

Walk the Solar System - Teaching Suggestions

Print a planisphere for each student on thick material such as 110 lb. card stock. Students cut them out. These are useful for students to keep; some will use them later, especially on a summer holiday in a dark sky area.

Practice using the planispheres over several days, perhaps using similar handout sheets as included with this file. It is important to end up identifying which zodiac constellation in each month is south at midnight. They are opposite the sun. They provide the background for the dance of the planets around the sun.

Put labels for months around classroom in a counterclockwise direction as seen from above. Keep the spacing even so months six months apart are directly opposite: eg June- December.

Hand out sheets with names of 13 zodiac constellations. The names should be big enough to read from across the classroom. Tape up the constellation next to the month when it is south at midnight (eg Virgo in April). These constellations are opposite the sun during those months. Push the desks back; put a large yellow balloon in the centre to represent the sun.

Get a student to carry a small model globe around the Sun in a counter clockwise direction. Stop when Sagittarius is south at midnight. (early July)

Get the student to face away from the Sun. That is midnight. Get him or her to turn slowly (counterclockwise from above). Stop halfway around. What would the time be? [Noon]. Now go a quarter turn. This is sunset. In the evening, we can see planets behind us in the orbit. Now another quarter for midnight, then a quarter to dawn at 6 am. Just before dawn, we see planets ahead of us.

Get the student to face the Sun again. The Sun would be south at noon. Ask what constellation could be seen behind the Sun? Gemini.

Gemini is the zodiac constellation for early June, not July. Some students might ask why the astrological zodiac constellation dates do not match the astronomical ones. That is because the north pole points to different spots in the sky over a 22 000 year cycle. Polaris is the pole star now. Two thousand years ago, when the Egyptian astronomer Ptolemy set up the zodiac constellations, the Earth's north pole pointed to a different spot in the sky. The spring equinox then occurred when the sun was in Aries, now it occurs when the sun is in Pisces. Our calendar keeps March 21 as the date of the equinox so the zodiac constellation for a given date changes, about one constellation every 2000 years.

Then get students to walk counterclockwise around the yellow balloon. This is the Earth's orbit. Ask students to do something like: "Walk for a year and then on to where the earth would be in August. What constellation is the sun in?" Or walk to where Leo would be opposite the sun.

Then add another smaller globe with Mars. This planet moves outside the Earth and slower. Get the students to walk so Earth moves around almost two times for each Mars orbit. You might start both in November 2006 when Mars is directly opposite the Sun.

Then add Venus. It goes inside Earth in $\frac{2}{3}$ of a year. Try two students for Earth and Venus. Before Venus passes us, it is visible in the evening sky, because it is behind us. After inferior conjunction, it is visible in the morning sky.

Extensions:

Use a ping pong ball to illustrate eclipses.

Show inner planets passing us. Before these inferior conjunctions, they are very bright and visible in the evening.

Show planets going above and below the orbit of earth. Usually inner planets are above or below the sun. On rare occasions there are transits.

Show oppositions when earth passes outer planets like Mars.

Show how a small asteroids moving close to the earth are deflected and can move into other parts of the solar system.

Finding Constellations

Name _____

1. Where is Cassiopeia at 10 pm on May 15? _____
Describe its shape.

2. Where is Aquila at 8 pm on Sep. 15? _____

Name the bright star in this constellation. _____

3. What is overhead at 9 pm on Sept. 15? _____

Sketch the shape of this constellation.

4. When does Betelgeuse rise on Aug 30? _____

Name another bright star in Orion. _____

Label both on the diagram at the right.

5. What bright star is rising at 9 pm on Dec. 5? _____

6. In what month is Gemini south at midnight? _____

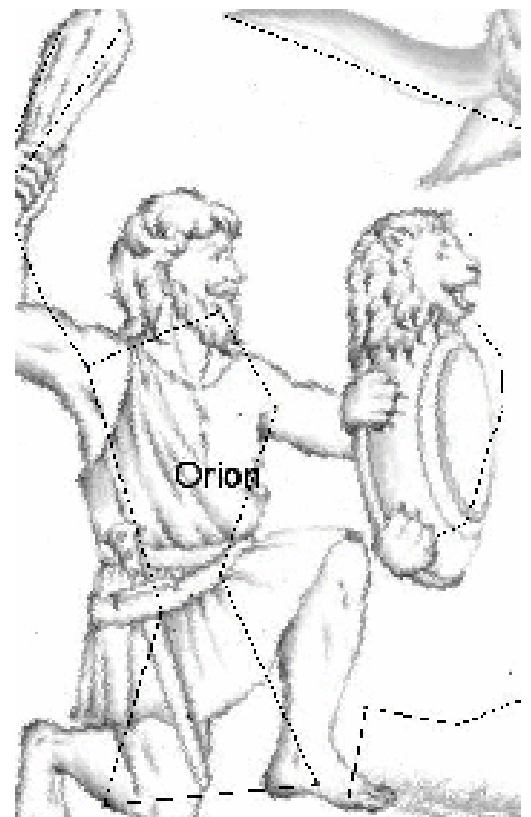
7. When does Regulus rise on New Year's Day? _____

