Instructor's Guide Quick Start

The BookShark™ Instructor's Guide (IG) is designed to make your educational experience as easy as possible. We have carefully organized the materials to help you and your children get the most out of the subjects covered. If you need help reading your schedule, see "How to Use the Schedule" in **Section Four**.

This IG includes a 36-week schedule, notes, assignments, readings, and other educational activities. See **Section Three** for specific organizational tips, topics and skills addressed, the timeline figure schedule, and other suggestions for the parent/teacher. Here are some helpful features that you can expect from your IG.

Easy to use
Everything you need is located right after the schedule each week. If a note appears about a concept in a book, it's easy to find it right after the schedule based on the day the relevant reading is scheduled.

Maps
Colorful map answer keys, which double as bookmarks, will help you easily find relevant map locations. You will find the coordinates and the location name in your notes.

4-Day Schedule
Designed to save one day a week for music lessons, sports, field trips, co-ops or other extra-curricular activities.

To Discuss After You Read
These sections help you hone in on the basics of a book so you can easily know if your children comprehend the material.

Vocabulary
This section includes terms related to cultural literacy and general vocabulary words in one easy-to-find place.

Notes
When relevant, you'll find notes about specific books to help you know why we've selected a particular resource and what we hope your children will learn from reading it. Keep an eye on these notes to also provide you with insights on more difficult concepts or content (look for "Note to Mom or Dad").
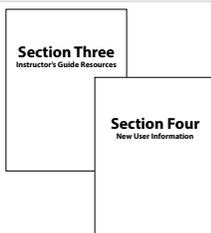
Instructor's Guide Resources and New User Information
Don't forget to familiarize yourself with some of the great helps in **Section Three** and **Section Four** so you'll know what's there and can turn to it when needed.

How to Use the Schedule

More notes with important information about specific books.

The ☒ symbol provides you with a heads-up about difficult content. We tell you what to expect and often suggest how to talk about it with your kids.

4-Day Schedule:

This entire schedule is for a 4-Day program. We provide a blank cell on Day 5 to allow for your own activities and topics that you would like to teach your children.

Write in the week's date for your records.

The ◷ symbol indicates there is a timeline suggestion in the notes for that day.

The ◉ symbol indicates you will find a map assignment in the notes for that day.

The ◷⸸ symbol indicates there is a figure for you to place on the timeline.

Use the extra rows to schedule additional assignments or activities.

Additional space for your record keeping.

HISTORY E		WEEK 1			SCHEDULE
Date:	Day 1 ₁	Day 2 ₂	Day 3 ₃	Day 4 ₄	Day 5 ₅
History/Geography					
William Wilberfoce	chaps. 1–2	chaps. 3–4 ☒	chaps. 5–6 ◷⸸	chaps. 7–8	
Wee Sing America	(re-)learn "The Star Spangled Banner" pp. 8–9.				
Readers					
By the Great Horn Spoon!	chap. 1 ◷◉	chaps. 2–3 ◉	chaps. 4–5 ◉	chap. 6–mid p. 76 ◉	
Read-Alouds					
Moccasin Trail	chap. 1 ◉	chap. 2 ◉	chap. 3 ◉	chap. 4 ◉	
Oxford Illustrated Book of American Children's Poems		p. 8		p. 9	
Electives					
Other Notes					

☒ Special Note to Mom or Dad   ◉ Map Point   ◷⸸ Timeline Figure   ◷ Timeline Suggestion

Date:	Day 1 ₁	Day 2 ₂	Day 3 ₃	Day 4 ₄	Day 5 ₅
History/Geography					
The Story of Science: Aristotle Leads the Way	chap. 1 🕐 🌐	chap. 2 🌐	chap. 3 pp. 20–28 (mid-page) 🕐 🌐	chap. 3 pp. 28–33 🕐 🌐	
String, Straightedge, and Shadow	Prologue	chap. 1	chap. 2	chap. 3	
Current Events	Use the following box to record when you have completed the activity. **Sixth Grade:** one report; at least one of international concern every other week. **Seventh Grade:** two reports; at least one of international concern. **Eighth & Ninth Grade:** three reports; at least two of international concern.				

