



Pictures in the Sky

Teacher Information:

Constellations are images of human and animal figures in the sky, using the stars much like a dot-to-dot picture. They were originally distributed symmetrically around a point directly above Earth's North Pole at that time. Since Earth wobbles like a top, the axis gradually shifts in a circular motion over 26,000 years. This is called *precession*. Astronomers have used their knowledge about precession to calculate that the constellations were most likely invented nearly 3,000 years ago.

Many of the constellations were figures of mythology fitted into star patterns and, therefore, do not always look like the figures they represent. For example, the stars forming Sagittarius the Archer look more like a teapot than an archer with bow and arrow.

The 12 zodiac constellations are located along the path Earth follows around the sun, called the *ecliptic*. The sun, moon, and planets are seen against the background of these constellations. Astronomy had its beginnings in astrology in which human behavior was supposedly controlled by the motion of the planets, sun, and moon within the zodiac constellations. Early astrologers carefully recorded the changing locations of these celestial bodies, valuable data that later helped astronomers understand much about these motions. Scientists realize there is no connection between how these celestial bodies move and what happens to anyone on Earth. Zodiac and other constellations serve as a useful sky map, helping us locate planets, comets, and other celestial bodies. For example, monthly charts show locations of planets within constellations. Learning these constellations can help students locate them and the planets which move among the star patterns.

The dates when the sun is in each zodiac constellation (see Zodiac Constellations) do not match dates you will see in horoscopes since these charts were made long ago when the sun was in different constellations. The sun's position changes against these constellations since Earth does not return to exactly the same place in its orbit at the same time each year. The months stated on the pictures are astronomically correct for the location of the sun at this time.

Materials:

Zodiac constellations (on the following pages), overhead projector, 12 sheets of large black construction paper, chalk or white grease pencil, clamp-on light fixture with 150-watt bulb.

Lesson Preparation:

1. Make transparencies of the zodiac constellations. Project them individually onto the large black paper and use the white marker to trace the stars (dots) and lines. The sizes of the dots denote brightness, not star size. Larger dots represent brighter stars.



2. Include the name of the constellation as well as when the sun is there and when it can be seen.
3. Find a large room for this lesson. Use a string 4-feet (122 cm) long with a loop at one end and a piece of chalk tied to the other to make a circle in the center of the floor. Have someone hold the loop on the string in the center of the floor, stretch out the strings, and use the chalk to draw a circle. Shorten the string to 2.5 feet (76 cm) and draw another circle within the first, using the same center point. Place the clamp-on lamp in the center of these circles above the level of your head, if possible.

Procedure:

1. Describe the information about the zodiac constellations, using the transparencies to enable students to see what they look like.
2. Select 12 students to hold the zodiac constellation pictures. Space them equally around the large circle. The constellations should be in numerical order, clockwise around the circle.
3. Place remaining students around the inner circle, facing the constellations. Turn on the bright light and turn off the room lights. Tell them that the bright light is the sun and they are the Earth.
1. Have them spin slowly in their positions in a counterclockwise direction. Day is when they face the sun; night is when they face away from the light and see the stars.
4. Explain that if they could go out beyond the solar system, they would see that Earth moves counterclockwise around the sun. Let them walk slowly in a counterclockwise direction around the circle, looking at the stars. Point out that the constellations appear to change as they move.
2. From Earth they see new constellations gradually appearing in the eastern sky as those in the west gradually disappear below the western horizon. It takes 12 months to get back to the original set of constellations. Have them walk around the circle until they return to the constellation they saw at first. Explain that they have just gone through one year.
5. Tell them to turn toward the sunlight and try to see the constellations beyond. Explain that the sun is so bright we can't see the stars beyond it. Tell the students that the 12 zodiac constellations correspond to the location of the sun during each of the 12 months. When the sun is "in" one of them (e.g., Leo), we can't see that constellation. Only when we go into space where sunlight is not scattered by Earth's atmosphere, can we see the stars and sun together. Even then, some of the stars near the sun are hard to see. We can also catch glimpses of bright stars and planets during a total solar eclipse when the sun is blotted out by the moon and we can see outer space beyond our atmosphere.
6. Explain that the planets and moons move around the sun on a plane, like a huge dinner plate with the sun in the center. The zodiac constellations lie beyond this plane and appear roughly east-west across Earth's sky. The planets, moon, and sun never appear in the sky north or south of this band of stars.
7. Describe the history of constellations and the connection between astrology and astronomy. Be sure to tell them that scientists today know that the movements of the planets, sun, and moon within the zodiac constellations do not control our lives.



Closure:

Distribute the zodiac constellations and have students look at the figures the star patterns are supposed to represent. Ask them which ones most resemble the pictures. These are Leo (the lion), Scorpius (the scorpion), and Taurus (the bull—face and horns only).

Extender:

Enlarge copies of some constellations without the lines and have the students make their own constellations. Have them use the patterns of the stars (dots) to turn them into pictures of things familiar to them.

