



# Inventor's Workshop: What is an Inventor?

**Grade Level:** 3 - 5th grade

## **Unit Objectives:**

Students will...

1. Learn about the life, scientific contribution and workspaces of inventor Lewis Howard Latimer through a tour/virtual tour of the Lewis Latimer museum.
2. Compare Lewis Latimer's inventor workspace, to other scientific laboratories and the modern day makerspace.
3. Explore the tools and materials used in Lewis Latimer's home laboratory and used by scientists in other laboratories. Students will build an understanding of a laboratory as a complex space including safety precautions, supplies and equipment.
4. Develop a criteria to test the efficiency of a room layout design and build an understanding of proportions and geometric measurements.
5. Work in a small group to create a paper prototype of (choose one):
  - a. An Industrial laboratory in the past and present.
  - b. An inventor's workshop in the past and present (makerspace).

## **Concepts/Skills:**

Prototyping, engineering design, 3D to 2D spatial translation and reasoning, and practice with using measurement tools.



# The Inventor

Learn about Lewis Latimer's Inventions

## Challenge

Create your own invention

## Learning Objective

Build an understanding of the physical spaces where scientists, engineers, and inventors work.

## Duration

Suggestion time 60 minutes

## Lesson Outline

<b>Engage</b>	10 minutes
<b>Explore</b>	10 minutes
<b>Explain</b>	20 minutes
<b>Elaborate</b>	15 minutes
<b>Evaluate</b>	5 minutes

# ENGAGE

10 minutes

Students will be introduced to the idea of an inventor workshop and design their own. We will learn about these places by learning about the life and home workshop of **Lewis Howard Latimer**. As students will tour the places where he worked and designed, we will explore how working at a large laboratory is different from working at home.

One of the best ways to capture and engage students is by starting with familiar ideas, images and references. We suggest you start the lesson by looking at examples of inventors we know from pop culture and media to consider the places where people invent.

Integrating pop culture into your lesson doesn't mean you want to have a focused discussion on the popular culture reference. Instead, you can use knowledge from what students already have to anchor their ideas and to create a connection to engage with the tour of Lewis Latimer's House, on a deeper level.

## THINKING PROMPT:

*Think about the various spaces where scientists and inventors do their work. We call those spaces laboratories (labs), workshops or makerspaces.*

*Some examples of science labs or inventor workshops are in our television and media. Some popular culture examples include: Phineas and Ferb, Harry Potter and the Sorcerer's Stone, Despicable Me, and A Wrinkle in Time.*

- *Have you seen a lab in a movie or television show?*
- *Have you ever visited a lab in real life?*
- *Have you seen an advertisement in a book or magazine, or on the internet that takes place in a lab?*
- *Ask your students to consider the key elements of a lab, and make a class list.*

INQUIRY QUESTION:



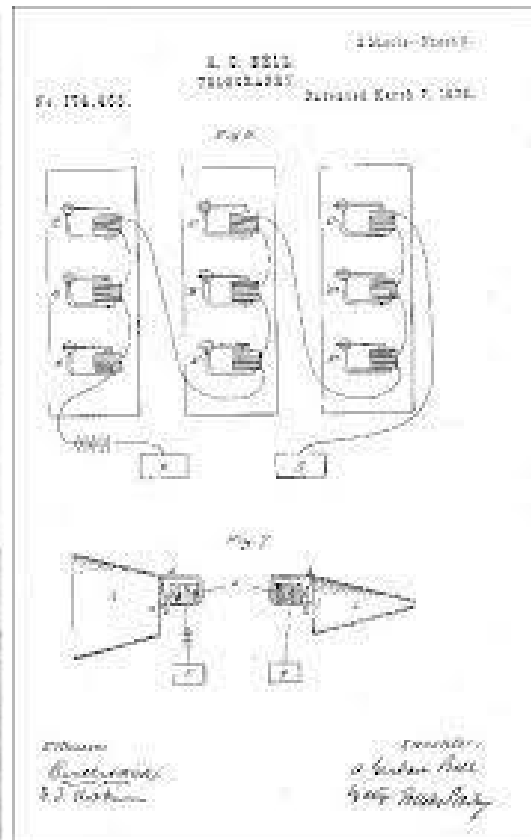
- What do these laboratory spaces have in common?  
*Examples: Big tables, special lights, a place to put supplies...*
- How are these laboratory spaces different?  
*Examples: Smaller tools, windows, comfortable feeling and furniture.....*

