(v) communicate solutions individually in a variety of settings

(vi) communicate solutions individually in a variety of formats

(vii) communicate solutions collaboratively in a variety of settings

(viii) communicate solutions collaboratively in a variety of formats

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

Breakouts

(i) engage respectfully in scientific argumentation using applied scientific explanations

(ii) engage respectfully in scientific argumentation using empirical evidence

(4) Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;

Breakouts

(i) analyze scientific explanations and solutions by using empirical evidence so as to encourage critical thinking by the student

(ii) analyze scientific explanations and solutions by using logical reasoning so as to encourage critical thinking by the student

(iii) analyze scientific explanations and solutions by using experimental testing so as to encourage critical thinking by the student

(iv) analyze scientific explanations and solutions by using observational testing so as to encourage critical thinking by the student

(v) evaluate scientific explanations and solutions by using empirical evidence so as to encourage critical thinking by the student

(vi) evaluate scientific explanations and solutions by using logical reasoning so as to encourage critical thinking by the student

(vii) evaluate scientific explanations and solutions by using experimental testing so as to encourage critical thinking by the student

(viii) evaluate scientific explanations and solutions by using observational testing so as to encourage critical thinking by the student

(ix) critique scientific explanations and solutions by using empirical evidence so as to encourage critical thinking by the student

(v) record the apparent movement of the Moon

(vi) analyze the apparent movement of the Moon

(vii) observe the apparent movement of the stars

(viii) record the apparent movement of the stars

(ix) analyze the apparent movement of the stars

(x) predict sunrise

(xi) predict sunset

(B) observe the movement of planets throughout the year and measure how their positions change relative to the constellations;

Breakouts

(i) observe the movement of planets throughout the year

(ii) measure how [the planets'] positions change relative to the constellations

(C) identify constellations such as Ursa Major, Ursa Minor, Orion, Cassiopeia, and constellations along the ecliptic and describe their importance; and

Breakouts

(i) identify constellations along the ecliptic

(ii) describe the importance [of the constellations along the ecliptic]

(D) understand the difference between astronomy and astrology, the reasons for their historical conflation, and their eventual separation.

Breakouts

(i) understand the difference between astronomy and astrology

(ii) understand the reasons for their historical conflation

(iii) understand [the] eventual separation [of astronomy and astrology]

(7) Science concepts. The student knows our relative place in the solar system. The student is expected to:

(A) demonstrate the use of units of measurement in astronomy, including astronomical units and light years, minutes, and seconds;

Breakouts

(i) demonstrate the use of units of measurement in astronomy, including astronomical units

(ii) demonstrate the use of units of measurement in astronomy, including light years

(iii) demonstrate the use of units of measurement in astronomy, including minutes

(iv) demonstrate the use of units of measurement in astronomy, including seconds

(B) model the scale, size, and distances of the Sun, Earth, and Moon system and identify

Breakouts

(i) calculate the relative light-gathering power of different-sized telescopes to compare telescopes for different applications

(C) analyze the importance and limitations of optical, infrared, and radio telescopes, gravitational wave detectors, and other ground-based technology; and

Breakouts

(i) analyze the importance of optical telescopes

(ii) analyze the importance of infrared telescopes

(iii) analyze the importance of radio telescopes

(iv) analyze the importance of gravitational wave detectors

(v) analyze the importance of other ground-based technology

(vi) analyze the limitations of optical telescopes

(vii) analyze the limitations of infrared telescopes

(viii) analyze the limitations of radio telescopes

(ix) analyze the limitations of gravitational wave detectors

(x) analyze the limitations of other ground-based technology

(D) analyze the importance and lthe

(vi) relate Kepler's laws of planetary motion to the motion of the planets

(vii) relate Kepler's laws of planetary motion to the formation of the [planets'] satellites

(viii) relate Kepler's laws of planetary motion to the motion of the [planets'] satellites

(B) explore and communicate the origins and significance of planets, planetary rings, satellites, asteroids, comets, Oort cloud, and Kuiper belt objects;

Breakouts

(i) explore the origins of planets

(ii) explore the origins of planetary rings

(iii) explore the origins of satellites

(iv) explore the origins of asteroids

(v) explore the origins of comets

(vi) explore the origins of Oort cloud objects

(vii) explore the origins of Kuiper belt objects

(viii) explore the significance of planets

(ix) explore the significance of planetary rings

(x) explore the significance of satellites

(xi) explore the significance of asteroids

(xii) explore the significance of comets

(xiii) explore the significance of Oort cloud objects

(xiv) explore the significance of Kuiper belt objects

(xv) communicate the origins of planets

(xvi) communicate the origins of planetary rings

(xvii) communicate the origins of satellites

(xviii) communicate the origins of asteroids

(xix) communicate the origins of comets

(xx) communicate the origins of Oort cloud objects

(xxi) communicate the origins of Kuiper belt objects

(xxii) communicate the significance of planets

(xxiii) communicate the significance of planetary rings

(xxiv) communicate the significance of satellites

(xxv) communicate the significance of asteroids

(xxvi) communicate the significance of comets

(xxvii) communicate the significance of Oort cloud objects

(xxviii) communicate the significance of Kuiper belt objects

(C) compare the planets in terms of orbit, size,

(ii) identify the source of energy within the Sun as nuclear fusion of hydrogen to helium

(C) describe the eleven-year solar cycle and the significance of sunspots;

and Breakouts

(i) describe the eleven-year solar cycle

(ii) describe the significance of sunspots

(D) analyze the origins and effects of space weather, including the solar wind, coronal mass ejections, prominences, flares, and sunspots.

Breakouts

(i) analyze the origins of space weather, including the solar wind

(ii) analyze the effects of space weather, including the solar wind

(iii) analyze the origins of space weather, including the coronal mass ejections

(iv) analyze the effects of space weather, including the coronal mass ejections

(v) analyze the origins of space weather, including the prominences

(vi) analyze the effects of space weather, including prominences

(vii) analyze the origins of space weather, including flares

(viii) analyze the effects of space weather, including flares

(ix) analyze the origins of space weather, including sunspots

(x) analyze the effects of space weather, including sunspots

(13) Science concepts. The student understands the characteristics and life cycle of stars. The student is expected to:

(A) identify the characteristics of main sequence stars, including surface temperature, age, relative size, and composition;

Breakouts

(i) identify the characteristics of main sequence stars, including surface temperature

(ii) identify the characteristics of main sequence stars, including age

(iii) identify the characteristics of main sequence stars, including relative size

(iv) identify the characteristics of main sequence stars, including composition

(B) describe and communicate star formation from nebulae to protostars to the development of main sequence stars;

Breakouts

(i) describe star formation from nebulae to protostars to the development of main sequence stars

(ii) communicate star formation from nebulae to protostars to the development of main sequence stars

(C) evaluate the relationship between mass and fusion on stellar evolution;

Breakouts

(i) evaluate the relationship between mass and fusion on stellar evolution

(D) compare how the mass of a main sequence star will determine its end state as a white dwarf, neutron star, or black hole;

Breakouts

(i) compare how the mass of a main sequence star will determine its end state as a

Breakouts

(i) evaluate the limits of observational astronomy methods used to formulate the distance ladder

(C) evaluate the indirect evidence for the existence of dark energy;

Breakouts

(i) evaluate the indirect evidence for the existence of dark energy

(D) describe the current scientific understanding of the evolution of the universe,