Texas

Beginning with School Year 2010-2011.

High School Grades

§112.33. Astronomy

	Starry Night Lesson Plans in Order of Relevance						
(4) Science concepts. The student recognizes the importance and uses of astronomy in civilization. The student is expected to:	**Unit A**	**Unit C**	**Unit D**	**Unit E**	**Unit F**	**Unit H**	**Unit I**
(A) research and describe the use of astronomy in ancient civilizations such as the Egyptians, Mayans, Aztecs, Europeans, and the native Americans;	E2	E4	A4	A5			
(B) research and describe the contributions of scientists to our changing understanding of astronomy, including Ptolemy, Copernicus, Tycho Brahe, Kepler, Galileo, Newton, Einstein, and Hubble, and the contribution of women astronomers, including Maria Mitchell and Henrietta Swan Leavitt;	C2	H2					
(C) describe and explain the historical origins of the perceived patterns of constellations and the role of constellations in ancient and modern navigation; and	E1	E2	E3	E4			
(D) explain the contributions of modern astronomy to today's society, including the identification of potential asteroid/comet impact hazards and the Sun's effects on communication, navigation, and high-tech devices.	D2	D3	F2	I1	I2	I3	
(5) Science concepts. The student develops a familiarity with the sky. The student is expected to:	**Unit A**	**Unit E**					
(A) observe and record the apparent movement of the Sun and Moon during the day;	A1	A4	A5				
(B) observe and record the apparent movement of the Moon, planets, and stars in the nighttime sky; and	A1-A5	E1-E4					
(C) recognize and identify constellations such as Ursa Major, Ursa Minor, Orion, Cassiopeia, and constellations of the zodiac.	E2	E3	E4				
(6) Science concepts. The student knows our place in space. The student is expected to:	**Unit B**	**Unit C**	**Unit D**	**Unit G**	**Unit H**	**Unit I**	
(A) compare and contrast the scale, size, and distance of the Sun, Earth, and Moon system through the use of data and modeling;	B1	B2					
(B) compare and contrast the scale, size, and distance of objects in the solar system such as the Sun and planets through the use of data and modeling;	C1-C4	D1	D2	I2			
(C) examine the scale, size, and distance of the stars, Milky Way, and other galaxies through the use of data and modeling;	G1	H1	H2	I3			
(D) relate apparent versus absolute magnitude to the distances of celestial objects; and	G1	G2					
(E) demonstrate the use of units of measurement in astronomy, including Astronomical Units and light years.	B2	G1	H1	H2			
(7) Science concepts. The student knows the role of the Moon in the Sun, Earth, and Moon system. The student is expected to:	**Unit A**						
(A) observe and record data about lunar phases and use that information to model the Sun, Earth, and Moon system;	A4						
(B) illustrate the cause of lunar phases by showing positions of the Moon relative to Earth and the Sun for each phase, including new moon, waxing crescent, first quarter, waxing gibbous, full moon, waning gibbous, third quarter, and waning crescent;	A4						
(C) identify and differentiate the causes of lunar and solar eclipses, including differentiating between lunar phases and eclipses; and	A5						
(D) identify the effects of the Moon on tides.	A3						

(B) explain how latitudinal position affects the length of day and night throughout the year;	A2			
(C) recognize that the angle of incidence of sunlight determines the concentration of solar energy received on Earth at a particular location; and	A2			
(D) examine the relationship of the seasons to equinoxes, solstices, the tropics, and the equator.	A2			
(9) Science concepts. The student knows that planets of different size, composition, and surface features orbit around the Sun. The student is expected to:	**Unit B**	**Unit C**	**Unit D**	
(A) compare and contrast the factors essential to life on Earth such as temperature, water, mass, and gases to conditions on other planets;	C1	B1	B2	
(B) compare the planets in terms of orbit, size, composition, rotation, atmosphere, natural satellites, and geological activity;	C1	C3	C4	
(C) relate the role of Newton's law of universal gravitation to the motion of the planets around the Sun and to the motion of natural and artificial satellites around the planets; and	C2			
(D) explore the origins and significance of small solar system bodies, including asteroids, comets, and Kuiper belt objects.	D1	D2	D3	
(10) Science concepts. The student knows the role of the Sun as the star in our solar system. The student is expected to:	**Unit F**			
(A) identify the approximate mass, size, motion, temperature, structure, and composition of the Sun;	F1	F3		
(B) distinguish between nuclear fusion and nuclear fission, and identify the source of energy within the Sun as nuclear fusion of hydrogen to helium;	F1			
(C) describe the eleven-year solar cycle and the significance of sunspots; and	F2			
(D) analyze solar magnetic storm activity, including coronal mass ejections, prominences, flares, and sunspots.	F2			
(11) Science concepts. The student knows the characteristics and life cycle of stars. The student is expected to:	**Unit G**			
(A) identify the characteristics of main sequence stars, including surface temperature, age, relative size, and composition;	G2			
(B) characterize star formation in stellar nurseries from giant molecular clouds, to protostars, to the development of main sequence stars;	G2	F3		
(C) evaluate the relationship between mass and fusion on the dying process and properties of stars;	G2	G3		
(D) differentiate among the end states of stars, including white dwarfs, neutron stars, and black holes;	G2	G3		
(E) compare how the mass and gravity of a main sequence star will determine its end state as a white dwarf, neutron star, or black hole;	G2	G3		
(F) relate the use of spectroscopy in obtaining physical data on celestial objects such as temperature, chemical composition, and relative motion; and	G2	G3	H1	I3
(G) use the Hertzsprung-Russell diagram to plot and examine the life cycle of stars from birth to death.	G2	G3		
(12) Science concepts. The student knows the variety and properties of galaxies. The student is expected to:	**Unit H**			
(A) describe characteristics of galaxies;	H1	H2		
(B) recognize the type, structure, and components of our Milky Way galaxy and location of our solar system within it; and	H1	H2		
(C) compare and contrast the different types of galaxies, including spiral,	H1	H2		

