**Inventive Thinking**

**This six-week unit introduces the research process, as well as the creative and critical thinking used by writers, inventors, and famous people from the Renaissance and beyond.**

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**Overview**

* + This unit builds upon the idea of the Renaissance as a period of new learning and discovery, through pairings of fiction and non-fiction books on related topics. This is an effective unit is particularly effective for teaching through which to teach the research process, since the person or historical context behind particular inventions are most likely new to students. Students publish and present their research papers to the class. Students then find commonalities among inventors and innovators, share these insights in group discussions, and use this information as a springboard for their own writing innovation and creativity. This unit sets in motion the reading, writing, researching, and word analysis processes that will be a hallmark of their fifth-grade year. This unit ends with an open-ended reflective essay response to the essential question.
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**Focus Standards**

* + These Focus Standards have been selected for the unit from the Common Core State Standards.
    - **RL.5.9**: Compare and contrast stories in the same genre (e.g., mysteries and adventure stories) on their approaches to similar themes and topics.
    - **RI.5.2**: Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
    - **RI.5.9**: Integrate information from several texts on the same topic in order to write or speak about the subject knowledgably.
    - **RF.5.4**: Read with sufficient accuracy and fluency to support comprehension.
    - **RF.5.4(b)**: Read on-level prose and poetry orally with accuracy, appropriate rate, and expression on successive readings.
    - **W.5.2**: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
    - **SL.5.1**: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) on *grade 5 topics and texts*, building on others’ ideas and expressing their own ideas clearly.
    - **SL.5.1 (c)**: Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
    - **SL.5.1 (d)**: Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
    - **L.5.1**: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
    - **L.5.1 (a)**: Explain the function of conjunctions, prepositions, and interjections in general and their function in particular sentences.
    - **L.5.1 (b)**: Form and use the perfect (e.g., *I had walked; I* *have walked; I will have walked*) verb tenses.

[Common Core State Standards, ELA](http://commoncore.org/free/resources/CCSSI_ELA_Standards.pdf) (1.5 MB)

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**Suggested Student Objectives**

* + - Read and compare information learned from fiction and nonfiction books about an inventor of choice (e.g., *Leonardo the Beautiful Dreamer* by Robert Byrd and *The Usborne Book of Inventors from DaVinci to Biro* by Struan Reid, Patricia Fara, and Ross Watton).
    - Write a variety of responses to historical fiction texts.
    - Recognize the value of primary-source documents when studying a historical period, such as the Renaissance (e.g., Leonardo’s notebook).
    - Conduct research and develop a multimedia presentation on an inventor of choice.
    - Explain the historical context surrounding an invention of choice, based on information from multiple print or digital sources.
    - Begin defining relationships between words (e.g., inventor, invention, venue, innovator, innovative, innovate, new, etc.).
    - Participate in group discussions.
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**Suggested Works**

* + (E) indicates a CCSS exemplar text; (EA) indicates a text from a writer with other works identified as exemplars.

**Literary Texts**

**Stories (Historical Fiction)**

* + - *Leonardo: Beautiful Dreamer* (Robert Byrd)
    - *Leonardo da Vinci* (Diane Stanley)
    - *Starry Messenger: Galileo Galilei* (Peter Sis)
    - *The Invention of Hugo Cabret* (Brian Selznick)
    - *Midnight Magic* (Avi)
    - *Fine Print: A Story about Johann Gutenberg* (Joann Johansen Burch and Kent Alan Aldrich)
    - *What Are You Figuring Now?: A Story about Benjamin Banneker* (Creative Minds Biography) Jeri Ferris
    - *A Picture Book of George Washington Carver* (Picture Book Biography) (David Adler and Dan Brown)

**Poems**

* + - “Time” (Valerie Bloom)
    - Riddles from Chapter 5: Riddles in the Dark, *The Hobbit* (J.R.R. Tolkien)
    - *Carver: A Life in Poems* (Marilyn Nelson)

**Informational Texts**

**Informational Text**

* + - *Toys!: Amazing Stories Behind Some Great Inventions* (Don L. Wulffson and Laurie Keller) (E)
    - *The New How Things Work* (David Macaulay and Neil Ardley)
    - *So You Want to be an Inventor?* (Judith St. George and David Small)
    - *The Usborne Book of Inventors from DaVinci to Biro* (Struan Reid, Patricia Fara, and Ross Watton)
    - *Women Inventors* series (Jean F. Blashfield)
    - *Telescopes: The New Book of Knowledge* (Scholastic) (Colin A. Ronan) (E)
    - *About Time: A First Look at Time and* *Clocks* (Bruce Koscielniak) (E)
    - *Where Do You Get Your Ideas? Favorite Authors Reveal Their Writing Secrets* (Sandy Asher and Susan Hellard)
    - *Amazing Leonardo da Vinci Inventions You Can Build Yourself* (Build It Yourself Series) (Maxine Anderson)
    - *Leonardo da Vinci: A Nonfiction Companion to Monday with a Mad Genius* (Magic Tree House Research Guide) (Mary Pope Osborne, Natalie Pope Boyce, and Sal Murdocca)
    - *Michelangelo* (Getting to Know the World’s Greatest Artists) (Mike Venezia)
    - *Outrageous Women of the Renaissance* (Vicki Leon)
    - *Science in the Renaissance* (Brendan January)
    - *Science in the Renaissance* (Renaissance World) (Lisa Mullins)
    - *Renaissance Artists Who Inspired the World* (Explore the Ages) (Gregory Blanch and Roberta Stathis)
    - *In Their Own Words: Thomas Edison* (George Sullivan)

**Online Research Topics**

*Note: No children’s books exist on these inventors*.