# EXPLORE

20 minutes

## Watch Video:

[“Lewis H Latimer, Electrical Pioneer and Inventor, a Seldom Told History”](#)  
(6:45 Minutes)



Lewis Howard Latimer (1848-1928), was an African-American inventor, electrical pioneer, and a son of fugitive slaves. With no access to formal education, Latimer taught himself mechanical drawing while in the Union Navy, and eventually became a chief draftsman, patent expert, and inventor.

Lewis Howard Latimer’s workspace at his home was quite different from the laboratories he used when working with Thomas Edison. After watching the following videos and discuss the similarities and differences with your students.

## KEY VOCABULARY

**Science Laboratory (lab):** A place used to try out specific information and test out theories in science. This room is used to document, measure and explore properties.

**Inventor's Workshop:** Home Based labs that provides flexibility for inventors to work when inspired.

**Makerspace:** a place in which people share ideas about technology and equipment.

## PLACES FOR INVENTING & MAKING

For some students the concept of a laboratory that is not a scientific laboratory is difficult to contextualize. It is important for students to explore the concept that invention happens in different spaces.

### What is a science laboratory?

A science laboratory (lab for short) is a place or setting which is used to try out specific scientific information. In this room experiments are carried out. Observations and investigations are performed.



## **What is an Inventor's Workshop?**

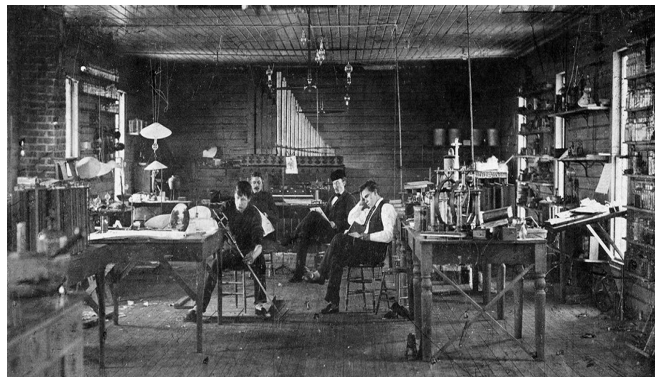
In the times of Lewis Latimer, many labs were based in homes. This provided flexibility for inventors, designers and engineers to work when they were inspired - and for many individuals ideas can start in the middle of the night.

## **Historic and Modern Inventor's Workspaces**

Thomas Edison was the founder of the Edison Company (now known as General Electric). Lewis Latimer was employed by Edison alongside a team of other scientists - men and women with a variety of skills. Together they invented electrical advancements which ultimately helped individuals and society live more productive lives.



Modern labs are found in colleges and universities, and at companies that create products we use everyday - from a pharmaceutical company that creates a new toothpaste flavor, to a car company that is designing a self-driving electric car. Scientists are working in laboratories all over the world discovering new and exciting ways to fix big problems.



## What is a Makerspace?

A **makerspace** is a place in which people with shared interests and scientific perspectives gather to share ideas, brainstorm new projects, and collaborate. Through an extensive process of trial-and-error, these makerspace projects may or may not bring important scientific advancements.



### THINKING PROMPT:

Lewis Howard Latimer was an inventor who worked daily at a large institution with other scientists, including Thomas Alva Edison, to create a better light bulb. That laboratory was called the Edison Lab (General Electric). There Mr. Latimer worked with a team of scientists, and they generated new ideas to improve some of Mr. Edison's inventions.

Sometimes Mr. Latimer had ideas that he wanted to work on during later nights, or he wanted to work on new ideas for new inventions of his own.

Did Mr. Latimer work in an institutional laboratory all the time? Why or why not?

He liked to work at home because he had ideas that were different from the ideas at his working team. He wanted to think about his ideas and solve other problems.

