backwards in a way, but that must be what is happening. The water is losing energy, not the ice. The water must be losing energy to the ice and as a result the ice is gaining energy, getting warmer and melting. Hey, that makes perfect sense!

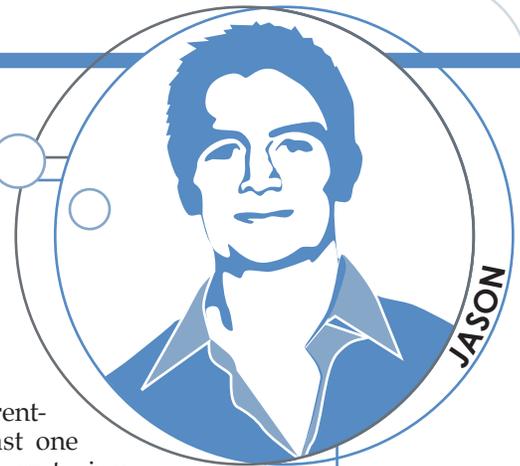
Choice A — "Water transferred energy to the ice as the ice melted," is a good match with that thinking, but before I select choice A, I'm going to take a closer look at D.

7

Choice D states that "ice transferred energy to the water which lowered the temperature of the water." Well, the temperature of the water was lowered, but if the ice actually transferred energy to the water, which would be like adding energy, wouldn't the temperature of the water actually get warmer?

That seals it. I'm selecting choice A.





Questions 30 and 31 come from the same information about hemophilia in the family. There are two paragraphs of text, a diagram and a key. Question 31 may or may not need all that information.

The question asks about which set of grandparent-parent-child relatives must all have had at least one hemophilia allele on an X chromosome. Before even trying to find the answer, I need to sort out and notice some key words in the question.

There are two words in the question that I need to pay special attention to: *must* and *all*. They are small and basic words, but I've learned many times that words like that can be especially important in correctly answering questions like this. *All* means no exceptions. *Must* means it's required.

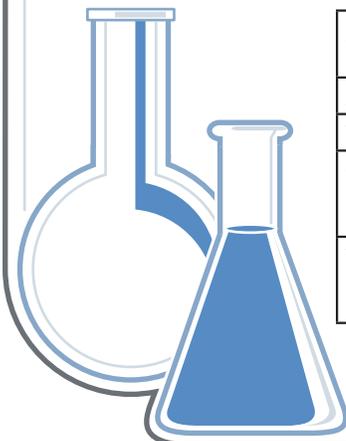
1

2

One of the confusing things about the Royal Family Pedigree diagram is that the key indicates that a colored-in circle stands for an affected female, yet the diagram only has blank circles. I guess this means that there are no affected females. The information in the text mentions that female carriers are not identified, but I don't understand why. I'll need to pay extra attention to the females in the diagram, since the female carriers are not identified. So "affected" must mean that the person has the disease but "carriers" aren't affected by the disease. Since males only have one X chromosome, if they get the allele for hemophilia on it they will be affected by the disease. A male is either affected by the disease or not, but a male can't be a carrier. This means that a mother who isn't affected by the disease but carries the allele could pass it on to her children, but a father who isn't affected by the disease isn't carrying the allele so he can't pass it on.

3

I think I need a chart to sort all of this out. If I use the information needed from the diagram to make an organized chart and pay attention to the key words from the question, I should be able to come to a logical conclusion. The organized chart could help me find the set of relatives that must all have had at least one hemophilia allele on an X chromosome.



Answers	Name	Affected or a Carrier?	Name	Affected or a Carrier?	Name	Affected or a Carrier?
A	Albert	NO	Helena	Not sure	Alice	Not sure
B	Louis IV	NO	Irene	Not sure	Sigismund	NO
C	Leopold	YES	Alice	YES (because son is affected)	Viscount Trematon	YES
D	Queen Victoria	YES (because son is affected)	Leopold	YES	Charles Edward	NO

— NEXT PAGE →

4

When I read the question and possible answers and start looking at the diagram, I see I can help myself by drawing four lines right on the diagram itself to connect the names from each answer choice. I'll label each line A-D to show which line goes with which answer. That helps me visualize which sets of relatives to focus on and which ones I can ignore. The diagram has four columns representing four different generations, but the answer choices only include three consecutive generations.

After connecting the four sets of names from the answer choices with a line on the diagram, I can look at the four answers one at a time to see if they meet the must/all test.

