Science

Nature Notebook
Nature Walks & Scouting
Astronomy Lessons
Astronomy Labs

Alveary

Alveary

Alt. Science Options

Science: Astronomy

GRADE(S): 11-12

About the Course

This course includes the following topic(s): Astronomy Lessons, Astronomy Labs, Nature Notebook: Grades 9-12, Nature Walks & Scouting: Grades 9-12

About Nature Notebook: Grades 9-12
Outdoor work is established or continued as a lifelong habit. Optional resources are provided in science lessons and on the Alveary bookshelf.

About Nature Walks & Scouting: Grades 9-12
Outdoor work is established or continued as a lifelong habit. Optional resources are provided in science lessons and on the Alveary bookshelf.

About Astronomy Lessons
An elective in Earth Science, Astronomy is a fascinating topic in which learners explore celestial objects, history, and philosophy. Teachers wishing for explicit instruction on topics related to world view should include the optional Crossroads text.

About Astronomy Labs
Labs/fieldwork are an essential part of science in which students engage with the Things they are reading about and practice the scientific method.

Placement & Combining Tips

Nature Notebook: Grades 9-12
Learners may be combined and follow their own interests.

Nature Walks & Scouting: Grades 9-12
Learners may follow their own interests or follow the plan of their local scouting troop or natural history club.

Astronomy Lessons
Recommended for students in Grades 11-12, depending on math placement. Students should have completed Algebra 1 (Algebra 2 if taking Denison Success) and Geometry.

Scheduling

GRADE	SCHEDULE INFO.	BOOKS
9-12	Nature Notebook: Grades 9-12 1+ time/week 20 min+	
9-12	Nature Walks & Scouting: Grades 9-12 1 time/week 30 min+	
11-12	Astronomy Lessons 5 times/week 45 min	100 Things to See in the Night Sky The Last Stargazers Astronomy Textbook The Day Without Yesterday The Crossroads of Science and Faith: Answers to Exercises The Crossroads of Science and Faith: Astronomy Through a Christian Worldview
11-12	Astronomy Labs 1 time/week 60 min	

Sample Weekly View

Day 1	Day 2	Day 3	Day 4	Day 5
Science: Astronomy				
Astronomy Lessons Nature Walks & Scouting: Grades 9-12	Astronomy Lessons	Astronomy Lessons	Astronomy Lessons Nature Notebook: Grades 9-12	Astronomy Lessons Astronomy Labs

Planning & Prep

Permission to print for non-commercial use. See Alveary group use policy to use lessons in a group context.

LINKS: Click text or scan the QR code in the top corner of the lesson plan pages to view online resources associated with the lessons.

Responsibility for previewing all links rests with the teacher. All links were checked at the time of publication; however, websites change frequently and may contain objectionable content. Please report broken links by contacting us through our website.

Astronomy Lessons
☐ Carve out time to continue or establish the regular habit of spending time in nature, including the use of a nature journal, as appropriate.

☐ Obtain materials from the supply lists.

☐ Select a science book from the Alveary bookshelf for personal reading time, as appropriate.

☐ Bookmark or print Quick Links, as needed.

Books & Resources

For book rationales and purchase options, click the Book List link or scan the QR code below.
∞ View Book List Details

Science: Astronomy

Astronomy Lessons

100 Things to See in the Night Sky

The Last Stargazers


Astronomy Textbook


The Day Without Yesterday


The Crossroads of Science and Faith: Answers to Exercises


The Crossroads of Science and Faith: Astronomy Through a Christian Worldview

Supplies

For supply list details and basic supplies helpful to have on hand, click the links or scan the QR code below.
∞ View Basic Supplies

(No Subject Supplies Assigned)

Quick Links

Click THIS text or scan the QR code for links.

