

Summer and winter constellations in a cup

Background information

Due to the Earth's orbit around the Sun, the constellations seen in the night sky change throughout the year. The constellation of Orion can be seen during summer evenings and the constellation of Scorpius is in the sky during winter evenings.

- Orion is found low in the eastern sky from December, sits overhead throughout February, and sinks low in the western sky come April.
- Scorpius is visible low in the eastern sky from May, appears overhead during August, and is sinking low in the western sky by November.

Orion and Scorpius appear in opposite parts of the sky and, at certain times, one can be seen rising as the other one sets. At other times, one constellation is in the sky at night and the other is in the sky during the day – unseen because the light of the Sun drowns out the light of the stars. Six months later, when the Earth has travelled around to the other side of the Sun, their positions are reversed. There is a myth that states that Orion keeps far away from Scorpius because he was killed by the poisonous sting in the scorpion's tail.

The following activity allows students to become familiar with some common constellations visible during summer and winter evenings, and demonstrates how light from the Sun drowns out the constellations during the day.

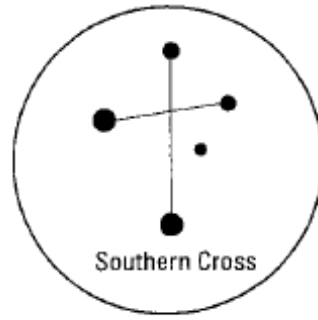
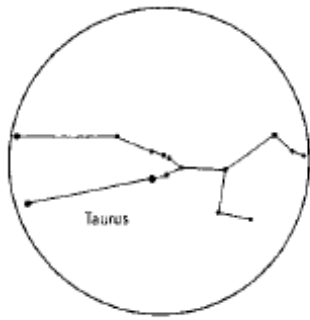
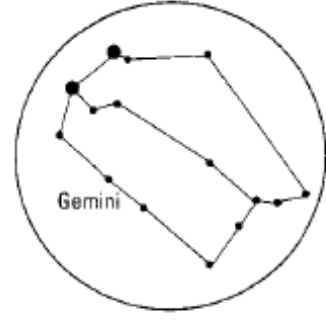
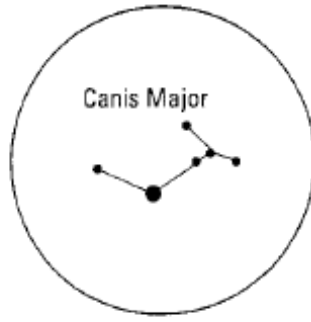
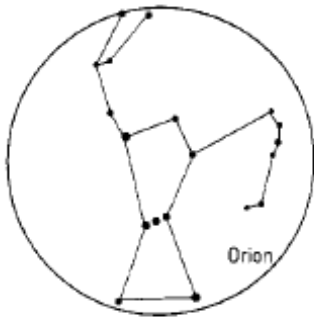
What you need

- Plastic or polystyrene cup (1 per pair of students)
- Thick pin, skewer or sharp pencil
- Scissors
- Torch (1 per pair of students)
- Access to a darkened room