5

Choice **A** starts off with Albert, who is unaffected, includes Helena, who may or may not be a carrier (since carrier females are not identified), and finishes with Alice, who also may or may not be a carrier. That's easy. It can't be choice A because I know that Albert is not affected. Choice A definitely doesn't meet the all test.

Choice **A** is incorrect.

6

Choice **B** starts with Louis IV, includes Irene and finishes with Sigismund. Just like choice **A**, Louis IV and Sigismund, since they're both male, would both be affected if they carried the allele on their X chromosome. I can eliminate choice **B** because it doesn't meet the all test.

Choice **B** is incorrect.

7

Choice **C** starts off with an affected male, Leopold. Next in line is Alice, who may or may not be a carrier. Viscount Trematon (with names like these I'm glad I'm not in the royal family) is the third person and he is affected. This one is a possibility. I know Leopold and Trematon are both affected, but I'm not sure about Alice in the middle.

Although Alice is not identified as a carrier, she must carry the hemophilia allele, since her son Trematon has it. She must have passed the allele to him.

Choice **C** passes the must test! It also passes the all test because all three of them carried at least one hemophilia allele.

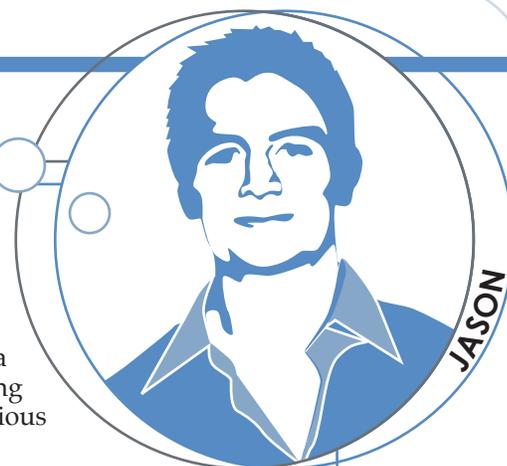
8

But I'm still going to look at choice **D**, just to make sure.

Choice **D** starts with Queen Victoria – she may or may not carry the allele, continues with Leopold, who is affected and finishes with Charles Edward who is not affected. Queen Victoria must have carried the allele since her son Leopold is affected, for the same reason as Alice in choice **C**. That means the first two were affected, but Charles Edward is not affected. This one does not pass the must test and also does not pass the all test.

Choice **C** is correct.





Question 12 includes a cartoon of two “atom people.” The actual question asks that I explain the response of atom A in terms of protons and electrons. It also asks that I describe how protons and electrons affect charge. This is a short-answer item and is worth two points. Looking carefully at the wording of the question, it is obvious that I need to explain and then describe.

In the comic strip, atom A says, “I think I lost an electron!” Atom B replies, “Are you sure?” Atom A responds, “I’m positive!”

Since I have to explain the response of atom A, I need to focus on that last sentence: “I’m positive!”

1

2

The joke of the comic strip is that when atom A says, “I’m positive,” he really means that he is positively charged as well as positive like, “I’m sure.” My explanation of this response needs to be in terms of protons and electrons.

I know that normally an atom has the same number of protons as electrons, which makes the atom neutral.

If an atom loses an electron, then the atom would no longer be neutral. It would have more protons than electrons. When an atom has more protons than electrons, it becomes positively charged. That’s why he says “I’m positive!”

If atom A had gained an electron instead of losing one, then in the comic strip he would have said, “I’m negative!”

3

With these thoughts, I think I can do a pretty good job answering this question. I can explain the response of atom A and I can describe how protons and electrons affect charge so that I can get both points.

• NEXT PAGE ➡



4

Here is my response.

**Unless otherwise indicated, the atom starts off "neutral," or having the same number of protons as electrons. As Atom A loses one electron, it has one more proton than electrons. Thus, the atom is now positive.**

I should get two points on this one!

5

Here are some responses written by other students.

