

LESSON 1: INTRODUCTION TO INVENTION

Invention Process Step: Introduction

Grade Level: 3-5

Base Time: 45 minutes



ESSENTIAL QUESTION

What is an invention and what is the process most inventors follow to develop an invention?

LESSON OVERVIEW

This lesson will explore the concepts of “invention” and “innovation” and the steps needed to invent and innovate. Students will learn to identify the inventions and innovations in their everyday lives. They will be introduced to the Invention Process, the framework that guides inventors/designers in their work.

OBJECTIVE

Students will be able to:

- Define and differentiate between “invention” and “innovation”
- Understand the framework and steps of the Invention Process
- Understand the importance of documentation to make informed decisions and to accurately record the invention process using a journal/logbook

LESSON STANDARDS

Next Generation Science Standards:

- 3-5-ETS1-1
- 3-5-ETS1-2

Common Core ELA Standards:

- CCSS.ELA-LITERACY.SL 3.1, 4.1, 5.1
- CCSS.ELA-LITERACY.SL 3.2, 4.2, 5.2
- CCSS.ELA-LITERACY.SL 3.4, 4.4, 5.4
- CCSS.ELA-LITERACY.RI 3.2, 4.2, 5.2

MATERIALS

Resources for the Educator

- Video: The Henry Ford’s Innovation Nation: Soccer Ball That Generates Energy
Link: <https://www.youtube.com/watch?v=0gifXci-FUK> (3:50)

Materials

- YIP Inventors’ Journals
- [Worksheet: Invention or Innovation?](#) (NOT included in Inventors’ Journal)
- [Worksheet: Problem Identification](#) (included in Inventors’ Journal)
- Sets of similar items, examples:
Gloves: garden glove, winter glove, mitten, vinyl glove, bike/golf glove, baseball glove, oven mitt
Pencils: wooden pencil, carpenter’s pencil, mechanical pencil, colored pencil, pen, pen with eraser
Drinking Straws: plastic straight straw, wide straw, bendy straw, reusable metal straw
Lights: candle, flashlight, small lantern, head light, keychain light, book reading light

NOTES FOR THE EDUCATOR

Educator may lead the following lesson plan with flexibility to adapt as needed to fit technology and class format.

Introduce the Young Inventors' Program (YIP). Over the next few weeks, the class will embark on an invention journey. Students will learn about the invention process and then will be able to design and build their own unique inventions. Students may work in groups and/or individually to develop an invention project as you prefer.

Students will all be provided with Inventor's Journals. Each student should keep their own invention journal/logbook to record the activities in their invention journey. Talk to them about the importance of writing down all ideas, research, design plans and changes they make along the way. YIP Inventor's Journals include many of the worksheets used in the YIP lessons and activities so that they can be kept in one place. You may choose to establish your own requirements for the YIP Inventor's Journals and share those with your students. You should also decide if students can take these journals home or if they will be kept in the classroom. The Inventor's Journals should be used in each YIP lesson. YIP provides hard copies of the YIP Inventor's Journals to all students, or you can download and copy or use the digital version found on the Young Inventor's Program website:

<https://www.unh.edu/leitzel-center/young-inventors-program/teach/curriculum>.

INSTRUCTION & ACTIVITIES

Educator Instruction:

Ask students, "What is an invention? What makes something an invention?" Have students share their answers with the class and write their ideas on the board for the whole class to see. There is no need at this point to provide a formal definition of "invention" and "innovation" but consider all answers as possible definitions.

Next, share the definitions of INVENTION and INNOVATION with the class.

Invention = is a new device or process that originates after study and experiments

Innovation= is when you take an existing concept, object, or invention and using creativity improve on it by adding something, creating another use for it etc.

Activity: Invention or Innovation? (10 minutes)

Distribute the Invention or Innovation? Worksheet (not included in the YIP Inventor's Journal).

Divide students into small groups. Give each group one example of a set of similar items (you will need one item for each group- if you have 4 groups, you will need 4 items). Item sets might include:

- Gloves- winter glove, mitten, garden glove, vinyl glove, bike/golf glove, baseball glove, heated/hot hands glove, oven mitt,
- Pencil- wooden pencil, carpenter's pencil, mechanical pencil, colored pencil, pen, pen with eraser
- Drinking Straw- plastic straight straw, wide straw, bendy straw, reusable metal straw
- Light- candle, flashlight, small lantern, head light, keychain light, book reading light

Have students examine their items closely and complete the Invention or Innovation? Worksheet. After allowing 5 mins of work time, have each group share their item, its unique features, why those features are important, and ways the items might be improved. Then lead a discussion about whether these items are inventions or innovations. Most are innovations that stemmed from the original/basic version, but made improvements or changed the item to solve a more specific problem or to be used by a specific group of people. Ask students to think of what the original invention might have been and why it was created.