* + - An Wang
    - Carlos Finlay

**Art, Music, and Media**

**Art**

* + - Leonardo da Vinci, [*Mona Lisa*](http://www.artchive.com/artchive/L/leonardo/monalisa.jpg.html) (c. 1503-06)
    - Michelangelo, [*Sistine Chapel Ceiling*](http://www.christusrex.org/www1/sistine/0B-Ceiling.jpg) (1508-12)
    - Michelangelo, [*Dome of St. Peter’s Basilica*](http://saintpetersbasilica.org/Interior/Dome/Dome.htm) (1506-1626)
    - Raphael, [*School of Athens*](http://www.artchive.com/artchive/R/raphael/school_athens.jpg.html) (1510-11)
    - Donatello, [*St. George*](http://scoutsparatodos.files.wordpress.com/2009/04/donatello-stgeorge.jpg) (c. 1416)
    - Pieter Brueghel, [*Peasant Wedding*](http://www.ibiblio.org/wm/paint/auth/bruegel/wedding.jpg) (1567)

**Music**

* + - Traditional, possibly Henry VIII of England, *Greensleeves* (1580)
    - Canadian Brass, [“English Renaissance Music”](http://www.canadianbrassstore.com/cbs--mt-45792.html)
    - The King’s Singers, [Madrigals](http://www.kingssingers.com/c/kings-singers/cds-aand-dvds.html)
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**Sample Activities and Assessments**

* + **Literature Response**

“Historical fiction” is a genre that takes place in the past but has a fictional character or fictional elements to it. As a class, we will compare and contrast various historical fiction stories. In order to prepare for class discussions, create a T-chart in your journal where you take notes about people, places, or events you believe are represented accurately, and people, places, or events you believe are fictional. Be sure to include in your notes the page number and book title for each example so you can refer back to the text. (RL.5.1, RL.5.9)

**Literature Response**

In your journal, create a character map of the main character in the historical novel you are reading. Show how the character changes (or develops) over the course of the text. Compare your character with one chosen by a classmate. How are the characters similar? How are they different? (RL.5.2, RL.5.3)

**Informational Text Graphic Organizer**

As a class, we will keep a chart about the creative and inventive people we have read about; the chart will include the following information:

* + - Name of your person
    - Where he/she lived
    - When he/she lived
    - What did he/she do that made him/her famous?
    - What are some additional facts you found interesting?
    - What adjectives would you use to describe this person? Why?

Your teacher may ask you to write your own responses on a Post-It note, on a white board, or in your journal and share it with a partner before each section of the class chart is filled in. Be sure to include page numbers and the title of the book so you can refer back to the text if needed. (RI.5.4, RL.5.9)

**Class Discussion**

What are the common characteristics of the creative/inventive thinkers we have studied? How would we define creative/inventive thinkers? (SL.5.1a, b, RI.5.9)

**Class Discussion**

Read and compare what you learn about Leonardo da Vinci from fiction and nonfiction text (e.g., *Leonardo the Beautiful Dreamer* by Robert Byrd and *The Usborne Book of Inventors from DaVinci to Biro* by Struan Reid, Patricia Fara, and Ross Watton). How does knowing the historical information enhance your understanding of the fictional story? (RL.5.9, SL.5.1a, b, c, d)

**Research Project/Multimedia Presentation**

Using the internet, biographies, and an encyclopedia, read all you can about an inventor, either one we’ve read about together or another of interest (such as Christiaan Huygens, the inventor of the pendulum clock). As a class, we will create a [timeline](http://www.readwritethink.org/classroom-resources/student-interactives/timeline-30007.html) of the inventors we’ve studied in order to understand where each inventor “lived” chronologically in history. Finally, write a short informative/explanatory piece about an inventor of choice that answers the question “How do innovators and inventors build on what has come before them?” Publish it and present it in a multimedia format to the class, or create a podcast and upload it to the class webpage. (RI.5.2, RI.5.9, RI.5.3, W.5.2a, b, c, d, e, RF.5.4b)

**Journal Writing**

Inventors are creative people who turn their ideas into reality. Leonardo da Vinci is one of many famous inventors who kept notebooks of ideas. Look at one of his original notebooks [here](http://www.bl.uk/collections/treasures/leonardo/leonardo_broadband.htm?middle). Start a section of your writing journal for ideas. What ideas for inventions do *you* have? Create lists and draw and label pictures. Share your ideas with a classmate to strengthen your ideas. (W.5.9b, W.5.5)