(A) research and describe the historical development of the Big Bang Theory, including red shift, cosmic microwave background radiation, and other supporting evidence;	H3	H2		
(B) research and describe current theories of the evolution of the universe, including estimates for the age of the universe; and	H3	H2		
(C) research and describe scientific hypotheses of the fate of the universe, including open and closed universes and the role of dark matter and dark energy.	H3	H2		
(14) Science concepts. The student recognizes the benefits and challenges of space exploration to the study of the universe. The student is expected to:	**Unit I**	**Unit H**	**Unit C**	**Unit D**
(A) identify and explain the contributions of human space flight and future plans and challenges;				
(B) recognize the advancement of knowledge in astronomy through robotic space flight;	I2	I1	H1	
(C) analyze the importance of ground-based technology in astronomical studies;	I3			
(D) recognize the importance of space telescopes to the collection of astronomical data across the electromagnetic spectrum; and	I2	I3	H1	
(E) demonstrate an awareness of new developments and discoveries in astronomy.	I2	I3	C4	D3
Science Skills				
(2) Scientific processes. The student uses scientific methods during laboratory and field investigations. The student is expected to:	**All Starry Night Lessons**			
(A) know the definition of science and understand that it has limitations	✓			
(B) know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	✓			
(C) know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but may be subject to change as new areas of science and new technologies are developed;	✓			
(D) distinguish between scientific hypotheses and scientific theories;	✓			
(E) plan and implement investigative procedures, including making observations, asking questions, formulating testable hypotheses, and selecting equipment and technology;	✓			
(F) collect data and make measurements with accuracy and precision;	✓			
(G) organize, analyze, evaluate, make inferences, and predict trends from data, including making new revised hypotheses when appropriate;	✓			
(H) communicate valid conclusions in writing, oral presentations, and through collaborative projects; and	✓			
(I) use astronomical technology such as telescopes, binoculars, sextants, computers, and software.	✓			
(3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and	**All Starry Night Lessons**			

(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;	✓					
(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;	✓					
(C) draw inferences based on data related to promotional materials for products and services;	✓					
(D) evaluate the impact of research on scientific thought, society, and the environment; and	✓					

§112.36. Earth and Space Science

(4) Earth in space and time. The student knows how Earth-based and space-based astronomical observations reveal differing theories about the structure, scale, composition, origin, and history of the universe. The student is expected to:	**Unit G**	**Unit H**	**Unit I**			
(A) evaluate the evidence concerning the Big Bang model such as red shift and cosmic microwave background radiation and current theories of the evolution of the universe, including estimates for the age of the universe;	H1	H2	H3	I3		
(B) explain how the Sun and other stars transform matter into energy through nuclear fusion; and	F1	G2				
(C) investigate the process by which a supernova can lead to the formation of successive generation stars and planets.	G2	G3				
(5) Earth in space and time. The student understands the solar nebular accretionary disk model. The student is expected to:	**Unit A**	**Unit B**	**Unit C**	**Unit D**	**Unit F**	**Unit G**
(A) analyze how gravitational condensation of solar nebular gas and dust can lead to the accretion of planetesimals and protoplanets;	B1	F3	C2			
(B) investigate thermal energy sources, including kinetic heat of impact accretion, gravitational compression, and radioactive decay, which are thought to allow protoplanet differentiation into layers;	F1	D3	G2	G3		
(C) contrast the characteristics of comets, asteroids, and meteoroids and their positions in the solar system, including the orbital regions of the terrestrial planets, the asteroid belt, gas giants, Kuiper Belt, and Oort Cloud;	D1	D2	C1-C4			
(D) explore the historical and current hypotheses for the origin of the Moon, including the collision of Earth with a Mars-sized planetesimal;	A3					
(E) compare terrestrial planets to gas-giant planets in the solar system, including structure, composition, size, density, orbit, surface features, tectonic activity, temperature, and suitability for life; and	C1	B1	B2			
(F) compare extra-solar planets with planets in our solar system and describe how such planets are detected.						