Introduction

Welcome to the *Invention and Innovation* Module. You will learn about the history of invention, the process of innovation, the characteristics of some inventors, and how the design process has been used throughout history. You will be able to identify three major categories of inventions. You will be able to name the three main reasons for inventing.

This student guide consists of several activities that will introduce you to system and the Universal Systems Model. You will use the information gained in this material to solve several challenges/problems. Begin your study of the *Invention and Innovation* Module by reading each step in the daily activities and completing the assignments.

Taking the Pretest

Write your answers to the Pretest on your sheet of paper. Follow your teacher’s instructions for taking the *Invention and Innovation* pretest. The pretest does not count as part of your module grade. Its purpose is to help determine how much you learn during this module.

Complete the pretest on the next page before moving on to the next step.
Invention and Innovation Pre-Test

Write answers on a piece of paper and turn in to your instructor when directed.

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

1. During which stage of time were the wheel and the plow invented?
   a. The Stone Age  
   b. The Bronze Age  
   c. The Iron Age  
   d. The Industrial Revolution

2. A CD player is an example of which type of invention?
   a. Processes  
   b. Devices and machines  
   c. Products  
   d. Discoveries

3. Which of the following is not a problem solving process?
   a. Troubleshooting  
   b. Scientific discovery  
   c. Experimentation  
   d. Research and development

4. Which of the following was a financial invention?
   a. The smallpox vaccine  
   b. Playing cards  
   c. The cotton gin  
   d. The wheelchair

5. What is the process of altering an existing product or system to improve it?
   a. Innovation  
   b. Adaptation  
   c. Discovery  
   d. Invention

6. The idea for the protective clothing firefighters wear came from the idea of the space suit. What is this called?
   a. Invention  
   b. Innovation  
   c. Discovery  
   d. Spin-off

7. A new technique for performing surgeries is an example of which type of invention?
   a. Devices  
   b. Products  
   c. Processes  
   d. Machines

8. In which step of the invention process do inventors build models and test them?
   a. Experimentation  
   b. Review  
   c. Creative thinking  
   d. Information collection

True/False
Indicate whether the sentence or statement is true or false.

9. New and unique products are called innovations.

10. Products are manufactured artifacts.

11. A problem is anything that can be made better through change.

12. Inventors do not need to know about products that already exist because they are not concerned with the present.

13. Inventions can be made less expensive with innovation.

14. A challenge is an obstacle or goal that needs to be met.

15. All mammals have the ability to think creatively.
Pre-Test continued

Matching

For the following questions, determine whether each phrase is an invention or a discovery (A–B).

a. Invention  
   b. Discovery

16. Electricity  
17. Vacuums  
18. Vacuum cleaners  
19. Laws of motion  
20. Hot air balloons  
21. Light bulbs

Short Answer

Provide complete responses to the following questions or statements.

22. List the five steps of the invention process.
23. Give three examples of characteristics inventors might have.
24. Name three ways inventors can collect information.
25. What happens if, during the review stage of the invention process, the inventor realizes the invention does not solve the problem?
Reviewing Vocabulary Words

In this module there will be key terms given to you at the beginning of every activity that you will need to define.

These words and their definitions will be located in the videos, reading material, or software used in the daily activities.

The words and definitions need to be written down on your vocabulary/study question worksheet. When you finish place the sheet in your folder. The instructor will let you know the proper procedure before you begin the module.

Today’s activity includes these vocabulary words. List them on your vocabulary/study question worksheet. **Look for them as you do the activities and write the definitions in your own words.**

1. Inventions
2. Industrial Revolution
3. Information Age
Today’s Essential Question:
Can the student classify an invention into the time period in which it was invented?

Reviewing Study Questions

Read and copy the study questions. Look for the answers in today’s lesson. When you find the answers, record your answers on your vocabulary/study question worksheet. Keep the questions in your folder until your instructor asks for them.

1. During which period of time were the wheel and plow invented?
   a. The Stone Age   b. The Bronze Age
   c. The Iron Age   d. The Industrial Revolution

2. All animals have the ability to think creatively.
   a. True
   b. False
Today’s Essential Question:
Can the student classify an invention into the time period in which it was invented?

Reading

Locate the text titled *Technology Design and Applications* (Blue Text). Read pages 212 thru 216. This section will introduce to you the history of invention.

Journal Entry

In your journal, write about an early invention that we still use today. Keep your journal entry until the end of the module then you will turn it into the instructor.

Closing...

You have now reached the end of today’s lesson. Make sure that all material is in its proper location and the module area is clean. Chairs up and computer at the log in screen. Remember, you are responsible for the module area.
Essential Question:
Can the student give examples of how key inventions have impacted our society?