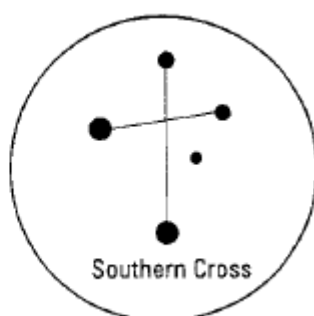
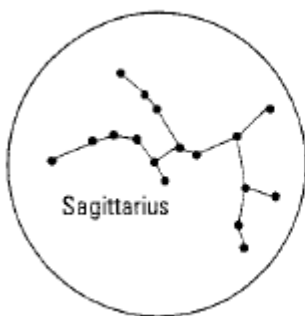
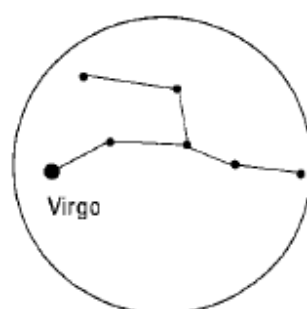
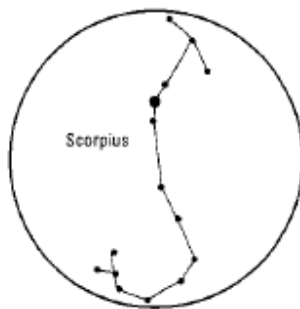
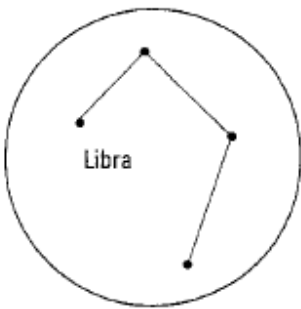
What to do

1. Cut out one of the cup constellations (see below), and paste it, face up, onto the inside bottom of the cup. Make small holes where the dots are by carefully pushing a pin or skewer through the dots one at a time. Make larger holes in the positions where there are larger dots (representing brighter stars).
2. Darken a room that has a clear wall to simulate night-time. Put the torch into the cup and shine it onto the wall. The constellation should appear as dots of light. For best results, adjust the distance between the cup and the wall.
3. Turn on the lights to represent daytime. Discuss what happens to the constellations, even if the students leave their torches on.
4. Encourage the students to look for their constellation in the night sky.

Summer constellations



Winter constellations



Changing constellations

Background information

Due to the Earth's orbit around the Sun, the constellations seen in the night sky change throughout the year. The constellations Orion and Scorpius are located at opposite sides of the Celestial Sphere (the imaginary sphere of stars that surrounds our Solar System). So as Orion sets in the west, Scorpius rises in the east, and vice versa.

During the Southern Hemisphere summer, when the South Pole of the Earth is pointed towards the Sun, the Earth is positioned between the constellation of Orion and the Sun. This is why Orion can be seen in our night sky during summer evenings. As the Earth continues to move around the Sun throughout the year, Orion is observed low in the eastern sky during the evening from December, sits overhead throughout February, and sinks low in the western sky come April.

During the Southern Hemisphere winter, when the South Pole of the Earth is pointed away from the Sun, the Earth is positioned between the constellation of Scorpius and the Sun. This is why Scorpius can be seen in our night sky during winter evenings. Scorpius is observed low in the eastern sky during the evening from May, appears overhead during August, and sinks low in the western sky come November.

The Southern Cross is positioned close to the South Celestial Pole, so from Melbourne it can be seen all year round.

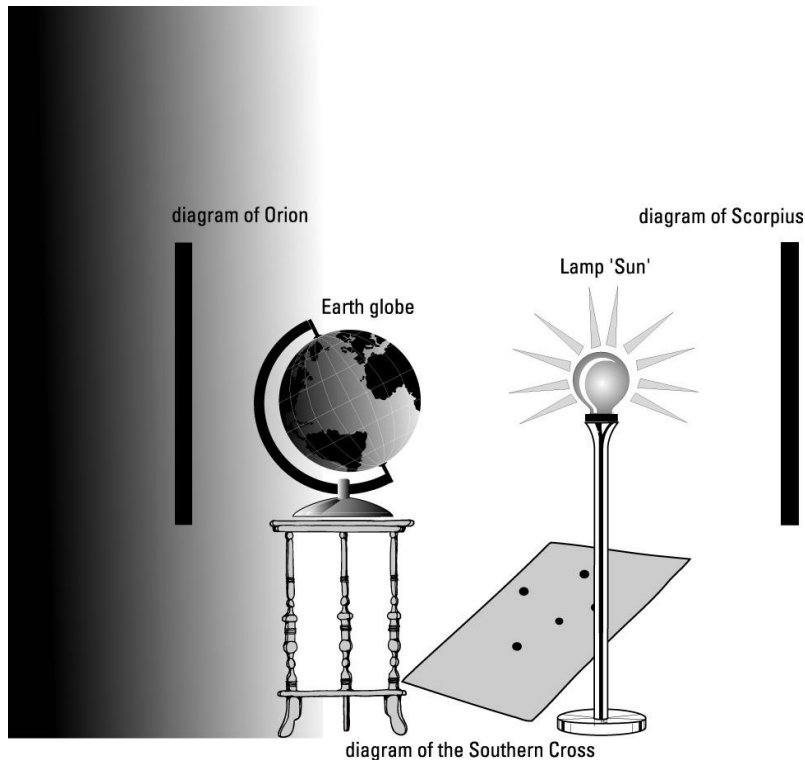
The following activity demonstrates how the position of the Earth relative to the Sun causes the various constellations to be visible at different times during the year.