Other Notes

Day 1

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 1

To Discuss After You Read

1. What was the difference between the ancient Sumerian and Egyptian calendars? What inspired the difference? ➡

Timeline and Map Activities

🕐 **Sumerian civilization (ca. 3000 BCE)**
🕐 **Ziggurat of Ur (ca. 2100 BCE)**
🕐 **Babylonian Empire (1750–539 BCE)**

🕐 **Assyrian Empire (950–612 BCE)**
🌐 *Iraq (Mesopotamia); Egypt* (use the map on page 5 in your book)

String, Straightedge, and Shadow | Prologue

To Discuss After You Read

The author mentions "the huge telescope at Mount Palomar." This 200 inch diameter Hale telescope is the earliest of its kind, though in the years since this book was published, the world has 18 telescopes larger in size, including single mirrors 323" in diameter, and segmented mirrors up to 409".

2. Where does the word "geometry" come from? ➡

3. What three tools did the ancient people use to make mathematical discoveries? ➡

N Special Note to Mom or Dad   🌐 Map Point   🕐 Timeline Suggestion

Current Events | Two to three reports

A Rationale for Studying Current Events

Why study current events? There are many reasons. One is to help students become familiar with the names and events that are in the news. When kids become familiar with these names and events, they are better able in the future to read articles about the same people or the same or related events.

Another reason: by reading news from other parts of the world, we get to see our local situation in a broader context. It's similar to what we gain by studying history. We see, for instance, that we are not alone in some of our experiences: "We don't have it so bad." Finally, a study of current events—as a study of history in general—can give us the opportunity to learn from other people's mistakes.

Imagine. Are you likely to go someplace you've never heard of? Hardly! Nor are you likely to try a new idea if you've never heard of anyone else doing the same thing before.

By becoming informed about other people in other places, we broaden our horizons and open our minds to all manner of options we would otherwise never consider.

Parents: How to "Teach" (or Learn!) Current Events

If your students are unfamiliar with key people, dates, events, and terms, read together! Browse through a current news magazine together; choose an appropriate-looking article, then start reading. *If it helps, read the article out loud*. There should be no shame in this. If our students need our help, then we should give it to them. By helping them now, we reduce the need for us to help them later.

As you read, ask your students if they understand what the author is talking about. If you come across an uncommon or unfamiliar term, explain it or look it up. Try to give your students whatever historical, cultural, and other background you can. In addition, talk about what appear to be parallel situations with which they might be familiar from their studies of history or other cultures.

This process may be rather slow at the start, but it will enable your students to understand what they would have otherwise never understood. It will give them a wealth of information they would otherwise know nothing about.

After you finish reading, have your students try to summarize what you just read. We have found that the best time to hold current event discussions is either over the dinner table or, for older students, during your daily student-teacher time.

Note to Student or Parent: Though you may make these written assignments, it is not *our* expectation that you or your students will be required to write these reports. We recommend *oral* presentations only.

Seventh Grade: Two reports; at least one of international concern.

Eighth and Ninth Grade: Three reports; at least two of international concern.

Day 2

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 2

To Discuss After You Read

4. How is science different from myth? How did myths help form science? ➡

5. What is a hypothesis? ➡

6. When does a hypothesis become a theory? ➡

7. What do you need to be a scientific thinker? ➡

8. What two questions have scientists asked from the beginning? ➡

9. How do numbers and math intersect with science? ➡

10. What does it mean that "It's the average pattern of a large sample of roses or sunflowers or elephant tusks that is predictable. You can never be sure how any single one may turn out"? ➡

Timeline and Map Activities
- 🌐 *Egypt, India, China* (map 2)
- 🌐 *Greece, Peru* (map 3)

String, Straightedge, and Shadow | Chapter 1

To Discuss After You Read

11. Summarize this chapter. ➡

Current Events | Two to three reports

Day 3

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 3, pp. 20–28 (mid page)