- a. Glove- a piece of animal skin or fur wrapped around a hand
- b. Pencil- a piece of charcoal or graphite
- c. Light- a burning stick held aloft

Educator Instruction:

Distribute the Inventor's Journals to students.

Briefly explain how the journals will be used to record their invention process- their ideas, research, drawings, and other activities they do while working on the project. Each student should keep their own invention journal/logbook to record the activities in their invention journey. Talk to them about the importance of writing down all ideas, research, design plans and changes they make along the way. Remind students that the journal is like a diary and should be completed as they are working, and they should include the date as they make entries. They should note the date of their work as they enter things into the journal.

NOTE: Tell students if they may work on their journals at home, or if journals will be kept in the classroom. If assessing the journal, explain to students your expectations, any deadlines, or requirements you may have.

All ideas have an originator, an inventor. Many inventors follow the same basic process to turn their ideas into something real- a product. This is called the Invention Process. Most inventions are the result of the stretch from *what is* to *what might be*. If it doesn't feel easy, that is OK!

Introduce the steps of the Invention Process.

NOTE: You may choose to refer to the definitions listed in the YIP Inventor's Journal.

1. **IDENTIFY** – Ask questions to determine the problem.
2. **UNDERSTAND**- Research the problem fully. Who does it affect? What may cause the problem? What might be possible solutions.
3. **IDEATE**- Use creative problem-solving to turn an idea into a solution.
4. **DESIGN**- Sketch a drawing of the solution and its design. Label the parts. out their prototype designs.
5. **BUILD**- Put your plans in action and build a model (a prototype).
6. **TEST**- Test the model to collect data and receive feedback.
7. **REDESIGN**- Make adjustments and improvements to their prototype. The Test and Re-Design steps may repeat several (or many) times until the inventor is satisfied with the results.
8. **COMMUNICATE**- Present your idea and your solution.

OPTIONAL

Share video: The Henry Ford's *Innovation Nation*: Soccer Ball That Generates Energy. (Link: <https://www.youtube.com/watch?v=0gifXci-FUk>, 3:50 minutes. Video included in slide deck).

Video summary- Jessica O. Matthews had a unique idea: turn a soccer ball into a battery that powers lights for people in the developing world. Her story shows how an ordinary object can be transformed to address a need and improve people's quality of life.

Facilitate group discussion following video. What steps of the Invention Process were highlighted and how did she approach them?

Educator Instruction:

Discuss how identifying the problem is the first step of the Invention Process and starting to invent. Ask students to begin to think about the problems around them or the things that they wish could be made easier (school, home, activities) and the people who have those problems (themselves, family, friends, pets). You might give some prompts to help them get started:

- Chores that they have that they wish were easier- what could make them easier?
- Things that are hard for them or others to do
- Things to help their pets or animals in nature
- And improvement for a hobby (sport, music, craft, etc) to make it more fun or easier to do

Students are also encouraged to talk to others to ask them what things in their lives bother them or are problems to help generate ideas.

Activity: Problem Identification (10 minutes + additional time before next class)

Have students complete Part 1 of the Problem Identification Worksheet in the YIP Inventor's Journal and list 2-4 problems they think of. You may ask students to complete this worksheet in class or at home.

NOTE: It is strongly suggested that this part of the worksheet be completed before beginning Lesson 2, especially if you are limited in the number of classes for the unit.

IDEAS FOR VIRTUAL INSTRUCTION

Activity: Invention or Innovation?

Ask students to select 2-3 similar items from home (Examples: Garden glove, winter glove and sports glove; Plain drinking straw, bendy straw, reusable straw; Dinner spoon, plastic spoon, serving spoon, measuring spoon; Shoe, flip flop, water shoe, boot). Have them complete the Invention or Innovation? Worksheet. You may ask students to submit or share their work using the virtual platform of choice.

Video:

After introducing the steps of the Invention Process, have students watch the video: The Henry Ford's Innovation Nation: Soccer Ball That Generates Energy. (Link:

<https://www.youtube.com/watch?v=0gifXci-FUk>, 3:50 minutes.)

Choose One:

1. Ask students to draw their own icons (pictures) to represent one or all of the steps of the invention process. Students may submit work using the virtual platform of choice.
2. Ask students to write a paragraph on one step of the invention process that Jessica Matthews experienced as she made her energy creating a soccer ball. Students may submit work using the virtual platform of choice.

Activity: Problem Identification

Have students complete Part 1 of the Problem Identification Worksheet in the YIP Inventor's Journal. You may ask students to complete this worksheet in class or at home.

CHECK FOR UNDERSTANDING***Educator may wish to do one of the following to check for understanding:***

Ask students to name the part of the Invention Process that they feel is most challenging and then to name the step that they are most excited about.

OR

Ask students to draw an icon to represent one step of the Invention Process that they are most excited about.

TAKE HOME ASSIGNMENT

(OPTIONAL IF GIVING HOMEWORK)

Ask students to complete Part 1 of the Problems Identification Worksheet included in the YIP Inventor's Journal.