

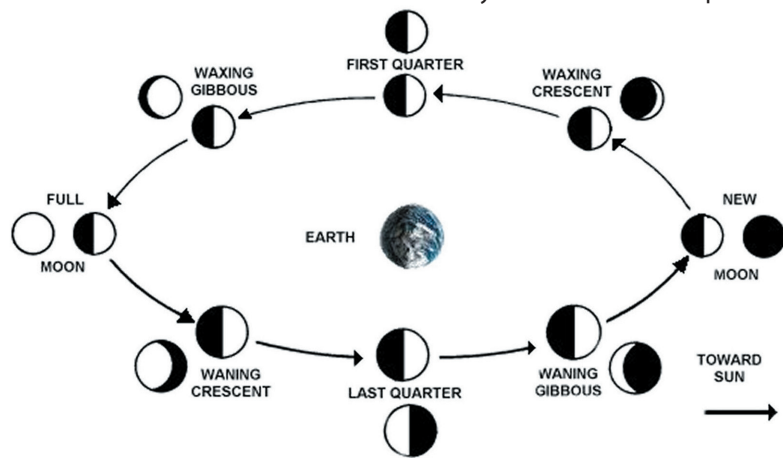
LESSON PLAN

MUSIC AND SCIENCE

Throughout history, music has been used to celebrate nature. Both folk songs and concert music frequently celebrate the sun, the moon, the seasons and other natural phenomena.

Discuss the science of the moon.

- The moon is believed to have originated 4.5 billion years ago when a collision between the earth and another planetary body occurred, dislodging a gigantic chunk of rocky debris. This debris gathered into a ball and began to orbit the Earth.
- Unlike the Earth, the moon is made of solid rock. It has no water and no volcanic activity. Because it lacks a protective atmosphere, the moon has been hit by meteorites very frequently. These are the cause of the moon's numerous craters.
- One side of the moon always faces away from the sun, and thus is permanently dark.
- The moon's gravitational pull causes the earth's tides. The bodies of water nearest the moon swell, while those farther away recede.
- The moon is only visible when it is reflecting sunlight. Depending on the relative positions of the sun, moon and earth, different portions of the moon are illuminated, from a "crescent moon" to "gibbous moon" to a "full moon." The various phases of the moon are shown in the diagram at right.



The phases of the moon

Discuss the mythology of the moon, and how the moon has been perceived by cultures throughout history.

- For instance, the word "lunacy" is derived from the French word for moon, lune. Because crime rates have historically been higher during the full moon, the moon was often cited as a cause of madness. Werewolves and other creatures draw their power from the moon.
- Some cultures perceive a human face in the full moon. The picture at right is taken from the first science fiction movie, a 1902 French silent film entitled *Le Voyage dans la Lune*.
- The mysterious associations of the moon have been a source of inspiration for many composers including Claude Debussy (Clair de lune from his piano piece *Suite bergamasque*) and Arnold Schoenberg (*Pierrot lunaire*).



Class Lesson:

- Play a recording and read a translation of the French folk song *Clair de lune*. This familiar song illustrates the special qualities of moonlight—mysterious, secretive and romantic.
- Play a recording of the first movement of Beethoven's *Sonata No. 14 in C-sharp minor*. Listen for the characteristics which have led many to call this work his "moonlight" sonata.
- Invite the students to bring in other art-work—music, painting, poems, etc.—that celebrate the moon.

Further Study:

Many concert works exist that can be paired with discussions of scientific topics. Gustav Holst's *The Planets* for orchestra is a musical portrait of each planet. Claude Debussy's orchestral work *La Mer* ("The Sea") describes the ocean at times of calm and times of tempest. Debussy also has many piano works that portray the wind, rain, clouds and more. Ludwig Beethoven's *Symphony No. 6* ("Pastoral") includes several natural scenes, including a lightning storm. Ferde Grofé's *Grand Canyon Suite* is a popular orchestral tone poem. Camille Saint-Saëns' *Carnival of the Animals* is a wonderfully colorful work celebrating elephants, whales, turtles, donkeys—and even fossils. Bedřich Smetana portrays the river of his homeland, the Moldau. Similarly, Charles Ives depicts the quietly flowing Housatonic river in the last movement of his *Three Places in New England*. George Crumb's *Song of the Whale* is a celebrated avant-garde work for electric flute, violin and piano that evokes the plaintive and mysterious voices of these undersea mammals. In works such as *Oiseaux Exotiques*, the 20th-century composer Olivier Messiaen included references to the bird-song of hundreds of species, which he avidly recorded. In addition, there are untold folk and popular songs that refer to nature, including such familiar tunes as *Fly Me to the Moon*, *Singing in the Rain* and *Somewhere Over the Rainbow*.