To Discuss After You Read

12. What makes the seasons? ➡

13. What fixed event helped the Egyptians determine the length of a solar year? ➡

14. What is the summer solstice? The winter solstice? ➡

15. What are equinoxes? ➡

16. What is the analemma? ➡

17. Why does the moon dazzle and disappear? ➡

Timeline and Map Activities

🕐 **Emperor Yao (ca. 2357 BCE)**

🌐 *Mesopotamia, Egypt* (use the map located on page 5 in the book)

🌐 *Swaziland, China* (map 2)

String, Straightedge, and Shadow | Chapter 2

Today, the proper descriptor is no longer "Primitive people" (p. 16). Wikipedia explains:

> In older anthropology texts and discussions, the term "primitive culture" refers to a society believed to lack cultural, technological, or economic sophistication or development. For instance, a culture that lacks a written language might be considered less culturally sophisticated than cultures with writing systems; or a hunter-gatherer society might be considered less developed than an industrial capitalist society. While becoming less politically correct, some Western authors, such as anthropologists and historians, used it to describe pre-industrial indigenous cultures. Historically, assigning "primitive" to other people has been used to justify conquering them

To Discuss After You Read

18. Summarize this chapter. ➡

Current Events | Two to three reports

Day 4

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 3, pp. 28–33

Vocabulary

Vocabulary

Rationale: Knowing definitions is critical to understanding. That's why we've included important vocabulary terms in your Guide. More common terms that you may not know are listed first, followed by, where applicable, cultural literacy terms that provide depth to stories but may not be commonly known. Read the vocabulary sections aloud with your Mom or Dad. See if you can determine the meanings of the **bold italic** words. Or look up the definitions as you read through your assignments. We provide the answers in the Parent Guide.

waft: to pass smoothly through the air or over water.

To Discuss After You Read

19. How does clock time and calendar time differ? [p. 29] ➡

20. Who came up with a 24-hour day? ➡

21. Where did the seven day week come from? [p. 30] ➡

22. Is time absolute or relative? ➡

23. What is the difference between arithmetic and geometry? [p. 32] ➡

Timeline and Map Activities

🕐 **Palenque astronomical center (600–800 CE)**

🕐 **Stonehenge (ca. 3000–1500 BCE)**

🌐 *Palenque, Mexico* (map 3)

🌐 *Stonehenge, England* (map 1)

🌐 *Babylon, Mesopotamia* (use the map located on page 5 in the book)

🌐 *India* (map 2)

String, Straightedge, and Shadow | Chapter 3

To Discuss After You Read

24. In what two ways did the Stone Age men use geometry? ➡

25. What was probably the first geometric form to be admired? ➡

26. How were the first circles probably made? ➡

Current Events | Two to three reports ■

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HISTORY J		WEEK 2			SCHEDULE
Date:	**Day 1** 6	**Day 2** 7	**Day 3** 8	**Day 4** 9	**Day 5** 10
History/Geography					
The Story of Science: Aristotle Leads the Way	chap. 4 🕑 🌍	chap. 5 🕑 🌍	chap. 6 🕑 🌍	chap. 7 🕑 🌍	
String, Straightedge, and Shadow	chap. 4 🌍	chap. 5 🕑	chap. 6 🕑 🌍	chap. 7 🕑 🌍	
Current Events	**Seventh Grade:** two reports; at least one of international concern. **Eighth & Ninth Grade:** three reports; at least two of international concern.				

Other Notes

Day 1

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 4

To Discuss After You Read

1. Why is Thales noteworthy? [p. 36] ➡

2. How could Thales easily measure the height of a pyramid? ➡

3. What is an axiom? ➡

4. Why is Thales seen as one of the founders of "Western civilization"? ➡

5. Thales thought that all things in nature are made of water. Although that isn't correct, why was that hypothesis interesting? [p. 40] ➡

6. Thales wondered if the earth floats on water. Was he correct in that hypothesis? ➡

7. Are most ratios constant? ➡

N Special Note to Mom or Dad   🌍 Map Point   🕑 Timeline Suggestion

- ☐ **Thales, the founder of Geometry (ca. 624–546 BCE)**
- ☐ *Aegean Sea, Ionia* (see the map on page 35 of the book)