Source:

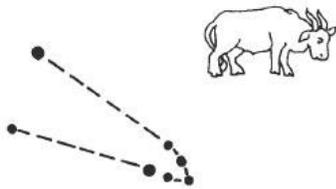
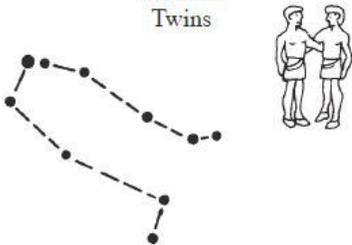
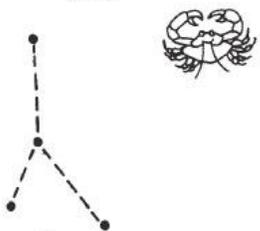
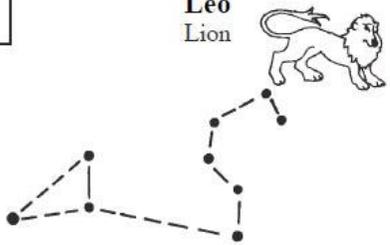
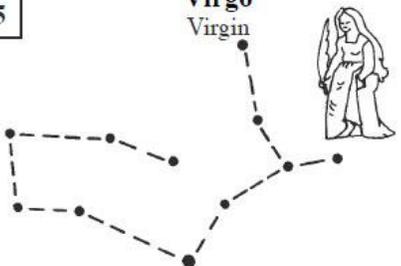
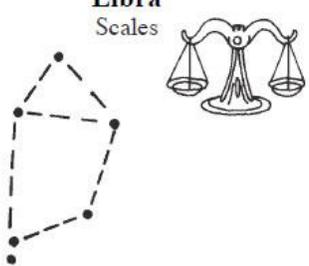
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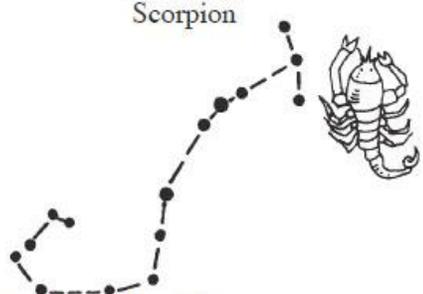
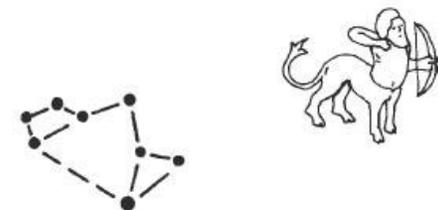
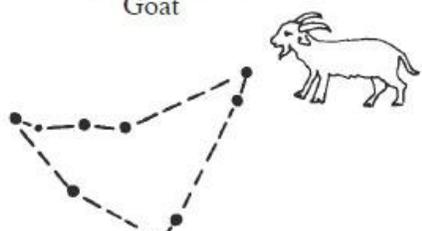
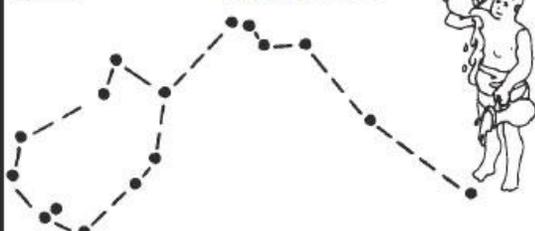
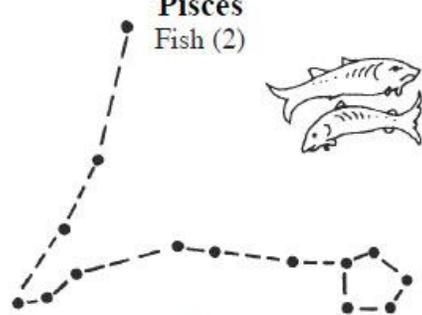
Zodiac Constellations

To the Student: The 12 constellations in these pictures are those which appear along the path the sun seems to follow in the sky as Earth moves around it. Long ago people thought that our lives were controlled by the location of planets in these constellations. Today, we know that the planets move in orbit around the sun and have no influence on humans at all. The shapes of constellations form a useful map of the sky which helps us locate planets which are seen against these stars. A planet looks like an extra star in a constellation, but it gradually moves into the next constellation.

The time on a card stating when a constellation is visible is the best month to see it. However, it will also be visible the month before and after. Visibility of these constellations also depends on the latitude of your location.

<p>1</p> <p>Taurus Bull</p>  <p>sun located here: June visible in night sky: January</p>	<p>2</p> <p>Gemini Twins</p>  <p>sun located here: July visible in night sky: February</p>
<p>3</p> <p>Cancer Crab</p>  <p>sun located here: August visible in night sky: March</p>	<p>4</p> <p>Leo Lion</p>  <p>sun located here: September visible in night sky: April</p>
<p>5</p> <p>Virgo Virgin</p>  <p>sun located here: October visible in night sky: May</p>	<p>6</p> <p>Libra Scales</p>  <p>sun located here: November visible in night sky: June</p>



<p>7</p> <p>Scorpius Scorpion</p>  <p>sun located here: December visible in night sky: July</p>	<p>8</p> <p>Sagittarius Archer</p>  <p>sun located here: January visible in night sky: August</p>
<p>9</p> <p>Capricornus Goat</p>  <p>sun located here: February visible in night sky: September</p>	<p>10</p> <p>Aquarius Water Bearer</p>  <p>sun located here: March visible in night sky: October</p>
<p>11</p> <p>Pisces Fish (2)</p>  <p>sun located here: April visible in night sky: November</p>	<p>12</p> <p>Aries Ram</p>  <p>sun located here: May visible in night sky: December</p>