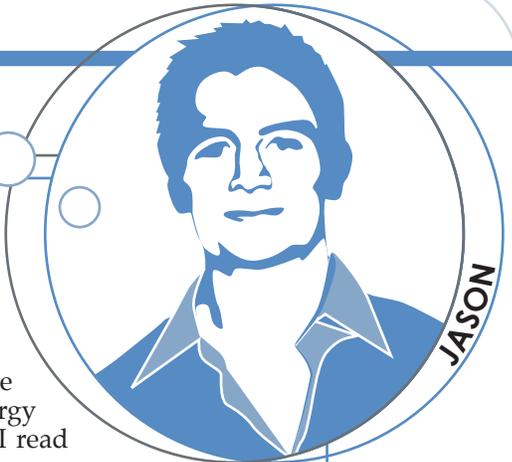
**If atom A were to lose an electron than it would lose part of its negative charge. This would cause it to become positively charted. The opposite would happen if it gained an electron so would be negatively charged. This is how some compound are formed when a positive and negative atom meet.**

This one got only one point.

**Protons have a positive charge and electrons have a negative charge.**

This one got zero points.





At first glance this looks pretty straightforward. I know that short-answer responses are worth two points, so the first thing I'm going to do is reread the test item and try to determine everything I'll need to include in my answer to get the full two points. First of all, the test item is asking me to pick one alternative energy source from the ones listed in the question. As I read on, it tells me that after I pick an alternative energy source, I need to be sure to include one advantage and one disadvantage in using that type of energy. So, as I'm writing my response, I'll be sure to include the energy source along with an advantage and a disadvantage. This is sure to earn me two points!

1

After looking at the list in the question of possible alternative energy sources, I realize that I'm most familiar with wind power, so I'll focus on it to answer the rest of the test item. Looking back to the test item, I know that I need to list an advantage to wind power as well as a disadvantage. I will list all of the possible advantages and disadvantages I can think of and then pick the ones that are the strongest to include in my answer.

2

Now that I have my list of advantages and disadvantages, I think I'll circle the advantage and the disadvantage I feel most confident about, so I am ready to write. I circled wind power is cheap and clean as an advantage. I circled not windy – no energy as my strongest disadvantage. I think I'm ready to write. After I finish writing my answer, I will be sure to go back and double-check it to make sure I listed the energy source as well as one advantage and one disadvantage. I think I'm well on my way to earning a full two points!

3



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4

Here is my response.

**The choice that I picked is wind power. Advantages of having wind power are that it is really cheap and it is extremely clean. The disadvantages are when it is not a windy day, you will not get any energy.**

I should get two points on this one!

5

Here are some responses written by other students.

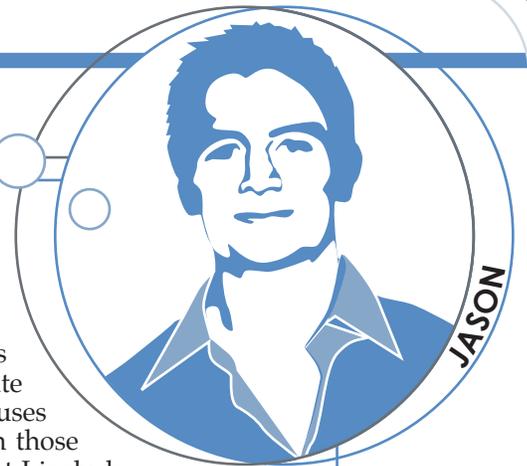
**Windpower would be my alternative source of energy because it would be cheaper for people living in the area and also it might help save the azone layer since it is natural.**

This one got only one point.

**The wind power are generated by the wind when it gets windy the wind tower is making power through the whole countryside for an example in the middle of the Ohio & West Virginia Country side they have many wind power plants.**

This one got zero points.





At first glance, I notice that this question is all about the earth's plates and the effects of their movements. I'll go back and read the question one more time. This time as I read it, I'll underline all of the things that the question is asking me to do. I underlined "two effects of plate tectonics" and "explain how plate tectonics causes each effect." I notice two very familiar words in those sentences: cause and effect. I want to be sure that I include both of those things in my answer, so I can score a full four points.

1

My next step is to start brainstorming all of the possible effects of plate tectonics. I do know that mountains are formed as a result of plate tectonics, so I'll put that down. I believe earthquakes and volcanoes are a result of plate tectonics, too.

2

Now that I have possible effects listed, I have to work backward to list the causes of these things. I'll list the cause of each of these effects, and then pick my two best examples to include in my writing.

3

The formation of mountains is an easy one. When the plates collide and push up against each other, mountains are formed. I also remember that when the plates push into each other or slide past each other, an earthquake can be caused. I'll list that one too. I'm not exactly sure how volcanoes are caused by plate tectonics, so I won't write about volcanoes.