String, Straightedge, and Shadow | Chapter 4

To Discuss After You Read

8. How did early mathematicians use shadows? ➡

Timeline and Map Activities
- ☐ *Nile, Tigris, Euphrates River valleys* (use the map on page 122 of *The Story of Science* book)

Current Events | Two to three reports

Day 2

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 5

To Discuss After You Read

9. What were some of Anaximander's new ideas? ➡

10. What were some of Anaximenes's new ideas? ➡

11. Why is Anaxagoras important beyond his scientific ideas? ➡

12. Who were Pericles, Euripides, and Socrates? ➡

13. What does it mean that "reason rules the world"? ➡

14. What were some of Anaxagoras's new ideas? ➡

15. What are meteors? ➡

16. Why is base 60 a reasonable way to use numbers? ➡

Timeline and Map Activities
- ☐ **Anaximander (ca. 611–547 BCE)**
- ☐ **Anaximenes (ca. 570–500 BCE)**
- ☐ **Anaxagoras (ca. 500–428 BCE)**
- ☐ *Athens, Greece* (map 1)

String, Straightedge, and Shadow | Chapter 5

To Discuss After You Read

17. What did rope-stretchers do? ➡

18. What does "3-4-5" have to do with swift surveying? ➡

19. How did the rope stretchers determine whether the canals were dimensionally sound? ➡

20. How could rope-stretchers determine length? ➡

- ☐ **Pyramid at Saqqara—oldest man-made structure (2730 BCE)**
- ☐ **Jarmo, Syria—oldest known village (5000 BCE)**

Current Events | Two to three reports

Day 3

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 6

To Discuss After You Read

21. Empedocles believed there were four elements that made up the world, and two forces. What were they? ➡

22. What are the four states of matter? ➡

Wikipedia offers a brief introduction to plasma:

> A plasma can be created by heating a gas or subjecting it to a strong electromagnetic field applied with a laser or microwave generator. This decreases or increases the number of electrons, creating positive or negative charged particles called ions, and is accompanied by the dissociation of molecular bonds, if present.
>
> The presence of a significant number of charge carriers makes plasma electrically conductive so that it responds strongly to electromagnetic fields. Like gas, plasma does not have a definite shape or a definite volume unless enclosed in a container. Unlike gas, under the influence of a magnetic field, it may form structures such as filaments, beams and double layers.
>
> Plasma is the most abundant form of ordinary matter in the Universe (the only matter known to exist for sure, the more abundant dark matter is hypothetical and may or may not be explained by ordinary matter), most of which is in the rarefied intergalactic regions, particularly the intracluster medium, and in stars, including the Sun. A common form of plasmas on Earth is seen in neon signs.

23. Rewrite Empedocles' paragraph on p. 57. ➡

24. Empedocles' statement was the first (as far as we know) to declare what? [p.57] ➡

Timeline and Map Activities
- ☐ **Empedocles (ca. 495–435 BCE)**
- ☐ *Athens, Greece* (use the map on page 59 of the book)

String, Straightedge, and Shadow | Chapter 6

To Discuss After You Read

25. Why were the stars important for the people of Mesopotamia? ➡

26. How did the stargazers measure an angle? [p. 51] ➡

  "East" is where the sun rises on the spring and fall equinoxes. Directions are angles from that point.

27. Besides astronomy, what two other inventions did the Mesopotamians leave us? ➡

28. What modern everyday item has come to us from the Babylonian astronomers' discovery? ➡

Timeline and Map Activities

🕐 **More than 300 years of astronomical observations begins (747 BCE)**

Current Events | Two to three reports

Day 4

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 7

To Discuss After You Read

29. Are the skies the same in the northern and southern hemispheres? ➡

30. What was the Phoenicians' greatest contribution to the world? ➡

31. What two unlike things did Pytheas connect? ➡

32. Has Polaris always been the North Star? ➡

Timeline and Map Activities

🕐 **Herodotus the first historian (ca. 484–425 BCE)**
🌐 *Greece, Phoenicia (Lebanon), Carthage* (use the map on page 59 of the book)