What you need

- Diagrams of the Southern Cross, Orion and Scorpius
- Earth globe (tilted at 23.5 degrees to represent the Earth)
- Blu-Tack
- Lamp with no shade (to represent the Sun)

What to do

1. Blu-Tack the diagrams of Orion and Scorpius on opposite sides of the room. Ensure that both these constellations are lying on their sides.
2. Place the diagram of the Southern Cross about halfway between these constellations (on the floor).
3. Place a lamp representing the Sun on a chair or table halfway between and about the same height as the two constellations (Orion and Scorpius).
4. Switch the lamp on and darken the rest of the room.
5. Position yourself with the Earth globe so that it is between the Sun and the constellation of Orion. The South Pole should be pointing towards the Sun.
Explain to your students that this position represents summer in the Southern Hemisphere (approximately December 22).
6. Allow students to use the globe to identify Australia in the Southern Hemisphere, and some of the countries in the Northern Hemisphere.



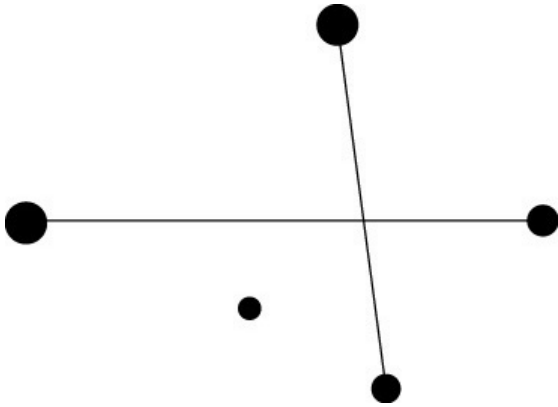
7. As you turn the Earth globe, you should be able to see that Orion is visible in the night sky and that Scorpius appears during the day but is drowned out by the Sun.
8. Ask the students whether the Southern Cross can be seen during summer in Australia. (The Southern Cross never drops below the horizon in Melbourne.)
9. Position the Earth between the Sun and the constellation of Scorpius. The South Pole and all of Antarctica should now be pointing away from the Sun and in 'darkness'. Explain to the students that this represents winter in the Southern Hemisphere (approximately June 22).
10. As you turn the globe, you should be able to demonstrate that during winter Scorpius can be easily seen in the night sky. However, the stars in Orion can't be seen during the day as these stars are drowned out by the light of the Sun.
11. Ask the students whether the Southern Cross can be seen during winter in southern Australia. (It can be seen, as the Cross never sets below the horizon at the latitude of Melbourne).