What are the good opportunities when working from home?  
No travel, take a rest, work early or late.....



What are some challenges about working from home?  
Interruptions, responsibilities, missing important time with family, not having the proper tools, danger/fire/explosion.....

***Did Latimer work in a laboratory all the time? Why or why not?***

*“He liked to work at home because he had ideas that were different from others. He wanted to think about his ideas and solve problems in his own space.”*

***What are the good opportunities when working from home?***

*“No travel, take a rest, work early or late.....”*

- *What are some challenges about working from home?*

*“Interruptions, responsibilities, missing important time with family, not having the proper tools, danger/fire/explosion.....”*

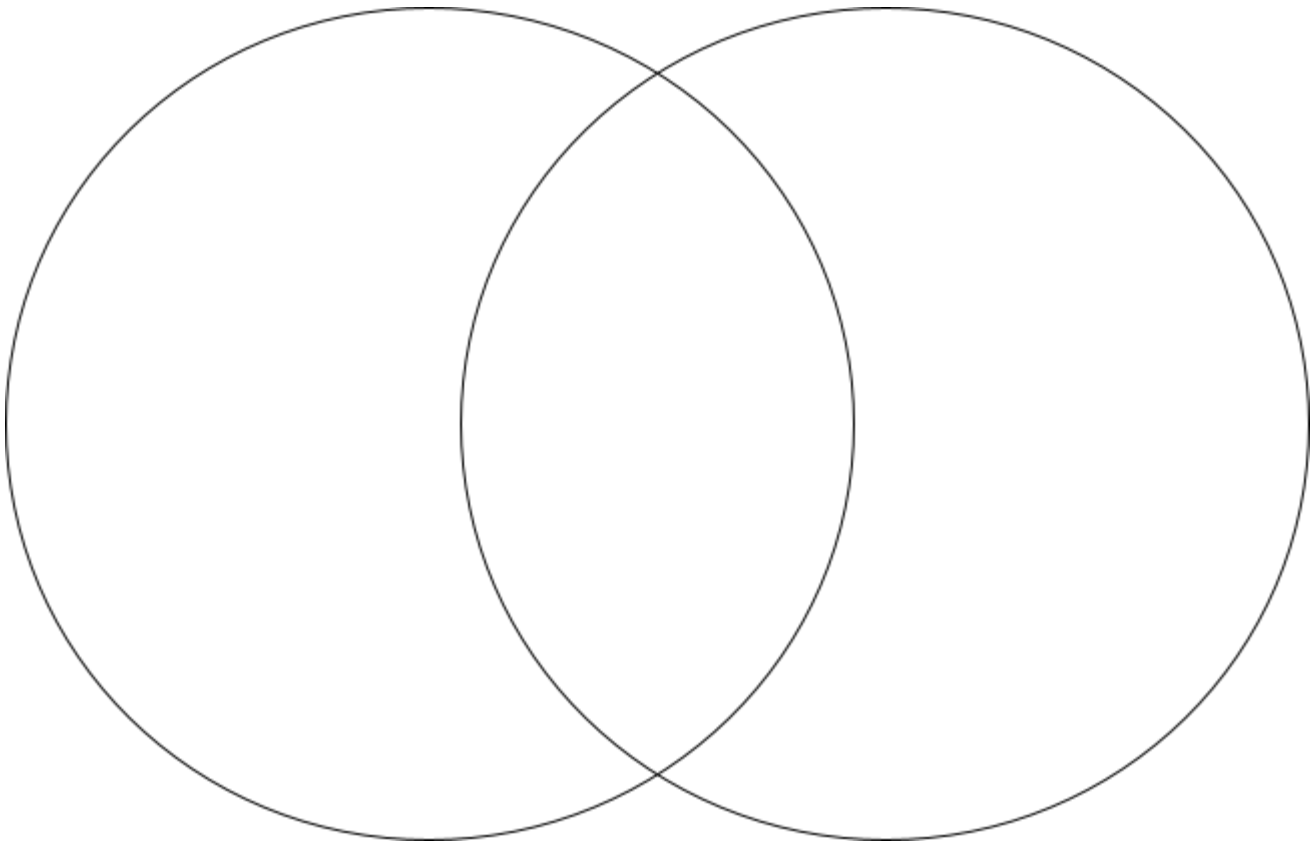
## WORKSHEET

**NAME**  
**GRADE**

**DATE**  
**TEACHER**

### ACTIVITY:

Mr. Lewis Howard Latimer's home Inventor's Workshop was a great place for discovery. It was a special place that he designed for a wide range of activities, with tools, and materials. Consider the laboratories we discussed from popular culture. Pick one and explain how they are similar or different from Mr. Latimer's House.