String, Straightedge, and Shadow | Chapter 7

To Discuss After You Read

33. Besides the Ionian philosophers, what other famous people were living near Miletus in the 6th century BCE? [p.61] ➡

34. What new kind of thinking did the Greeks develop? ➡

Timeline and Map Activities

🕐 **Thales (ca. 624–546 BCE)**
🌐 *Ninevah, Babylon* (use the map on page 5 of *The Story of Science* book)
🌐 *Aegean Sea, Miletus, Greece* (use the map on page 35 of *The Story of Science* book)
🌐 *Black Sea* (use the map on page 59 of *The Story of Science* book)

Current Events | Two to three reports ■

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Date:	Day 1 11	Day 2 12	Day 3 13	Day 4 14	Day 5 15
History/Geography					
The Story of Science: Aristotle Leads the Way	chap. 8 🕐 🌐	chap. 9 pp. 72–81 🕐	chap. 9 pp. 82–85	chap.10 & pp. 92–93 🕐 🌐	
String, Straightedge, and Shadow	chap. 8 🌐	chap. 9 🌐	chap. 10 pp. 70–85	chap. 10 pp. 86–91	
Current Events	**Seventh Grade:** two reports; at least one of international concern. **Eighth & Ninth Grade:** three reports; at least two of international concern.				

Other Notes

Day 1

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 8

To Discuss After You Read

1. How did the Babylonians use numbers? ➡

2. How did the Egyptians use numbers? ➡

3. Explain the difference between concrete and abstract math. ➡

4. Who was Pythagoras? ➡

5. Worldwide, who else lived concurrently with Pythagoras? ➡

6. What is pi? ➡

Timeline and Map Activities

🕐 **Pythagoras, the world's first great mathematician (ca. 582–507 BCE)**
🌐 *Samos* (use the map on page 35 of the book)
🌐 *Delphi* (use the map on page 65 of the book)

String, Straightedge, and Shadow | Chapter 8

To Discuss After You Read

7. What were some of the things Thales learned about? ➡

Ⓝ Special Note to Mom or Dad   🌐 Map Point   🕐 Timeline Suggestion

8. How did Thales earn money quickly? ➡

9. What story does Aesop tell about Thales? ➡

10. What did Thales learn in his travels? ➡

Timeline and Map Activities

🌐 *Mesopotamia, Egypt* (use the map on page 5 of *The Story of Science* book)

Current Events | Two to three reports

Day 2

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 9, pp. 72–81

To Discuss After You Read

11. What is the difference between an Ionian thinker and Pythagoras? ➡

12. Why were numbers important for Pythagoras? ➡

13. What is an irrational number? ➡

14. How did Pythagoras affect our understanding of sound? ➡

15. What is the Pythagorean Theorem? ➡

16. What were some of Pythagoras's other breakthroughs? ➡

Timeline and Map Activities

🕐 **Great Pyramids built (ca. 2550 BCE)**

String, Straightedge, and Shadow | Chapter 9

To Discuss After You Read

17. How did Thales astound the Egyptians? ➡

18. What did Thales notice about shadows? ➡

Timeline and Map Activities

🌐 *Giza, Egypt* (map 2)

Current Events | Two to three reports

Day 3

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 9, pp. 82–85

To Discuss After You Read

19. Is *one-third* an irrational number? ➡

20. Do irrational numbers have a place on a number line? ➡

21. What is phi? Why is it significant? ➡

Visit our IG links page for a link to a YouTube movie by Vi Hart, that goes further into pineapple and pinecone structure 💻. Or look up "Doodling in Math: Spirals, Fibonacci, and Being a Plant."