Okay – I'm ready to write. I need to be sure to include my two best causes and effects in my answer. Here goes!

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4

Here is my response.

**One effect that plate tectonics have on the Earth's crust is that when they slide over each other & push up against each other, they form mountains. When the plates push into each other, they can also cause earthquakes, making cracks in the Earth's crust sometimes.**

I should get four points on this one!

5

Here are some responses written by other students.

**There are many effects of plate tectonics. One effect is earthquakes. Earthquakes happen as a result of two plates bumping into one another. Another effect of plate tectonics is volcanoes. Volcanoes result when plates under the ocean push together and rise up forming a mountain-like structure or volcano. Plate tectonics has many effects on the earth.**

This one got three points.

**Two effects plate tectonics have is making mountains and making islands. Making mountains is a way of making new surroundings and making islands is a way of making new places.**

This one got two points.

**Two effects of plate tectonics is earth quakes because of how the crust is divided. Also, plant life because of different types of crusts.**

This one got only one point.



## ADDITIONAL RESOURCES

### OGT Resource Web Site for Students Preparing for the OGT

<http://ohio.measinc.com/Content.htm>

This site is designed for students preparing for the OGT. It provides resource materials and practice tests in all five content areas. The student Web site will be periodically updated with additional materials and resources.

### OGT Multimedia CD-ROM for Teachers

<http://ohio.measinc.com/teachers/>

Organized by reading, mathematics, writing, science and social studies standards, these CD-ROMs contain information about the OGT, including descriptions of the academic content standards and benchmarks, as well as released OGT multiple-choice test items. The CD-ROMs also contain constructed rubrics for each subject area, dozens of annotated student responses and a practice scoring section where teachers will be able to score constructed responses and compare their scores with the OGT committee scores. All of the standards and benchmarks, multiple-choice and constructed-response items, and annotated constructed response paper will be printable. An additional section of the CD-ROMs will be devoted to instruction, featuring videos of Ohio teachers conducting model lessons with their students. Every year in the fall, ODE plans to distribute updated CD-ROMs with new test items, student responses and model lesson videos to school districts.

### ODE Link to Academic Contents Standards

[http://www.ode.state.oh.us/families/academic\\_standards](http://www.ode.state.oh.us/families/academic_standards)

This site provides a listing of resources available online to families.

## ADDITIONAL RESOURCES

### A Guide to the New Ohio Graduation Tests for Students and Families

[www.ode.state.oh.us/proficiency/PDF/OGTGuide.pdf](http://www.ode.state.oh.us/proficiency/PDF/OGTGuide.pdf)

The purpose of this guide is to provide students and their families with:

- An overview of what may appear on the OGT in reading, writing, mathematics, science and social studies;
- Sample OGT questions;
- Test-taking tips and activities that will help students prepare for the OGT;
- Frequently asked questions about the OGT;
- A graduation checklist; and
- An OGT Web site.

### OGT Sample Tests and Previous OGT Tests

<http://www.ode.state.oh.us/proficiency/OGT>

This site provides both practice tests and previous OGT tests for download. Coaches can use these tests while working to develop their students' skills in mind mapping through questions.

### Instructional Management System (IMS)

<http://ims.ode.state.oh.us/ode/ims/>

The Instructional Management System on ODE's Web site is Ohio's Web-based vehicle for communicating the model curricula now aligned with the new academic content standards, to assist Ohio educators in designing and strengthening their lesson plans. With Internet access, educators can view, download and use the content, or customize lesson plans and assessments to meet the needs of individual students.

## ADDITIONAL RESOURCES

### Books:

Burke, J. (2000). *Reading Reminders, Tools, Tips, and Techniques*. Portsmouth, NH: Boynton/Cook

Cleary, B. A., & Duncan, S. J. (1997). *Tools and Techniques to Inspire Classroom Learning*. Milwaukee, WI: ASQ Quality Press.

Hyerle, D. (2004). *Student Successes with Thinking Maps: School-Based Research, Results, and Models for Achievement Using Visual Tools*. Thousand Oaks, CA: Corwin Press.

Hyerle, D. (1996). *Visual Tools for Constructing Knowledge*. Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R.J. (2003). *What Works in Schools: Translating Research into Action*. Alexandria, VA: Association for Supervision and Curriculum Development.