## DISCUSSION QUESTIONS:

What do these two inventions have in common?

Why do you think the new invention was created?

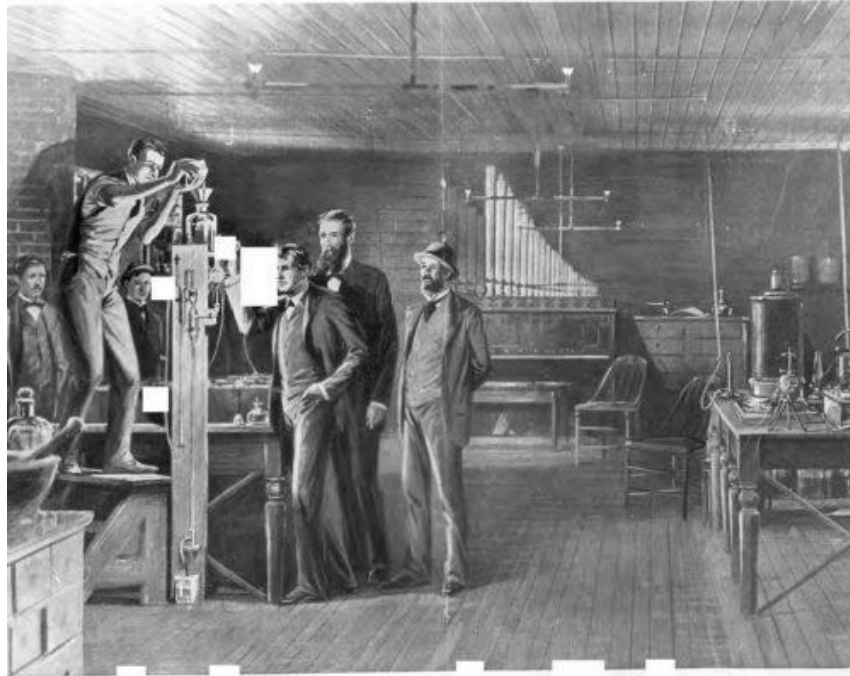
Where have you seen Latimer's invention? Have you seen the new invention you chose in a similar place?

In what ways do you think the invention was improved?

Do you think the newer version of the invention will be improved again in the future? If so, how?

# EXPLAIN

20 minutes



Lewis Latimer was an inventor who lived and worked in the late 1800's. His ideas brought new and improved inventions to people in the United States and around the world. He had many ideas, and some of those inventions are the foundation of a machine we have today.

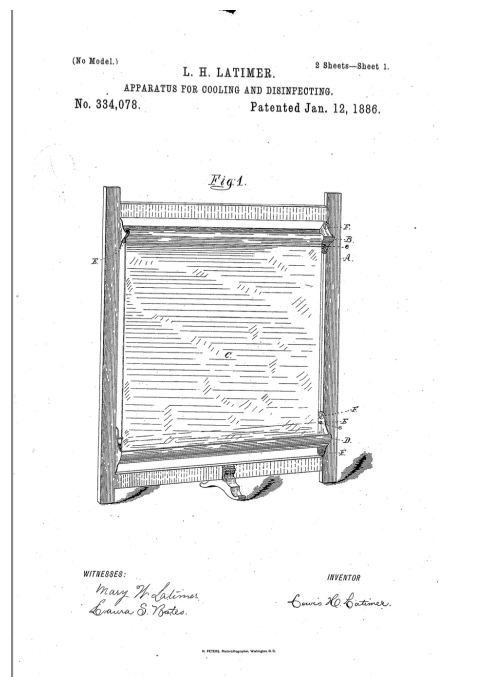
RESOURCES:

**WIKIPEDIA**

[https://en.wikipedia.org/wiki/Lewis\\_Howard\\_Latimer](https://en.wikipedia.org/wiki/Lewis_Howard_Latimer)

**LEMELSON CENTER**

“Edison’s light bulb used a carbonized bamboo filament, which unfortunately burnt out rather quickly. Latimer created a way to make the carbon filament more durable by encasing it in cardboard.”