Ages of Technology Activity:
Today we are going to use Microsoft Word to help us recreate Fig. 1-4 on page 25 in the yellow textbook titled *Technology Interactions*. This will help to familiarize each of you with some of the Ages of Technology and how to insert a table into Microsoft Word. Working in groups of 2 follow the following directions to create a table containing the information from Fig. 1-4 on page 25.

Instructions

1. First you must be able to minimize this screen you are reading. In order to do this you must click on the minus sign in the upper right hand corner of the page. To make the page come back up just click on the Publisher Page at the bottom of the screen. Do that now.
2. Now we will open up Microsoft Word. Click on Start/Programs/Microsoft Office/Word.
**Today's Essential Question:**
Can the student give examples of how key inventions have impacted our society?

**Instructions Continued:**
3. Now that you have Microsoft Word opened you will need to Insert a Table. Click on Table then insert then table. See example below.

4. Then set number of columns to 3 and number of rows to 5. Click on AutoFit contents. Than click OK.
5. Begin by typing Agricultural Age into the top left box.

<table>
<thead>
<tr>
<th>Agricultural Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

6. Continue to type in the rest of the information from Fig. 1–4 into the appropriate boxes. The boxes should adjust to hold all of the information.

7. To add bullets to the list go to Format / Tools and Numbering. Select bulleted choose one then OK.

8. When you finish typing all the information into the table save your work into your folder. File/ Save As/ My Documents/ Name it Ages of Technology.

9. Log out.
Your table should look like this:

<table>
<thead>
<tr>
<th>Agricultural Age</th>
<th>Industrial Age</th>
<th>Information Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Began about 10,000 years ago</td>
<td>Began around 1750</td>
<td>Began around 1850</td>
</tr>
<tr>
<td>Economy was based on Growing crops and raising Livestock</td>
<td>Economy was based on Manufacturing</td>
<td>Economy was based on knowledge</td>
</tr>
<tr>
<td>Some Key Inventions</td>
<td>Some Key Inventions</td>
<td>Some Key Inventions</td>
</tr>
<tr>
<td>- Plow</td>
<td>- steam engine</td>
<td>- telephone, radio, TV</td>
</tr>
<tr>
<td>- Loom</td>
<td>- blast furnace</td>
<td>- transistor</td>
</tr>
<tr>
<td>- Reading and writing</td>
<td>- mass production</td>
<td>- computer</td>
</tr>
<tr>
<td>- Measurement</td>
<td>- train, plane, automobile</td>
<td>- Internet and World Wide Web</td>
</tr>
<tr>
<td>- money</td>
<td>- skyscraper</td>
<td></td>
</tr>
<tr>
<td>Some Key Impacts</td>
<td>Some Key Impacts</td>
<td>Some Key Impacts</td>
</tr>
<tr>
<td>- Growth of towns and cities</td>
<td>- Public schools</td>
<td>- Electronic business (e-commerce)</td>
</tr>
<tr>
<td>- Specialization; not all people have to work at raising food</td>
<td>- People moving from farms and villages into cities</td>
<td>- Electronic education (e-learning)</td>
</tr>
<tr>
<td>- Most people work where they live, on the farm or in their shop</td>
<td>- Greater productivity; lower priced goods</td>
<td>- Globalization</td>
</tr>
<tr>
<td></td>
<td>- Most people go to a place of work, such as a factory or office</td>
<td>- Work goes with you-in the office, in the home, on the road</td>
</tr>
</tbody>
</table>

**Closing...**

You have now reached the end of today’s lesson. Make sure that all material is in its proper location and the module area is clean. Chairs up and computer at the log in screen. Remember, you are responsible for the module area.
Reviewing Vocabulary Words

Today’s activity includes these vocabulary words. List them on your vocabulary/study question worksheet. Look for them as you do the activities and write the definitions in your own words.

4. Discovery

Reviewing Study Questions

Read the study questions and look for the answers in today’s lesson. When you find the answers, record your answers on the vocabulary/study question worksheet according to your teacher’s instructions.

3. What is the difference between a discovery and an invention? Explain you answer.
Essential Question: Can a student distinguish between a discovery and an invention.

Reading

Locate the text titled *Technology Design and Applications*. Read page 217-218. This section will introduce you to discovery and Leonardo da Vinci.

Activity: Use the Internet to find out about the life of Leonardo da Vinci.

Of his designs which were your favorite 4 designs?

When were the inventions completed?

What discoveries did he need in order to make his inventions work?

What impacts have these designs made on our world?

Journal Entry

In your journal, write about something you learned about today. Did it relate to the standard? How did it relate? Keep your journal entry until the end of the module then you will turn it into the instructor.