Science: Astronomy

Astronomy Lessons

- SkyView Lite for iOS
- SkyView Lite for Android
- Stellarium
- Hubble Space Telescope
- Webb Space Telescope
- Earth Sky
- Astronomy Picture of the Day
- Veritas Forum
- Galaxy Zoo
- Globe at Night
- Exoplanet Watch
- Space Math
- Alveary Bookshelf
- Crossroads Answer Key Part 1
- Crossroads Answer Key Part 2

Science: Astronomy

How To Approach

Introduce

• If starting a new book or a new topic in the book, then look at the title or a picture and take a moment to consider previous ideas and experiences.

• If continuing a previous reading, recap what was read previously. Often, the title of the book's section can help to draw out the main idea.

Read

• Read or do, as instructed in the lessons, making note of or flagging unfamiliar terms, interesting ideas, important dates, inspiring quotes, etc.

• Use supportive strategies and educational tools to reduce frustration and better engage the mind, as appropriate. These could include, but are not limited to, the use of eBooks, pictures, audio, read-aloud, buddy reading, colored reading strips, etc.

• As they read, learners record ideas in a notebook or binder using outlines, diagrams, graphic organizers, or other methods (or a combination of methods) that suit them. These recordings can be a helpful mechanism for remembering or a mini-narration to support understanding.

• If learners do not understand a word or concept, do not worry. Try reading over the passage again, studying a picture or diagram, connecting the idea to something from real life, or practicing chapter exercises. The lab/field work further supports major concepts from the text.

Narrate

• Process the ideas of the lesson by retelling, defining a concept, explaining the links in a chain of thought, etc. Do this orally or silently to yourself.

• Use words, pictures, outlines, etc.

• If a particular idea cannot be narrated, then read or examine the text again.

Discuss

• Consider with the teacher any thoughts, confusion, or concerns about the passage.

• If understanding is still uncertain, try rereading the passage or do some personal research on the topic.

Connect

• Follow any extra links, examine any sidebars in the text, or pursue additional reading, depending on student interest.

Science: Astronomy

How To Approach Labs

Introduce

• Regardless of how many days are required to complete a particular activity, every Science Lab has the same flow, which follows the scientific method.

• Relevant concept(s) are introduced in the text.

• Your notebook entry begins with the introductory/prelab narration, including relevant information that you have read or previously experienced, what you plan to do in the lab, and any hypothesis or anticipated result.

Lab Procedure

• Perform the procedure according to the instruction, recording in your notebook what you do as it happens. This can be a challenge, but is an extremely important skill.

• Record all data and observations in the lab notebook.

Analysis & Conclusions

• After all data is collected, analyze the results by considering how the data reflects the introduced concepts and whether the hypothesis is supported by the data.

• If the data and observations do not support the hypothesis, reflect on why and what further testing would be interesting or helpful.

Science: Astronomy

Click THIS text or scan the QR code for links.

Term 1

WEEK 1 ⬚ **45m Astronomy Lessons - Lesson 1**

Identification

Materials: Astronomy Text, star finder

→ INTRO
This is your day each week to prepare for your field studies. You will begin with a short reading, but most of the lesson will be used for planning. To find a local club, explore your locale at the links below:
∞ Link: Night Sky Network
∞ Link: New Planetarium
∞ Link: Royal Astronomical Society

→ READ, NARRATE, & DISCUSS
Unit I Lesson 1 through the section "Shifting Skies" (to "in the sky.")

→ PREP
• Learn to orient yourself with the star finder.
• Use the Stellarium and Night Sky Quick Links that tell you what is visible to aid your viewing.
• Note what time the sky becomes dark enough to see the stars.
• Check the weather and note which nights will have cloud cover so that you can plan a night each week to do some sky gazing.
• As you are able, seek out local observatories or clubs to increase your knowledge and experience locating objects in the sky.

• PLAN WEEKLY
⬚ nature walk - record observations
⬚ science free read

WEEK 1 ⬚ **45m Astronomy Lessons - Lesson 2**

How Astronomy Works, Highlights from History

Materials: Astronomy Text

→ READ, NARRATE, & DISCUSS
Unit I Lsn 2. Narrate silently to yourself or write. Copy any diagrams and make sketches if helpful to understand the text. Consider any questions from the text as time permits.