**Word Study**

As an individual and as a class, keep an index card file of words studied (e.g., Renaissance, inventiveness, inventor, innovation, creativity, creation, etc.). Keeping the words on index cards will help you when we sort words by prefix, suffix, root words, meaning, spelling feature, etc. How do the root words help us understand the meaning of the words? (Note: This will be an ongoing activity all year long.) You may also be asked to work in groups to create [semantic maps](http://chs.smuhsd.org/learning_community/content_literacy/semantic_word_map.html) of the words “creativity” and “innovation” in order to explore your understanding of these words. (RI.5.6, L.5.4a)

**Listening/Musical Appreciation**

Listen to music from the Renaissance (see Art, Music, and Media). How does this music reflect the time period in which it was written? How is it similar to and different from music you listen to today? Discuss as a class. (SL.5.1a, b)

**Role Playing/Artistic Appreciation**

To help you appreciate how difficult it was for Michelangelo to paint the Sistine Chapel ceiling, tape paper under your desk and then draw a detailed picture for thirty minutes without stopping. After thirty minutes, switch from pencil to paint. With your classmates, discuss the experience, and how it helps you to appreciate the work that went into creating the Sistine Chapel ceiling. Finally, write in your journal about what it must have been like to tackle a project that took years for Michelangelo to complete in difficult conditions. (SL.5.1a, b, W.5.1a, b, c, d, e, f)

**Class Discussion**

Usually pictures enhance a story, but sometimes pictures are *part* of the story, such as in *The Invention of Hugo Cabret* by Brian Selznick. How do pictures tell a story? Justify your answer by citing specific pages from the text during class discussion. (SL.5.1a, b, c, d, SL.5.5)

**Reflective Essay**

Write an essay response to the essential question  (“How has inventive thinking, as revealed in fiction and nonfiction, changed our world?”) Your teacher may give you the opportunity to “[Give one, get one](http://rrisdmathteam.wikispaces.com/Give+One+Get+One)” before writing your response. (W5.9.a, b, W.5.7, SL.5.4)

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**Additional Resources**

* + [Write a Gem of a Poem](http://www.readwritethink.org/parent-afterschool-resources/activities-projects/write-poem-30153.html) (ReadWriteThink) (RL.5.4, W.5.4)

Note: Students learn about diamante poems, consider the idea of cause and effect, and work it into the poem format.

[Great American Inventors: Using Nonfiction to Learn About Technology Inventions](http://www.readwritethink.org/classroom-resources/lesson-plans/great-american-inventors-using-957.html) (ReadWriteThink) (RI.5.9)

Note: Students use technology every day, but do they ever stop and wonder about the inventors who made certain technology possible? This lesson encourages students to investigate three American inventors (Alexander Graham Bell, George Washington Carver, and Stephanie Kwolek) through research and readings of their biographies.

[Research Building Blocks: “Organize This!”](http://www.readwritethink.org/classroom-resources/lesson-plans/research-building-blocks-organize-179.html) (ReadWriteThink) (RI.5.9)

Note: Research skills can help students find answers for themselves. In this mini-lesson, students organize the information they have compiled through the research process by using sentence strips.

[Research Building Blocks: Skim, Scan, and Scroll](http://www.readwritethink.org/classroom-resources/lesson-plans/research-building-blocks-skim-155.html) (ReadWriteThink) (RI.5.9)

Note: Research skills can help students find answers for themselves. This lesson teaches students the skill of "Skim, Scan, and Scroll," which is taken from a research-skills unit and is one step of successfully completing a written research report.

[FamousInventors: A to Z](http://inventors.about.com/od/astartinventors/a/Famous_Inventor.htm) (About.Com)

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**Terminology**

* + - bibliography
    - character development
    - fiction
    - nonfiction
    - paraphrase
    - primary source documents
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**Making Interdisciplinary Connections**

* + **This unit teaches:**
    - **Science**
      * Inventors through various time periods (e.g., Galileo and his contributions to astronomy; Thomas Edison and his contributions to telecommunications, electricity, sound recording.; Benjamin Banneker and his contributions to astronomy and mathematics)
      * A study of “how things work” (e.g., similar to the information in the book by David Macaulay)
    - **History/ geography**
      * The Renaissance (e.g., a “rebirth” of ideas; patrons of the arts and learning; Leonardo da Vinci and Michelangelo)
      * The Reformation (e.g., Gutenberg; Ptolemaic [earth-centered] vs. sun-centered models of the universe)

**This unit could be extended to teach:**

* + - **Science**
      * The Scientific Method
      * Force and motion (e.g., [simple machines](http://edtech.kennesaw.edu/web/simmach.html), etc.)
      * Astronomy (e.g., constellations, moon phases, etc.)
    - **Art**
      * Further study of Renaissance art

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