Closing...

You have now reached the end of today’s lesson. Make sure that all material is in its proper location and the module area is clean. Chairs up and computer at the log in screen. Remember, you are responsible for the module area.
**Reviewing Vocabulary Words**

Today’s activity includes these vocabulary words. List them on your vocabulary/study question worksheet. Look for them as you do the activities and write the definitions in your own words.

5. Problem Solving  
6. Devices and Machines  
7. Products  
8. Processes  
9. Troubleshooting  
10. Experimentation  
11. Development

**Reviewing Study Questions**

Read the study questions and look for the answers in today’s lesson. When you find the answers, record your answers on the vocabulary/study question worksheet according to your teacher’s instructions.

4. A CD player is an example of which type of invention?
   A. Processes  
   B. Devices and Machines  
   C. Products  
   D. Discoveries

5. A new technique for performing surgeries is an example of which type of invention?
   A. Devices  
   B. Processes  
   C. Products  
   D. Machines
Essential Question: Can a student correctly categorize different inventions?

3 Reading

Locate the text titled *Technology Design and Applications*. Read page 217-219. This section will introduce you to different types/categories of invention and problem solving.

**Activity:** Use the Internet to find out about accidental inventions. Use Google to find at least 10 accidental inventions. Out of those 10 choose 4 and write a summary of what the inventor was attempting to do when they invented the product. Be prepared to share your inventions with the class.

**Summary:** covering the main points succinctly

**Succinctly:** marked by compact precise expression without wasted words

**Activity 2:** List the following inventions in the proper category: ink pen, Arthroscopic surgery, MP3 player, light bulb, clothing, pieces of music, no till farming, hydroponics, and food.

4 Journal Entry

In your journal, write about something you learned about today. Did it relate to the standard? How did it relate? Keep your journal entry until the end of the module then you will turn it into the instructor.

Closing...

You have now reached the end of today’s lesson. Make sure that all material is in its proper location and the module area is clean. Chairs up and computer at the log in screen. Remember, you are responsible for the module area.
Reviewing Vocabulary Words

Today’s activity includes these vocabulary words. List them on your vocabulary/study question worksheet. Look for them as you do the activities and write the definitions in your own words.

12. Problem 15. Innovation
14. Creative Thinking

Reviewing Study Questions

Read the study questions and look for the answers in today’s lesson. When you find the answers, record your answers on the vocabulary/study question worksheet according to your teacher’s instructions.

6. What is the process of altering an existing product or system to improve it?
   A. Innovation  B. Adaptation  C. Invention  D. Discovery

7. In which step of the invention process so inventors build models and test them?
   A. Experimentation  B. Review  C. Creative thinking  D. Information collection

8. A problem is anything that can be made better by change.
   A. True  B. False
9. A challenge is an obstacle or goal that needs to be met.
   A. True  B. False
10. All mammals have the ability to think creatively.
    A. True  B. False
Essential Question: Can a student correctly label the steps of the invention process?

Reading

Locate the text titled *Technology Design and Applications*. Read page 219-225. This section will introduce you to the invention process and other inventors. Use this information to define your terms and answer study questions.

Activity: Use the Internet to find out about NASA spin-offs. Use Google to find at least 10 NASA spin-offs. Out of those 10 choose 4 and write a summary of what the invention was used for by NASA and what it is used for now. Be prepared to share your spin-offs with the class.

Web site: www.thespaceplace.com/nasaspinoffs.html#chr

Summary: covering the main points succinctly

Succinctly: marked by compact precise expression without wasted words

Activity 2: List the leisure inventions that you use each day.

Journal Entry

In your journal, write about something you learned about today. Keep your journal entry until the end of the module then you will turn it into the instructor.

Closing...

You have now reached the end of today’s lesson. Make sure that all material is in its proper location and the module area is clean. Chairs up and computer at the log in screen. Remember, you are responsible for the module area.
Activity #3

1. Complete any missed assignments.

2. Have your journal entries, vocabulary and your questions checked off/graded by your instructor.

3. Study for your test.

Journal Entry

In your journal, write about something you learned about today. Keep your journal entry until the end of the module then you will turn it into the instructor.

Closing...

You have now reached the end of today’s lesson. Make sure that all material is in its proper location and the module area is clean. Chairs up and computer at the log in screen. Remember, you are responsible for the module area.
Activity #4
Take Post-Test

Journal Entry

In your journal, write about something you learned about today. Keep your journal entry until the end of the module then you will turn it into the instructor.

Closing...

You have now reached the end of today’s lesson. Make sure that all material is in its proper location and the module area is clean. Chairs up and computer at the log in screen. Remember, you are responsible for the module area.