Conceptual Astronomy 1
Standards Alignment
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If you need a standards map that is not listed here, provide a link to the standards to astronomyteacher@mac.com and a draft map can be generated for your use. It will eventually be added to this document.

An item in the correlation column means that activity either directly or partially addresses the standard listed.

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Next Generation Science Standards

Standards	**Correlation**	
HS-PS2-8. Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	CA1 2.15	CA1 2.21
HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	CA1 6.16	CA1 6.17
HS-PS2-4 Use mathematical representations of Newton's Law of Gravitation and Couloumb's Law to describe and predict the gravitational and electrostatic forces between objects.	CA1 6.16 CA1 6.17	CA1 3.11
HS-ESS1-1. Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy in the form of radiation.	CA1 2.21	
HS-ESS1-3. Communicate scientific ideas about the way stars, over their life cycles, produce elements.	CA1 2.21	

Standards	**Correlation**	
HS-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.	CA1 6.1 CA1 6.2 CA1 6.3 CA1 6.4 CA1 6.5 CA1 6.6 CA1 6.7 CA1 6.8 CA1 6.9	CA1 6.10 CA1 6.11 CA1 6.12 CA1 6.13 CA1 6.14 CA1 6.15 CA1 6.16 CA1 6.17
HS-ESS1-6. Apply scientific reasoning and evidence form ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.	CA1 3.5 CA1 3.6	CA1 3.7
HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.	CA1 2.21 CA1 2.18	CA1 2.19
HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	CA1 2.11	CA1 2.8
NOS: Scientific Investigations use a variety of methods	CA1 1.1 CA1 1.2 CA1 1.3 CA1 1.4 CA1 1.5 CA1 1.6 CA1 2.3 CA1 2.4 CA1 2.7 CA1 2.17	CA1 2.19 CA1 3.11 CA1 3.13 CA1 3.14 CA1 4.10 CA1 5.10 CA1 6.8 CA1 6.10 CA1 6.14 CA1 6.17

Standards	**Correlation**	
NOS: Scientific knowledge is based on empirical evidence.	CA1 1.5 CA1 2.3 CA1 2.4 CA1 2.19 CA1 2.21 CA1 3.1 CA1 3.12 CA1 3.14 CA1 4.10 CA1 5.9	CA1 5.10 CA1 6.1 CA1 6.2 CA1 6.3 CA1 6.7 CA1 6.10 CA1 6.14 CA1 6.16 CA1 6.17
NOS: Scientific knowledge is open to revision in the light of new evidence.	CA1 5.9 CA1 6.4 CA1 1.5	CA1 6.12 CA1 5.2
NOS: Science models, laws, mechanisms, and theories explain natural phenomena.	CA1 2.9 CA1 2.13 CA1 2.21 CA1 3.4 CA1 3.11 CA1 3.12 CA1 3.13 CA1 4.5	CA1 4.6 CA1 5.9 CA1 6.4 CA1 6.5 CA1 6.8 CA1 6.10 CA1 6.22 CA1 6.17
Science and Engineering Practices: Ask questions and define problems.	CA1 1.3 CA1 1.5 CA1 1.6 CA1 2.13 CA1 2.19 CA1 3.13	CA1 4.13 CA1 5.9 CA1 5.10 CA1 6.20 CA1 6.15 CA1 6.17

Standards	**Correlation**	
Science and Engineering Practices: Developing and using models.	CA1 1.2 CA1 1.1 CA1 1.3 CA1 1.6 CA1 2.9 CA1 2.15 CA1 2.13 CA1 2.19 CA1 2.21 CA1 3.3 CA1 3.4 CA1 3.10 CA1 3.11 CA1 3.12 CA1 3.13 CA1 3.14	CA1 4.3 CA1 4.4 CA1 4.5 CA1 4.13 CA1 4.15 CA1 5.9 CA1 5.10 CA1 6.5 CA1 6.6 CA1 6.7 CA1 6.10 CA1 6.4 CA1 6.12 CA1 6.13 CA1 6.15 CA1 6.17
Science and Engineering Practices: Planning and carrying out investigations.	CA1 1.1 CA1 1.2 CA1 1.3 CA1 1.4 CA1 1.5 CA1 1.6 CA1 2.4 CA1 2.5 CA1 2.7 CA1 2.17	CA1 2.19 CA1 3.13 CA1 3.14 CA1 4.10 CA1 5.9 CA1 5.10 CA1 6.8 CA1 6.10 CA1 6.14 CA1 6.17
Science and Engineering Practices: Analyzing and Interpreting Data.	CA1 1.5 CA1 2.1 CA1 2.3 CA1 2.4 CA1 2.5 CA1 2.7 CA1 2.12 CA1 2.17 CA1 2.19 CA1 2.21	CA1 3.1 CA1 3.11 CA1 3.12 CA1 3.12 CA1 4.10 CA1 5.9 CA1 6.10 CA1 6.12 CA1 6.17