String, Straightedge, and Shadow | Chapter 10, pp. 70–85

To Discuss After You Read

22. Whether Thales actually predicted the solar eclipse or not, why was the experience significant? ➡

23. How was Thales' thinking different from what the Babylonians and Egyptians had done before? ➡

Current Events | Two to three reports

Day 4

History & Geography

The Story of Science: Aristotle Leads the Way | Chapter 10 & pp. 92–93

To Discuss After You Read

24. Did Democritus agree with the idea that the four basic elements were the basis of all things? ➡

25. What did Leucippus teach about atoms? ➡

26. What is the difference between fission and fusion? ➡

27. Why did science stall after Democritus? ➡

Timeline and Map Activities

🕐 **Democritus proposes atoms as basic units (ca. 460–370 BCE)**

🌐 *Thrace* (use the map on page 87 of the book)

String, Straightedge, and Shadow | Chapter 10, pp. 86–91

To Discuss After You Read

28. How could you sum up Thales' contribution to world understanding? ➡

Current Events | Two to three reports ■

History J—Scope and Sequence: Schedule for Topics and Skills

Week	History/Social Studies	Geography	Biography
1	Ancient Sumerians, Ancient Egyptians, Ancient Civilizations; Science, and the beginnings of Mathematical thought; Space and lunar observations; clocks and time; the Stone Age	*Iraq; Egypt; Mesopotamia; India; China; Greece; Peru*	
2	Thales and Geometry; Pericles, Euripides, and Socrates; astronomical observations; Babylonians; Greeks and rational thought	*Athens; Ionia; Aegean Sea*	Thales; Anaximander; Anaximenes; Anaxagoras; Empedocles; Herodotus; Aesop
3	Numbers; Abstract and Concrete Math; Pythagoras/Pythagorean Theorem; Irrational numbers; phi; Democritus	*Mesopotamia; Giza, Egypt; Thrace*	Pythagoras; Democritus; Thales
4	Perfect numbers; Principles of logic; regular solids	*Athens; Samos; Italy; Alexandria*	Plato; Aristotle; Socrates; Alexander the Great; Artistarchus
5	Hero and the area of a triangle; mechanical ingenuity in Alexandria; Euclid and division; geometry; Archimedes and inventions	*Alexandria; Cairo; Carthage; Rome*	Hero; Eudoxus; Euclid; Apollonius; Archimedes; Eratosthenes
6	Mathematics and logical thought; Roman Architecture; Earth proportions and scale; Astronomy; star classification; Trigonometry; map-making; Mechanics/Force/Work	*Alexandria; Syracuse; Sicily; Rome; Rhodes*	Julius Caesar; Augustus Caesar; Archimedes; Hipparchus; Eudoxus; Ptolemy
7	Fall of Rome; gravity and specific gravity; Middle Ages; Astronomers and mapmakers in China; Math and Astronomy around the globe; Fibonacci sequence and the Golden Ratio/Pi	*Hippo; Cordoba, Spain; Poland; Hungary; Pisa, Italy; India; Iraq; Morocco; Zanzibar*	Augustine; Kublai Khan; Adelard of Bath; Pope Sylvester II; Aryabhata
8	Renaissance; moveable type and the printing press; plane and solid figures; theories and proofs/explorations and methods of discovery	*Paris; Naples; Seville, Spain; Philippines; Rome; Carthage; Samarkland; Syracuse*	Thomas Aquinas; Roger Bacon; Johannes Gutenberg; Vasco Nunez de Balboa; Ferdinand Magellan
9	Scientific Revolution; the Hundred Years' War; Fall of Constantinople; Thirty Years War; England's Civil War; the Plague	*Constantinople; Holland; Florence; Rome; Italy*	Leonardo da Vinci; Nicholaus Copernicus
10	London's Great Fire; the rotation of the Earth and its three motions; Greek's abstract mathematics; supernovas; Newton	*London; Copenhagen Sweden; Prague*	Johannes Kepler; Tycho Brache; Martin Luther; Vesalius
11	The 'Advancement of Experiments;' mathematics and motion; friction/inertia; Galileo's Principle of Relativity	*Pisa*	Galileo Galilei; Giordano Bruno; Christopher Marlowe; William Shakespeare; Christiaan Huygens; Galen of Pergamon
12	Telescopes and microscopes; nature and mathematics; the study of light and vision		Hans Lippershey; Antonie van Leeuwenhoek; Robert Hooke
13	Light and travel; Newton's Laws; mathematical proof; Calculus	*Holland; Sweden*	Rene Descartes; Isaac Newton
14	Spectroscopy; planetary orbit; cycles of eclipses; invention of the pendulum clock; time and the world; projectile motion	*Holland; Copenhagen*	Robert Hooke; Edmond Hailey; Olaus Christensen Huygens; John Harrison; Isaac Newton