Optional

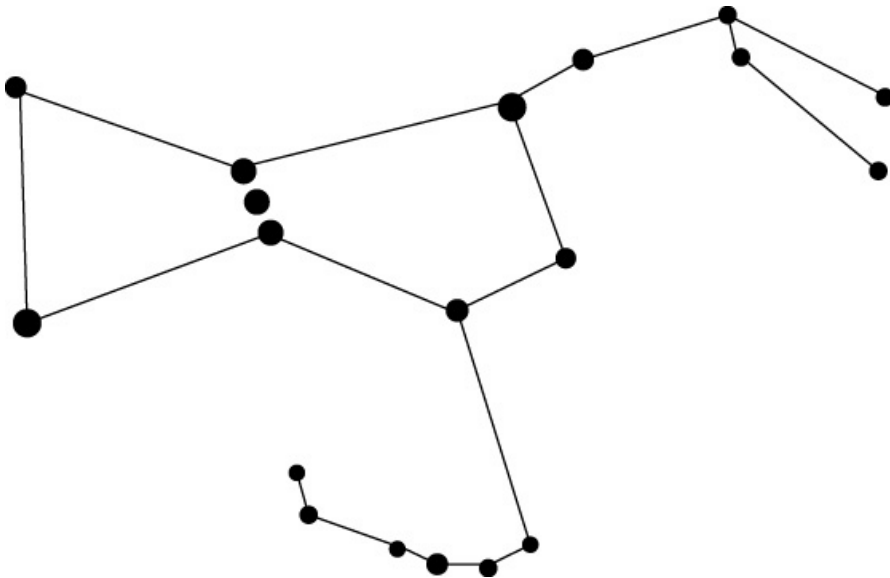
- Investigate whether Orion and Scorpius can be seen during autumn and spring using the same model.
- Research other constellations that are visible during winter or summer in the Southern Hemisphere.
- Look up the word *circumpolar* and name some circumpolar constellations in the Southern Hemisphere. (The use of a planisphere will be useful here.)

Changing constellations diagrams

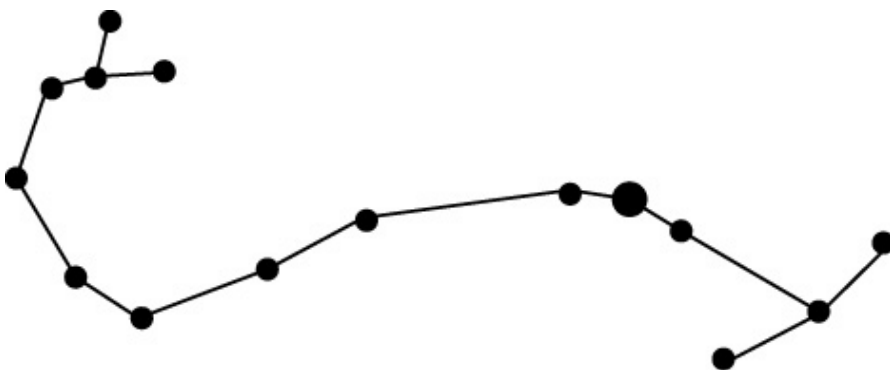
The Southern Cross



Orion



Scorpius



Making 2-D models of constellations

Introduction

This activity helps students to become familiar with the main constellations. The 2D models can be used as a temporary display around the classroom to help you remember the names and patterns of the constellations.

What you need

- Container of paper strips, each with the name of a main constellation
- A3 black cardboard (one per student)
- Sticky tape or glue
- White chalk, pencil or crayon
- Worksheet with the main constellations
- Aluminium foil

What to do

1. Choose a constellation from the container.
2. With aluminium foil, make 3-D stars by rolling the foil into balls and sticking these onto black cardboard in the shape of their constellation.
3. With a white pencil or crayon, draw imaginary lines joining the stars so that the constellations can be more easily identified.
4. With the aluminium foil, cut out the letters that make up the name of the constellation and label the constellation on the cardboard.
5. Place the labelled constellations along the back wall so that you have your own night sky in the classroom. You may want to use a star map as a reference to position the constellations as they would appear for a particular month at 8pm (AEST). Star maps are available online from the following website:
or from Skymaps.com: <http://www.skymaps.com/downloads.html>

