8 - Planetarium

Purpose: To experience the motion of the Sun and the night sky at different times and different locations on Earth.

During this activity, use only constellations from the following list:
- ✦ Cassiopeia
- ✦ Taurus
- ✦ Orion
- ✦ Canis Major
- ✦ Gemini
- ✦ Leo
- ✦ Ursa Major - Big Dipper
- ✦ Crux - Southern Cross
- ✦ Scorpius
- ✦ Sagittarius
- ✦ Cygnus
- ✦ Pegasus

In the spaces below, answer all questions:

Location on Earth - Hilo: We will start at the planetarium while located in Hilo and we will travel in time to different dates.

- Today's date: _____
  - Q1. In what cardinal direction did the Sun rise? _____
  - Q2. Record the time of sunrise and sunset: _____
  - Q3. Where is the Sun at noon (crossing the meridian)?_____
  - Q4. In what cardinal direction did the Sun set? _____
  - Q5. How many hours of daylight are there today? _____
- Summer Solstice: June 22
  - Q6. In what cardinal direction did the Sun rise? _____
  - Q7. Record the time of sunrise and sunset: _____
  - Q8. Where is the Sun at noon (crossing the meridian)?_____
  - Q9. In what cardinal direction did the Sun set? _____
  - Q10. How many hours of daylight are there on June 22? _____

- Q11. What constellation is in the western sky just after sunset?

☐Cassiopeia	☐Gemini	☐Scorpius
☐Taurus	☐Leo	☐Sagittarius
☐Orion	☐Ursa Major - Big Dipper	☐Cygnus
☐Canis Major	☐Crux - Southern Cross	☐Pegasus

- Q12. What pattern of stars is close to zenith at 2 am?

☐Cassiopeia	☐Gemini	☐Scorpius
☐Taurus	☐Leo	☐Sagittarius
☐Orion	☐Ursa Major - Big Dipper	☐Cygnus
☐Canis Major	☐Crux - Southern Cross	☐Pegasus

- Lahaina "Noon:" May 18

  - Q13. In what cardinal direction did the Sun rise? _____
  - Q14. Record the time of sunrise and sunset: _____
  - Q15. Where is the Sun at noon (crossing the meridian)?_____
  - Q16. In what cardinal direction did the Sun set? _____
  - Q17. How many hours of daylight are there on May 18? _____

- Autumn Equinox: September 21

  - Q18. In what cardinal direction did the Sun rise? _____
  - Q19. Record the time of sunrise and sunset: _____
  - Q20. Where is the Sun at noon (crossing the meridian)?_____
  - Q21. In what cardinal direction did the Sun set? _____
  - Q22. How many hours of daylight are there on Sept. 21? _____
  - Q23. What constellations are visible in the southern sky just after sunset?

☐Cassiopeia	☐Gemini	☐Scorpius
☐Taurus	☐Leo	☐Sagittarius
☐Orion	☐Ursa Major - Big Dipper	☐Cygnus
☐Canis Major	☐Crux - Southern Cross	☐Pegasus

  - Q24. What is the location of Cygnus in the sky just after sunset?

- Lahaina "Noon:" ___July 24___
    - Q25. In what cardinal direction did the Sun rise? _____
    - Q26. Record the time of sunrise and sunset: _____
    - Q27. Where is the Sun at noon (crossing the meridian)?_____
    - Q28. In what cardinal direction did the Sun set? _____
    - Q29. How many hours of daylight are there on July 24? _____
- Winter Solstice: ___December 21__
    - Q30. In what cardinal direction did the Sun rise? _____
    - Q31. Record the time of sunrise and sunset: _____
    - Q32. Where is the Sun at noon (crossing the meridian)?_____
    - Q33. In what cardinal direction did the Sun set? _____
    - Q34. How many hours of daylight are there on Dec. 21? _____
    - Q35. What constellations will be rising from the east just after sunset?

☐Cassiopeia	☐Gemini	☐Scorpius
☐Taurus	☐Leo	☐Sagittarius
☐Orion	☐Ursa Major - Big Dipper	☐Cygnus
☐Canis Major	☐Crux - Southern Cross	☐Pegasus

    - Q36. What constellations will just be setting in the northwest about 9pm?

☐Cassiopeia	☐Gemini	☐Scorpius
☐Taurus	☐Leo	☐Sagittarius
☐Orion	☐Ursa Major - Big Dipper	☐Cygnus
☐Canis Major	☐Crux - Southern Cross	☐Pegasus

- Spring or Vernal Equinox: ___March 20__
    - Q37. In what cardinal direction did the Sun rise? _____
    - Q38. Record the time of sunrise and sunset: _____
    - Q39. Where is the Sun at noon (crossing the meridian)?_____
    - Q40. In what cardinal direction did the Sun set? _____
    - Q41. How many hours of daylight are there on March 20?_____
    - Q42. Describe the location of Orion in the sky just after sunset.