Week	History/Social Studies	Geography	Biography
15	Advancements in Chemistry; element discoveries; the ideas behind 'Infinity'; Boyle's Law; Barometers; mathematics and probability; gas and kinetics; atoms and molecules; conservation law	*Vienna; Rhodes; Poland; Hamburg, Germany; Ireland; Belgium; Switzerland; Geneva; Netherlands; Russia*	Jabir ibn Hayyan; Albertus Magnus; Johann Friedrich Bottger; Franz Deleboe; Hennig Brandt; Robert Boyle; Blaise Pascal; Evangelista Torricelli; Daniel Bernoulli
16	Mathematics and Physics; Element discoveries; Fahrenheit and Celsius; average density of the Earth; instantaneous speed; Galileo's law of falling bodies	*France; Scotland; Poland; Holland*	Emilie du Chatelet; Voltaire; John Locke; Louis XIV; John Bunyan; Joseph Black; Henry Cavendish; Karle Scheele; Joseph Priestley; Daniel Fahrenheit; Anders Celsius; James Watt; Antoine-Laurent; Lavoisier
17	French Revolution and Lavoisier; systems of chemical nomenclature; meteorology, atoms, bonding and Law of Definite Proportions; Avogradro's number	*England*	William Herschel; Baruch Spinoza; Napoleon Bonaparte; John Dalton; Thomas Harriot; Amedeo Avogradro; Edward Frankland; Friedrich Kekule
18	Molecules and atomic masses/weights; *Principia*; the Periodic Table of Elements; Newton's theory of gravitation; static electricity/the study of electricity and movement	*Russia*	Dimitri Ivanovich Mendeleyev; Robert Bunsen; Niels Bohr; Benjamin Thompson; William Gilbert; Benjamin Frankin; Jean Theophilus Desaguliers
19	Longitude and latitude; Tropic of Cancer/Tropic of Capricorn; Longitude Act; kinds of electricity; Iodine; magnetic fields and gravitational fields; "the whole universe is tied through energy"; light waves and colors	*Rome; Copenhagen; Russia; Italy; London; Canary Islands; Madera Islands; Tropic of Cancer; Tropic of Capricorn; Jerusalem; Philadelphia; Scillies; Portugal; Carribean; Scotland*	Alessandro Volta; Humphry Davy; Hans Christian Oersted; Andre-Marie Ampere; Jeaen-Bernard-Leon-Foucault; William Sturgeon
20	Radio waves discovered; Longitude Act; molecules and the universal laws of physics; grandfather clocks; the definition of heat; basics of atomic theory; the definition of work, power, Joules, watts; kinetic and potential energy	*Austria; England; Portugal; West Indies;*	Heinrich Rudolf Hertz; Ludwig Boltzmann; John Harrison; James Joule; Charles Babbage; George Boole
21	Laws of thermodynamics; Harrison's H-4 watch; Kelvin Scale; probability	*Indonesia; Ireland; Newfoundland*	Julius Robert von Mayer; James Joule; William Thompson; James Cook
22	Nitroglycerine; the Nobel Peace Prize; x-rays; Harrison's watch and sea travel; Ockham's Razor; atoms	*Italy; Sweden*	Alfred Bernhard Nobel; Wilhelm Conrad Roentgen; Antoine-Henri Becquerel; Albert Michelson; Joseph John Thompson; Albert Einstein; William Gilbert

(continued on the following page)