8. Where is Taurus at midnight on Feb. 15? _____

9. Sketch the Big Dipper if you were looking north at 11 pm on August 31.

10. Where would Ophiuchus be at 9 pm. on May 1? _____

11. Make up and answer two more questions. _____



Navigating with your Planisphere

Name _____

1. When will Procyon rise on Sept. 1? _____
2. What direction is Polaris at 9 pm tonight? _____
3. What will be the direction of Polaris at 3 am tomorrow morning? _____
4. What constellation will be setting at 10 pm on Nov. 25? _____
5. Where is Gemini at midnight on July 1? _____
6. In what month is the Big Dipper close to overhead at 10 pm? _____
7. In what month is the same constellation close to the horizon at 10 pm? _____
8. In what month is Bootes opposite the Sun, that is south at midnight? _____
9. Fill in the chart:

Constellation	Month south at midnight	Dates Sun is in Constellation
Pisces		Mar 11 to Apr 18
Aries		Apr 18 to May 13
Taurus		May 13 to June 20
Gemini		June 20 to July 19
Cancer		July 19 to Aug 9
Leo		Aug 9 to Sept 16
Virgo		Sept 26 to Oct 30
Libra		Oct 30 to Nov 22
Scorpius		Nov 22 to Nov 29
Ophiuchus		Nov 29 to Dec 17
Sagittarius		Dec 17 to Jan 19
Capricornus		Jan 19 to Feb 15
Aquarius		Feb 15 to Mar 11

Round and Round the Sun

Name _____

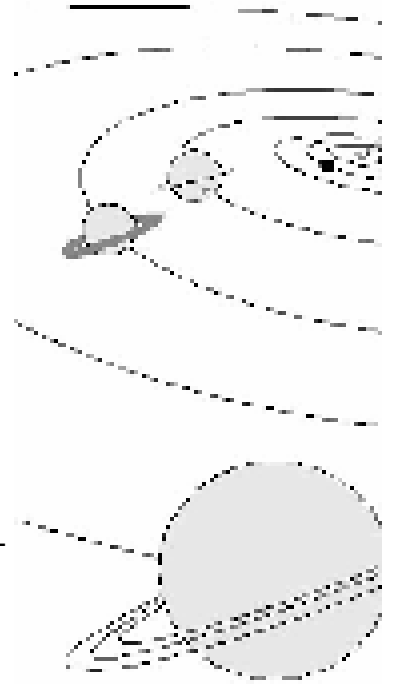
1. In December, what zodiac constellation is south at midnight? _____

2. In January, what constellation is the Sun in? _____

3. What month is the Sun in Cancer? _____

4. Where will the Sun be a month later? _____

5. When can you see Scorpio south at midnight? _____



6. When is your birthday? _____

What constellation was the sun in when you were born? _____

What is your astrological sign? _____

7. Can you see Aquarius at night in February? _____

Name a good month to see Aquarius at 10 pm. _____

8. In November, Mars is in Libra. Is it visible at night or is it close to the Sun? _____

9. In February, Venus is in Aries. Could you see it in the evening or the morning? _____

10. Make up and answer two more questions.

Answers

Finding Constellations

1. North, W shape 2. south, but high in sky, Altair 3. Cygnus, cross 4. midnight to 1 am, Rigel 5. Sirius 6. Dec. – Jan., 7. 8 to 9 pm 8. near western horizon, 9. the bowl faces up compared to the horizon 10. east horizon

Navigating with Your Planisphere

1. 2 to 3 am. 2. North 3. North 4. Aquila or Capricorn 5. below horizon, not visible in sky 6. March- April 7. Sept. October 8. April- May

Pisces- Oct., Aries - early Nov., Taurus – Dec., Gemini – Jan., Cancer – early Feb., Leo – March, Virgo – April, Libra - May, Scorpio – early June, Ophiuchus – late June, Sagittarius – July, Capricornus – August, Aquarius – Sept.

Round and Round the Sun

1. Taurus 2. Sagittarius or Capricornus 3. July-yAugust, 4. Leo, 5. May – June 6. Varies, astrological constellation one behind, ie born in early June, Sun in Taurus, astrological sign Gemini 7. No, Aquarius close to Sun, any summer or fall month 8. No, close to Sun 9. Sun in Aquarius, at sunset Venus in west,