WEEK 1 ⬚ **45m Astronomy Lessons - Lesson 3**

Astronomy Literature

Materials: The Last Stargazers

→ INTRO
Two days each week will be spent reading important works of astronomical literature. The lesson plans give you an idea of how many pages to read each week to finish the book on schedule, but this is flexible. If a book takes longer than suggested, you might read outside the lesson time or even leave off without finishing it. If you read faster than suggested, use the extra time for other activities in the course.

→ READ, NARRATE, & DISCUSS
Read about 19 pages per week (over 2 lesson days).

→ WRITE
Write a narration in your Astronomy Notebook.

WEEK 1 ⬚ **45m Astronomy Lessons - Lesson 4**

Astronomy Literature

Materials: The Last Stargazers

→ READ, NARRATE, & DISCUSS
Read about 19 pages per week (over 2 lesson days).

Science: Astronomy

Click THIS text or scan the QR code for links.

Term 1

→ WRITE
Write a narration in your Astronomy Notebook.

WEEK 1 ⬚ **45m Astronomy Lessons - Lesson 5**
Astronomy Current Events and Research

Materials: computer, optional: Crossroads of Science and Faith text

→ INTRO
About half of these days will be spent reading current events; the other half will be spent participating in citizen science. Keep a log or journal entry of your findings and thoughts in your Astronomy Notebook.

→ READ CURRENT EVENTS
EarthSky, Picture of Day, and Veritas Forum (in your Quick Links) are good options to explore. If you and your teacher prefer, the Crossroads of Science and Faith text could be substituted here.

OR

→ PRACTICE CITIZEN SCIENCE
Choose from Galaxy Zoo, Globe at Night, Exoplanet Watch, or Space Math (in your Quick Links).

WEEK 1 ⬚ **60m Astronomy Labs - Lesson 1**

Materials: journal, star finder

→ OBSERVE
Simply notice on this first night of observing. What are your first impressions? Or are you able to relocate any objects previously found? Do you notice anything new based on your use of the star finder or Quick Links? Keep a record of what you observe.

WEEK 2 ⬚ **45m Astronomy Lessons - Lesson 6**
Identification

Materials: 100 Things to See in the Night Sky

→ READ, NARRATE, & DISCUSS
How to Use This Book

→ PREP
• Learn to orient yourself by locating or reminding yourself where the four cardinal directions point in your place.
• Practice measuring objects at a distance using your hands.
• Review your viewing experience last week. Was it a good spot? Are there other possibilities that would be better? Can you do anything to improve your experience?
• Use the Stellarium and Night Sky Quick Links that tell you what is visible to aid your viewing.
• Check the weather and note which nights will have cloud cover so that you can plan a night each week to do some sky gazing.

• PLAN WEEKLY
⬚ nature walk - record observations
⬚ science free read

WEEK 2 ⬚ **45m Astronomy Lessons - Lesson 7**
⬚ *45m Astronomy - Lesson 7*

Materials: Astronomy Text

How Astronomy Works, Gravity

→ READ, NARRATE, & DISCUSS

Science: Astronomy

Click THIS text or scan the QR code for links.

Term 1

Unit I Lsn 3. Narrate silently to yourself or write. Copy any diagrams and make sketches if helpful to understand the text. Consider any questions from the text as time permits.

WEEK 2

⬚ **45m Astronomy Lessons - Lesson 8**

Astronomy Literature

Materials: The Last Stargazers

→ READ, NARRATE, & DISCUSS
Read about 19 pages per week (over 2 lesson days).

→ WRITE
Write a narration in your Astronomy Notebook.

WEEK 2

⬚ **45m Astronomy Lessons - Lesson 9**

Astronomy Literature

Materials: The Last Stargazers

→ READ, NARRATE, & DISCUSS
Read about 19 pages per week (over 2 lesson days).

→ WRITE
Write a narration in your Astronomy Notebook.