History J—Scope and Sequence: Schedule for Topics and Skills

Week	History/Social Studies	Geography	Biography
23	Electromagnetism; Coulomb's Law; Morse code; Thomas Edison and Nikola Tesla; electrons and atoms and matter		Michael Faraday; Charles-Augustin de Coulomb; Samuel Morse; Thomas Edison; Nikola Tesla; Albert Abraham Michelson; Edward Williams Morley; J.J. Thompson; Hermann von Helmholtz; William Crookes; Robert Andrews Millikan
24	Thompson's model of the atom; Radium; alpha and beta rays; Marie Curie and pitchblende; cosmic radiation; speed of a wave; blackbodies; mathematical constants; Planck's equation; Einstein and atoms and molecules; Special Theory of Relativity	*Poland; France; Montreal;*	Marie Curie; Pierre Curie; Ernest Rutherford; Victor Hess; Max Planck
25	Photons and properties; Einstein and Brownian motion; Speed of Light	*Denmark; Norway*	Lord Rayleigh; Thomas Young; Robert Milikan; Satyendra Nath Bose; Robert Brown; Ernest Rutherford; Niels Bohr
26	Bohr's picture of an atom; electromagnetic energy; hydrogen nuclei; protons, electrons, and neutrons; quantum mechanics; light as a particle	*Germany; Ukraine; Russia; Norway*	James Chadwick; George Gamoff; James Franck; Arthur Compton; Louis-Victor de Brolie
27	The Uncertainty Principle; complementarity; matrix mechanics; Schrodinger's experiments; particles and antiparticles; the "atom smasher" and giant accelerators; neutrino; inert and reactive atoms; the formation of molecules; DNA uncovered		Werner Heisenberg; Max Born; Erwin Schrodinger; Ernest Solvay; Paul Adrien Marice Dirac; Enrico Fermi; Wolfgang Pauli; Linus Carl Pauling; Watson and Crick
28	Covalent bonding; World War II; uranium and production of energy; uranium bomb; critical mass; the Manhattan Project	*California; Norway; Canada; Hungary; Italy*	Gilbert Lewis; J. Robert Openheimer; Otto Hahn; Knut Haukelid; Leo Szilard; Edward Teller; Irene and Frederic Joliot-Curie; Enrico Fermi
29	Weak force; nuclear fusion and fission; nuclear power and weapons; heavy water; nuclear research	*Sweden; New Mexico; Norway; Russia*	Enrico Fermi; Fritz Strassman; Lise Meitner; Klaus Fuchs; Richard Feynman; Robert Serber; Edward Teller; Stanislaw Ulam
30	U-235; Plutonium; Quantum Electrodynamics; Law of Physics; relative motion; invariant motion; time and space		Richard Feynman; Paul Dirac; Julian Schwinger; Sin'ichiro Tomonaga; Freeman Dyson; Paul Tibbets; Theodore Hall
31	Distance = velocity x time; Lorentz transformations; further bomb testing in New Mexico; Hiroshima; fourth dimension; mass and motion; the nuclear arms race	*Germany; Switzerland; Czech Republic; Belgium; Hiroshima; New Mexico*	Hendrik Lorentz; Hermann Minkowski

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32	General relativity; psychophysics; spacetime; gravitation; metals and crystals; space and the Milky Way; the Doppler effect; redshift; Hubble telescope; communication	*Italy; Siberia; Brazil; Belgium; Ireland; Bosnia; Afghanistan*	Walther Nernst; Arthur Stanly Eddington; Edwin Powell Hubble; Harlow Shapley; Willem de Sitter; Annie J. Cannon; Aleksandr Friedmann; Georges Lemaitre; Christian Doppler
33	Galaxies and growth; stars; white dwarfs; concrete; pulsars; giant stars, neutron stars, massive stars, and black holes; space race	*California; India; Bulgaria;*	henrietta Leavitt; Subrahmanyan Chandrasekhar; Fritz Zwicky; Lev Landau; George Gamow; John Archibald Wheeler
34	Event horizons and black holes; gravitational and electro-magnetic waves; meteorites and space dust; four forces of the universe; the cosmic microwave background	*Belarus; Italy; Germany; Japan; Australia; Washington; Louisiana*	Stephen Hawking; Yakov Zel'dovich
35	Multiverse; the Theory of Everything; supernovas and repulsive force; diamonds, carbon fiber, and dense materials	*Czech Republic; Chile; Hawaii*	Alan Guth
36	Dark energy; ceramics and terra cotta; quantum information theory; NASA and space exploration	*Switzerland; Arizona; Michigan; Argentina; West Virginia;*	Claude Shannon; Carl Sagan