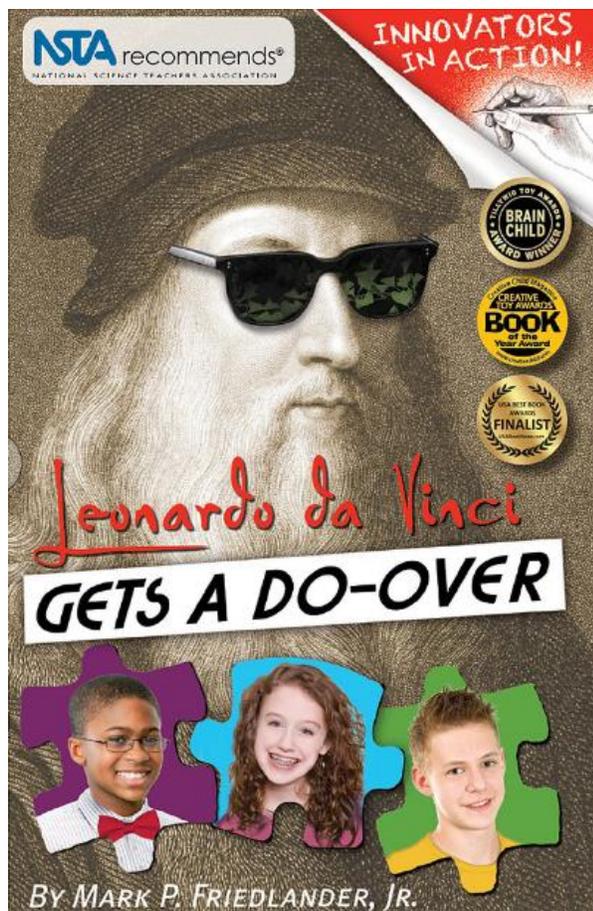


Innovators in Action: *Leonardo da Vinci Gets a Do-Over*

By Mark P. Friedlander
Published by Science Naturally, 2014
ISBN: 978-0-9678020-6-0
Ages 10-14 | Grades 5-9



After being dead for nearly 500 years, the great Renaissance master Leonardo da Vinci is back! Readers tag along as 7th graders Max, Tad, and Gina become the reincarnated da Vinci's ambassadors of the modern age—and learn about history, art, anatomy, and STEM topics along the way. Inventive and fast-paced, this story is as engaging as it is educational.

This book asks questions that will help develop some content science literacy. It is articulated to the standards noted here. The questions should encourage children to ask more questions and seek more explanations.

The free downloadable [Teacher's Guide](#) works through the book chapter-by-chapter to extend the its educational content and expand opportunities for learning.

Articulated to the **Next Generation Science Standards** and **Common Core State Standards**

Science curriculum standards were identified by Joan Wagner.

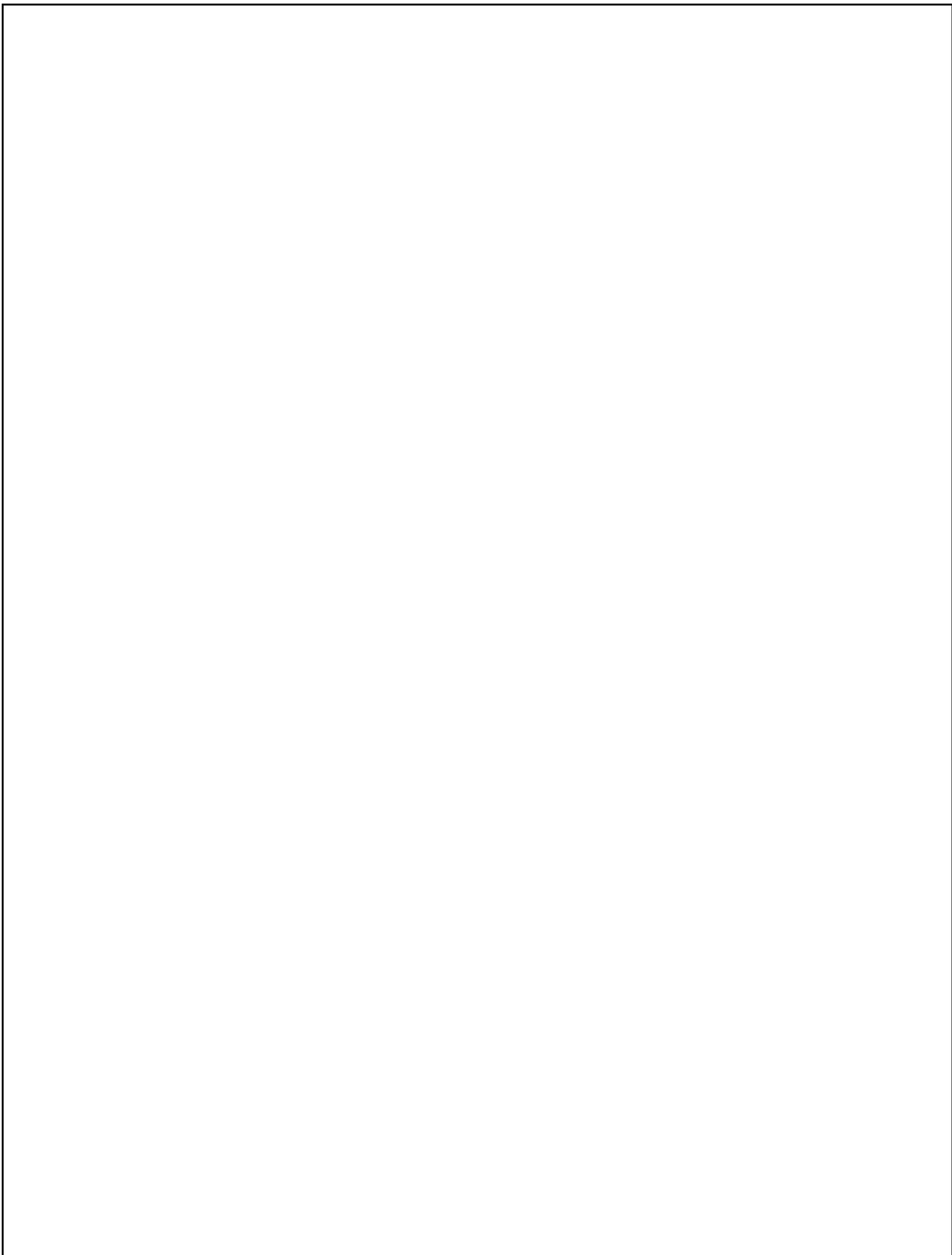
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Summary and Articulation of the Next Generation Science Standards