Standards	**Correlation**	
Science and Engineering Practices: Using Mathematics and computational thinking.	CA1 1.5 CA1 2.1 CA1 2.2 CA1 2.3 CA1 2.10 CA1 2.19 CA1 2.20 CA1 2.21 CA1 3.11 CA1 3.12 CA1 3.14 CA1 4.16 CA1 4.17	CA1 4.18 CA1 5.9 CA1 6.7 CA1 6.8 CA1 6.9 CA1 6.10 CA1 6.11 CA1 6.12 CA1 6.13 CA1 6.14 CA1 6.15 CA1 6.16 CA1 6.17
Science and Engineering Practices: Constructing explanations.	CA1 1.5 CA1 2.13 CA1 2.14 CA1 2.21 CA1 3.4 CA1 3.13 CA1 4.10	CA1 5.2 CA1 5.9 CA1 6.3 CA1 6.6 CA1 6.7 CA1 6.10
Science and Engineering Practices: Engaging in argument from evidence.	CA1 1.5 CA1 2.21 CA1 3.10 CA1 3.13 CA1 3.14 CA1 4.15	CA1 5.2 CA1 5.3 CA1 5.5 CA1 6.3 CA1 6.2 CA1 6.4
Science and Engineering Practices: Obtaining, evaluating, and communicating information.	CA1 1.5 CA1 1.6 CA1 3.13 CA1 3.14 CA1 4.12	CA1 4.2 CA1 5.2 CA1 6.4 CA1 3.15

Common Core for Math and ELA

Standards	**Correlation**	
MP.2. Reason abstractly and quantitatively.	CA1 1.5 CA1 2.8 CA1 2.9 CA1 2.17 CA1 2.19 CA1 2.21 CA1 3.2 CA1 3.11 CA1 3.12 CA1 3.14 CA1 4.15 CA1 4.16 CA1 4.17 CA1 5.9	CA1 5.10 CA1 6.1 CA1 6.2 CA1 6.3 CA1 6.6 CA1 6.7 CA1 6.8 CA1 6.10 CA1 6.11 CA1 6.12 CA1 6.13 CA1 6.15 CA1 6.16 CA1 6.17
MP.4. Model with mathematics.	CA1 2.4 CA1 2.5 CA1 2.7 CA1 2.8 CA1 2.9 CA1 2.11 CA1 2.17 CA1 2.19 CA1 2.21 CA1 3.12 CA1 3.14 CA1 4.5 CA1 4.15 CA1 4.16	CA1 4.17 CA1 5.9 CA1 5.10 CA1 6.6 CA1 6.7 CA1 6.8 CA1 6.10 CA1 6.12 CA1 6.13 CA1 6.14 CA1 6.15 CA1 6.16 CA1 6.17

Standards	**Correlation**	
MP.5. Use appropriate tools strategically.	CA1 2.1 CA1 2.2 CA1 2.3 CA1 2.4 CA4 2.6 CA1 2.11 CA1 2.17 CA1 2.19 CA1 2.20	CA1 2.21 CA1 4.11 CA1 5.9 CA1 5.10 CA1 6.7 CA1 6.8 CA1 6.10 CA1 6.12 CA1 6.14
CCR Reading Anchor 1: Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.	CA1 1.3 CA1 1.5 CA1 2.13 CA1 3.11	CA1 4.7 CA1 5.3 CA1 6.10 CA1 6.16
CCR Reading Anchor 7: Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.	CA1 2.11 CA1 3.10 CA1 3.9	CA1 4.2 CA1 6.4 CA1 3.15
CCR Reading Anchor 8: Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.	CA1 1.5 CA1 3.11	CA1 5.3 CA1 6.16
CCR Reading Anchor 10: Read and comprehend complex literary and informational texts independently and proficiently.	CA1 1.3 CA1 2.21 CA1 3.11	CA1 4.6 CA1 6.6 CA1 6.10
CCR Writing Anchor #2: Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.	CA1 5.7 CA1 6.4	CA1 1.6

Standards	**Correlation**	
CCR Writing Anchor #7: Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.	CA1 1.5 CA1 2.3 CA1 2.4 CA1 2.5	CA1 2.7 CA1 5.10 CA1 6.17
CCR Writing Anchor #8: Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.	CA1 1.6 CA1 4.2	CA1 5.7 CA1 6.4

National Standards

The following tables demonstrate how this course meets national and state teaching standards. The standards are in the left-hand column, while the information in the right-hand column indicates where in this course the elements of the individual standards are addressed.

These tables address only Part One of Conceptual Astronomy. Part Two will address most of the other astronomy related high school earth science standards.

Topics for which there are no activities have been omitted.