Many inventors also worked at home in inventor workshops. Smaller spaces that were specifically designed by the inventor.



## BRAINSTORM

Explain to your students that inventions come from ideas, and that the best inventions are developed in teams that work together. Ask your students to also consider the differences of working in a large industrial **Science Laboratory**, a home-based **Inventor's Workshop**, and the new workspaces that are being developed today in communities throughout the world called Makerspaces.

### **Inventing Something New:** 3 minutes discussion

Take notes on a board or Padlet. Exploring Lewis Latimer's workspace will support students as they gain an understanding that there were many inventions that changed the world - in this example with light through the lightbulb. What are some amazing things that would change our world?

**Examples:** Perhaps a car that could fly? Or maybe small pods for living under the water?

### **Workspace for Inventing:** 3 minutes discussion

Students also can discuss the design elements related to the real people who worked in real spaces for invention in the late 1800's -- industrial laboratories may have been dirty, unsafe, crowded, contained dangerous equipment, information and ideas were shared.

Examples: Using wider doorways for entering and exiting.

Latimer was an inventor who lived and invented in the late 1800's. His ideas brought new inventions to people in the United States and around the world. His innovations are the foundation of a few machines we have today.

# ELABORATE

15 minutes

After learning about Lewis Latimer's home we will ask students to complete a short design challenge to consider Lewis's most successful ideas from working in his workspaces and improving on inventions that existed.

Work with students to either design a space that would work to fix a problem or redesign something.

## **What would you invent in your workshop? Is there any new technology or machine that you would like to improve?**

Remember students should consider:

1. Inventing something new or rethinking something old
2. What is a useful and safe workspace for inventing

*Examples: a robotic arm, a chemical/bacteria that kills a new virus, a new cell phone with features that do not yet exist.*

The sky's the limit for this activity. Encourage students to think big. Many students will not know the names of the tools they need, that is not important for this assignment. The focus is demonstrating an understanding that there are different workspaces and they are better suited for different types of invention.

“Edison's light bulb used a carbonized bamboo filament, which unfortunately burnt out rather quickly. Latimer created a way to make the carbon filament more durable by encasing it in cardboard.”

[\(read more\)](#)



## WORKSHEET

**NAME**  
**GRADE**

**DATE**  
**TEACHER**

### ACTIVITY

Your challenge is to imagine inventing something new and the workspace for inventing. What would you invent? What would your workspace look like?

*Circle which space you chose to design below:*

**Science Laboratory**

**Inventor's Workshop**

**Makerspace**

In the space below, draw a picture of your invention:

### My New Invention/My Improved Invention

---

---

---

---



# EVALUATE

5 minutes

## ASSESSMENT RUBRIC

Use the students' design and written descriptions to evaluate students' ability to determine their understanding of an invention and its potential impacts.

Evaluate their description for the use of descriptive adjectives, voice, and organization.

	<b>Excellent</b>	<b>Good</b>	<b>Satisfactory</b>	<b>Needs Improvement</b>
Student demonstrates understanding the differences between scientific laboratories and a home based inventors workshop.				
Student provided a clear understanding of the work conducted in a laboratory.				
Student shared their work successfully.				
Student clearly depicted their laboratory using grade level descriptive language.				
Student shared their work confidently to the class and were able to communicate with others.				

# Common Core Standards

## **Geometry**

### 3.G.A.1

Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

## **Measurement and Data**

### 3.MD.D.8

Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

## **Next Generation Science Standards**

### 3-5 ETS1-1

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

### 3-5 ETS1-3

Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

### MS ETS1-1

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

### MS ETS1-3

Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

### MS ETS1-4

Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.