- Q43. What constellation is high in the southern sky at 9pm?

☐Cassiopeia	☐Gemini	☐Scorpius
☐Taurus	☐Leo	☐Sagittarius
☐Orion	☐Ursa Major - Big Dipper	☐Cygnus
☐Canis Major	☐Crux - Southern Cross	☐Pegasus

Putting it all together:

- Q44. Does the Sun always rise exactly from the east? _____
- Q45. List the direction of <u>sunrise</u> at the beginning of each season:

Summer:	Winter:
Autumn:	Spring:

- Q46. List the direction of <u>sunset</u> at the beginning of each season:

Summer:	Winter:
Autumn:	Spring:

- Q47. Fill out the following table using the numbers in previous questions:

	Summer Solstice:	Autumnal Equinox:	Winter Solstice	Vernal Equinox
Hours of daylight				

- Q48. How did the number of daylight hours change from:
    a) Summer Solstice to Autumnal Equinox: _____
    b) Autumnal Equinox to Winter Solstice: _____
    c) Winter Solstice to Vernal Equinox: _____
    d) Vernal Equinox to Summer Solstice: _____

- Q49. Describe the changes in the noon position of the Sun from:
    e) Summer Solstice to Autumnal Equinox: _____
    f) Autumnal Equinox to Winter Solstice: _____
    g) Winter Solstice to Vernal Equinox: _____
    h) Vernal Equinox to Summer Solstice: _____

- Q50. Was the Sun ever directly overhead at noon in Hilo? If so, when?

- Q51. Describe the location in the sky of the constellation Orion at sunset for the beginning of each season:
    i) Summer Solstice: _____
    j) Autumnal Equinox: _____
    k) Winter Solstice: _____
    l) Vernal Equinox: _____

- Q52. Using the list of constellations on the first page of this activity, enter the names of the constellations that you can see during the night as shown on the planetarium:

Hilo LAT: 19 N	Summer Solstice June 22	☐Cassiopeia ☐Taurus ☐Orion ☐Canis Major	☐Gemini ☐Leo ☐Ursa Major - Big Dipper ☐Crux - Southern Cross	☐Scorpius ☐Sagittarius ☐Cygnus ☐Pegasus
Hilo LAT: 19 N	Autumnal Equinox Sept. 21	☐Cassiopeia ☐Taurus ☐Orion ☐Canis Major	☐Gemini ☐Leo ☐Ursa Major - Big Dipper ☐Crux - Southern Cross	☐Scorpius ☐Sagittarius ☐Cygnus ☐Pegasus
Hilo LAT: 19 N	Winter Solstice Dec. 21	☐Cassiopeia ☐Taurus ☐Orion ☐Canis Major	☐Gemini ☐Leo ☐Ursa Major - Big Dipper ☐Crux - Southern Cross	☐Scorpius ☐Sagittarius ☐Cygnus ☐Pegasus
Hilo LAT: 19 N	Spring Equinox Mar. 20	☐Cassiopeia ☐Taurus ☐Orion ☐Canis Major	☐Gemini ☐Leo ☐Ursa Major - Big Dipper ☐Crux - Southern Cross	☐Scorpius ☐Sagittarius ☐Cygnus ☐Pegasus
Quito Ecuador LAT: 0 N	Spring Equinox Mar. 20	☐Cassiopeia ☐Taurus ☐Orion ☐Canis Major	☐Gemini ☐Leo ☐Ursa Major - Big Dipper ☐Crux - Southern Cross	☐Scorpius ☐Sagittarius ☐Cygnus ☐Pegasus
San Francisco California LAT: 40 N	Spring Equinox Mar. 20	☐Cassiopeia ☐Taurus ☐Orion ☐Canis Major	☐Gemini ☐Leo ☐Ursa Major - Big Dipper ☐Crux - Southern Cross	☐Scorpius ☐Sagittarius ☐Cygnus ☐Pegasus
North Pole LAT: 90 N	Spring Equinox Mar. 20	☐Cassiopeia ☐Taurus ☐Orion ☐Canis Major	☐Gemini ☐Leo ☐Ursa Major - Big Dipper ☐Crux - Southern Cross	☐Scorpius ☐Sagittarius ☐Cygnus ☐Pegasus
Santiago Chile LAT: 33 S	Spring Equinox Mar. 20	☐Cassiopeia ☐Taurus ☐Orion ☐Canis Major	☐Gemini ☐Leo ☐Ursa Major - Big Dipper ☐Crux - Southern Cross	☐Scorpius ☐Sagittarius ☐Cygnus ☐Pegasus
Atlanta Georgia LAT: 33 N	Spring Equinox Mar. 20	☐Cassiopeia ☐Taurus ☐Orion ☐Canis Major	☐Gemini ☐Leo ☐Ursa Major - Big Dipper ☐Crux - Southern Cross	☐Scorpius ☐Sagittarius ☐Cygnus ☐Pegasus