WEEK 2

⬚ **45m Astronomy Lessons - Lesson 10**

⬚ *45m Astronomy - Lesson 10*

Materials: computer, optional: Crossroads of Science and Faith text

Astronomy Current Events and Research

→ READ CURRENT EVENTS
EarthSky, Picture of Day, and Veritas Forum (in your Quick Links) are good options to explore. If you and your teacher prefer, the Crossroads of Science and Faith text could be substituted here. Make an entry in your notebook about what you discover.

OR

→ PRACTICE CITIZEN SCIENCE
Choose from Galaxy Zoo, Globe at Night, Exoplanet Watch, or Space Math (in your Quick Links). Log an entry in your notebook about what you do.

WEEK 2

⬚ **60m Astronomy Labs - Lesson 2**

Materials: journal, star finder

→ OBSERVE
Notice any objects that are or are becoming familiar. In what directions do they currently lie? Using your hands, measure their locations in the sky. Do these locations change during the evening? Keep a record of what you observe.

★ STUDENT/TEACHER TIP
Note that next week's fieldwork should be done in one or more daytime sessions!

Science: Astronomy

Click THIS text or scan the QR code for links.

Term 1

WEEK 3 ⬚ **45m Astronomy Lessons - Lesson 11**
Identification

Materials: 100 Things to See in the Night Sky, binoculars, paper, tripod/stand for binoculars

→ READ, NARRATE, & DISCUSS
Part I: Introduction & The Sun

→ PREP
- Review where the four cardinal directions point in your place.
- Practice measuring objects at a distance using your hands.
- You will view during the day this week - check the weather and decide when you will do some sky gazing. Will you view it at sunrise? Daytime? Sunset? Since most of the work in this course will be at night, make the most of this week!
- Ensure that you understand how to set up your binoculars securely, so that you can project the sun for safe viewing:
  ∞ Website Link: Track Activity on the Surface of the Sun
  ∞ Video Link: How to Project the Sun with Binoculars
- If you would like to consider an equinox special study, check out the idea below:
  ∞ Website Link: Sun Shadows

WEEK 3 ⬚ **45m Astronomy Lessons - Lesson 12**
How Astronomy Works, Spatial Relations

Materials: Astronomy Text

→ READ, NARRATE, & DISCUSS
Unit I Lsn 4. Narrate silently to yourself or write. Copy any diagrams and make sketches if helpful to understand the text. Consider any questions from the text as time permits.

WEEK 3 ⬚ **45m Astronomy Lessons - Lesson 13**
Astronomy Literature

Materials: The Last Stargazers

→ READ, NARRATE, & DISCUSS
Read about 19 pages per week (over 2 lesson days).

→ WRITE
Write a narration in your Astronomy Notebook.

WEEK 3 ⬚ **45m Astronomy Lessons - Lesson 14**
Astronomy Literature

Materials: The Last Stargazers

→ READ, NARRATE, & DISCUSS
Read about 19 pages per week (over 2 lesson days).

→ WRITE
Write a narration in your Astronomy Notebook.

- **PLAN WEEKLY**
⬚ nature walk - record observations
⬚ science free read

Science: Astronomy

Click THIS text or scan the QR code for links.

Term 1

WEEK 3

45m Astronomy Lessons - Lesson 15

Astronomy Current Events and Research

Materials: computer, optional: Crossroads of Science and Faith text

→ READ CURRENT EVENTS

EarthSky, Picture of Day, and Veritas Forum (in your Quick Links) are good options to explore. If you and your teacher prefer, the Crossroads of Science and Faith text could be substituted here. Make an entry in your notebook about what you discover.

OR

→ PRACTICE CITIZEN SCIENCE

Choose from Galaxy Zoo, Globe at Night, Exoplanet Watch, or Space Math (in your Quick Links). Log an entry in your notebook about what you do.

WEEK 3

60m Astronomy Labs - Lesson 3

Materials: journal, binoculars, paper, tripod/stand for binoculars

→ OBSERVE

Use your hands to measure locations and your binocular set-up to observe the sun's projection. DO NOT LOOK DIRECTLY AT THE SUN! Keep a record of what you observe.