Source:

http://books.nap.edu/html/nses/

Standards	**Correlation**
Science as Inquiry CONTENT STANDARD A: As a result of activities in grades 9-12, all students should develop • *Abilities necessary to do scientific inquiry* • *Understandings about scientific inquiry*	CA1 1.1 CA1 1.2 CA1 1.6 CA1 1.3 CA1 1.5
Earth and Space Science CONTENT STANDARD D: As a result of their activities in grades 9-12, all students should develop an understanding of • *Energy in the earth system* • Geochemical cycles • *Origin and evolution of the earth system* • Origin and evolution of the universe	CA1 2.21 CA1 2.3 CA1 2.4 CA1 2.5 CA1 2.13

Standards	**Correlation**
Physical science CONTENT STANDARD B: As a result of their activities in grades 9-12, all students should develop an understanding of • Structure of atoms • Structure and properties of matter • Chemical reactions • *Motions and forces* • Conservation of energy and increase in disorder • *Interactions of energy and matter*	CA1 2.17 CA1 6.17 CA1 6.16
History and Nature of Science CONTENT STANDARD G: As a result of activities in grades 9-12, all students should develop understanding of • Science as a human endeavor • Nature of scientific knowledge • Historical perspectives	CA1 1.5 CA1 1.6 CA1 1.3 CA1 1.1 CA1 6.4

Standards for California

California's Content standards are for all of high school and are separated into sections such as Earth Science and Physics. Standards designations refer to subject: section heading: Number: letter, where Section headings are topics such as "Earth's Place in the Universe."

Source:
http://www.cde.ca.gov/be/st/ss/scmain.asp

Standards	**Correlation**
EARTH SCIENCE 1. Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time. As a basis for understanding this concept: a. Students know how the differences and similarities among the sun, the terrestrial planets, and the gas planets may have been established during the formation of the solar system.	CA1 5.2 CA1 5.3 CA1 5.7 CA1 6.1 CA1 6.2 CA1 6.3 CA1 6.13 CA1 6.12
d. Students know the evidence indicating that the planets are much closer to Earth than the stars are.	CA1 3.2 CA1 3.12 CA1 2.17 CA1 6.14
e. Students know the Sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium.	CA1 2.21
f. Students know the evidence for the dramatic effects that asteroid impacts have had in shaping the surface of planets and their moons and in mass extinctions of life on Earth.	CA1 3.13 CA1 3.10
2. Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time. As a basis for understanding this concept: c. Students know the evidence indicating that all elements with an atomic number greater than that of lithium have been formed by nuclear fusion in stars.	CA1 2.21

Standards	**Correlation**
Physics Motion and Forces 1. Newton's laws predict the motion of most objects. As a basis for understanding this concept: e. Students know the relationship between the universal law of gravitation and the effect of gravity on an object at the surface of Earth. f. Students know applying a force to an object perpendicular to the direction of its motion causes the object to change direction but not speed (e.g., Earth's gravitational force causes a satellite in a circular orbit to change direction but not speed). g. Students know circular motion requires the application of a constant force directed toward the center of the circle.	CA1 6.13 CA1 6.12 CA1 6.15 CA1 5.10 CA1 5.6 CA1 5.9 CA1 6.8 CA1 6.10 CA1 6.17 CA1 6.11 CA1 6.9 CA1 6.16
Investigation & Experimentation Science Content Standards 1. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop their own questions and perform investigations. Students will: a. Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.	CA1 5.9 CA1 6.10 CA1 3.14
b. Identify and communicate sources of unavoidable experimental error.	CA1 6.17 CA1 1.5 CA1 2.13
c. Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.	CA1 1.5 CA1 2.13 CA1 6.17

Standards	**Correlation**
d. Formulate explanations by using logic and evidence.	CA1 5.9 CA1 1.5
e. Solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions.	CA1 6.10
f. Distinguish between hypothesis and theory as scientific terms.	CA1 1.1 CA1 1.3
g. Recognize the usefulness and limitations of models and theories as scientific representations of reality.	CA1 1.5
i. Analyze the locations, sequences, or time intervals that are characteristic of natural phenomena (e.g., relative ages of rocks, locations of planets over time, and succession of species in an ecosystem).	CA1 6.10
j. Recognize the issues of statistical variability and the need for controlled tests.	CA1 1.5
k. Recognize the cumulative nature of scientific evidence.	CA1 6.4
l. Analyze situations and solve problems that require combining and applying concepts from more than one area of science.	CA1 6.15 CA1 6.10 CA1 6.17
n. Know that when an observation does not agree with an accepted scientific theory, the observation is sometimes mistaken or fraudulent (e. g., the Piltdown Man fossil or unidentified flying objects) and that the theory is sometimes wrong (e.g., the Ptolemaic model of the movement of the Sun, Moon, and planets).	CA1 1.5 CA1 6.4

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