MS-LS1: From Molecules to Organisms: Structures and Processes

- In multi-cellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.
- Animals engage in characteristic behaviors that increase the odds of reproduction.
- Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction.

MS-LS2: Ecosystems: Interactions, Energy, and Dynamics

- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.
- Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling.
- Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.

MS-LS4: Biological Evolution: Unity and Diversity

- Natural selection leads to the predominance of certain traits in a population, and the suppression of others.

MS-ESS3: Earth and Human Activity

- All human activity draws on both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.

MS-ESS1: Earth's Place in the Universe

- Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.
- The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.
- Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.
- Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.

MS-PS1: Matter and Its Interactions

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.
- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.
- The term “heat” as used in everyday language refers both to thermal motion (the motion of atoms or molecules within a substance) and radiation (particularly infrared and light). In science, heat is used only for this second meaning; it refers to energy transferred when two objects or systems are at different temperatures.
- Temperature is not a measure of energy; the relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present.

MS-PS2: Motion and Stability: Forces and Interactions

- For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton’s third law).
- Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun.
- Forces that act at a distance (electric and magnetic) can be explained by fields that extend through space and can be mapped by their effect on a test object (a ball, a charged object, or a magnet, respectively).

MS-PS4: Waves and Their Applications in Technologies for Information Transfer

- A sound wave needs a medium through which it is transmitted.
- The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends.

Science and Engineering Practices

- Asking questions and defining problems.
- Planning and carrying out investigations.

Note: this book also strongly supports the Language Arts and Science component of the Common Core State Standards/Reading for Science.

Common Core State Standard Connections

NGSS Crosscutting Concepts for Middle School in Science:

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
- RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- RTS.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculations in a text.
- RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading the text on the same topic.

NGSS Crosscutting Concepts for Middle School Social Studies:

- WHST.6-8.1 Write arguments focused on discipline-specific content.
- WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; quote or paraphrase the data and conclusions of others while avoiding plagiarism.
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

NGSS Crosscutting Concepts for Middle School Math:

- 6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
- 6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.
- 7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about quantities.
- 7.RP.A.2 Recognize and represent proportional relationships between quantities.
- 8.EE.A.3 Distinguish among facts, reasoned judgment based on research findings, and speculations in a text.

English Language Arts Standards » History/Social Studies » Grade 6-8

- Key Ideas and Details: CCSS.ELA-LITERACY.RH.6-8.1:
Cite specific textual evidence to support analysis of primary and secondary sources.
- Craft and Structure: CCSS.ELA-LITERACY.RH.6-8.4:
Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.
- CCSS.ELA-LITERACY.RH.6-8.5:
Describe how a text presents information (e.g., sequentially, comparatively, causally).
- CCSS.ELA-LITERACY.RH.6-8.6:
Identify aspects of a text that reveal an author's point of view or purpose (e.g., loaded language, inclusion or avoidance of particular facts).
- Integration of
Knowledge and Ideas: CCSS.ELA-LITERACY.RH.6-8.8:
Distinguish among fact, opinion, and reasoned judgment in a text.
- CCSS.ELA-LITERACY.RH.6-8.9:
Analyze the relationship between a primary and secondary source on the same topic.

NGSS Crosscutting Concepts for Middle School Language Arts:

- [RI.8.8](#) Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.
- [SL.8.1](#) Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
- [SL.8.4](#) Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
- [SL.8.5](#) Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.