WHERE'S THE SUN?

Answers will depend on the time of day the observations are made. Students should include the time of observation.
SUN AND SHADOWS

1. What two ways does the Sun’s position in the sky change?
   The Sun travels across the sky every day, rising in the east and setting in the west. It also changes its path from season to season, getting higher in the sky during the summer and lower in the winter.

2. What are shadows and what causes them?
   Shadows are darkness. Shadows form (outdoors during the day) when sunlight is blocked by a person or an object.

3. What causes shadows to change size and direction during a day?
   The height of the Sun in the sky affects the length of shadows; the direction from which light comes affects the direction a shadow points. As the Sun moves across the sky, its height and direction changes which change the length and direction of the shadow.

4. Describe the Sun’s change of position in the sky during 1 day.
   The Sun rises in the east and travels west across the sky. It rises higher until it reaches noon. After noon the Sun continues to travel west, getting lower as it goes. The Sun sets in the west.

5. Describe the Sun’s change of position in the sky during 1 year.
   The Sun’s path across the sky changes with the seasons. The path is highest in the summer and lowest in the winter.
THE NIGHT SKY REVIEW

1. What are some of the objects you can see in the night sky that you can’t see during the day?
   - planets, stars, and possibly meteorites and comets

2. Which object is the brightest object in the night sky?
   - When it appears at night, the Moon is the brightest object in the sky. The planet Venus is the second brightest object.

3. Which star is the closest to planet Earth?
   - the Sun

4. Look at the picture of the crescent Moon on page 18 of the Science Resources book. What is the other bright object you can see in the night sky?
   - a planet—Venus
PHASES OF THE MOON-1

The Moon orbits the Earth during a 4-week lunar cycle. Place in each box the phase of the Moon we see from Earth during the cycle and name the phase.

new Moon

waxing crescent

first quarter

waxing gibbous

full Moon

waning gibbous

third quarter

waning crescent

new Moon

waxing gibbous, third quarter, full Moon, waxing crescent, waxing crescent, new Moon, first quarter, waning gibbous
PHASES OF THE MOON—2

The Moon orbits the Earth during a 4-week lunar cycle. Place in each box the phase of the Moon we see from Earth during the cycle and name the phase. Note where the Sun is.

- full Moon
- waning gibbous
- waxing gibbous
- third quarter
- first quarter
- waning crescent
- waxing crescent
- new Moon

Sunlight

full Moon, waxing gibbous, third quarter, waning crescent, waxing crescent, new Moon, first quarter, waning gibbous
STARGAZING REVIEW

1. Why do stars move across the night sky?
   Stars are stationary in the sky, but Earth rotates (turns on its axis), creating the appearance of stars moving across the night sky.

2. What is a constellation?
   A constellation is a group of stars in a pattern that has a name. The pattern of stars never changes its shape.

3. Why are the constellations seen in the summer sky different than those seen in the winter sky?
   Earth orbits the Sun. The side toward the Sun is always in daylight; the side away from the Sun is always in darkness. Stars surround Earth in all directions. Stars (constellations) are only seen in the dark. The dark side of Earth faces in different directions as it orbits the Sun, so different constellations are seen season by season.

4. Imagine you could see stars during the daytime. What constellation would you see at noon in the winter? Why do you think so?
   Aquila. The daylight side of Earth faces the part of the sky where Aquila is.
ALL ABOUT THE STARS

1. How many stars are there?
   There are millions and billions of stars, way too many to count.

2. What is the name of the star closest to Earth?
   the Sun

3. What happens to stars at the end of their lives?
   Small stars burn out and stop making heat and light. Large stars end with a huge explosion called a supernova.

4. What is a constellation?
   a group of stars in a pattern that has a name

5. What is the Milky Way?
   a galaxy composed of billions of stars, including the Sun. The Milky Way is one of billions of galaxies.

6. What does a telescope do?
   A telescope magnifies things, making them look larger and closer. You can see more stars with a telescope than you can with just your eyes.

7. Why are telescopes put on top of mountains or in space?
   to get them away from light from cities, etc., and to get above much of the atmosphere for a clearer view
sm20. a. What is a shadow?

A shadow is a dark area where an object has blocked the light.

b. What do you need to have a shadow?

a light source and an object to block the light

sm21. Johara and Noah were tracking the location of the Sun in the sky. Noah faced south and pointed to the Sun at 9:15 a.m., noon, and 2:15 p.m. Johara drew where his arm pointed, but forgot to label her drawing with the times.

Fill in the boxes with the times when Noah was pointing at the Sun.

2:15 p.m.  noon  9:15 a.m.

sm22. How could you tell the approximate time if you didn’t have a watch, but had a compass and you were outside on a sunny day?

Use the compass to find out east and west. In the morning your shadow will point west and in the afternoon it will point east. If your shadow is long, it is near sunrise or sunset and if it is short it is noon.
sm23. a. Why do the shape and direction of your shadow change during the day?  
(Circle the one best answer.)

A. The Sun's position changes during the day.
B. The shadows can show the time of day.
C. The Sun rises at different times each day.

b. What direction do shadows always point?  
(Circle the one best answer.)

A. toward the Sun
B. away from the Sun
C. to the left

sm24. a. How does the Sun appear to travel across the sky during the day?  

The Sun moves from east to west each day.

b. Why does the Sun appear to travel across the sky during the day?  

The Sun is in one place, and the Earth is rotating to the east on its axis.

sm25. How does Earth's rotation explain day and night?  
(Mark all the correct answers.)

X It is daytime on the side facing the Sun.
   Days are longer in the summer.
X The side facing away from the Sun is dark.
X The side of Earth facing the Sun is always changing.
sm26. a. How does a flagpole’s shadow change over a year?

In the summer the shadows are shorter, and in the winter the shadows are longer.

b. Why do shadows change over a year?

In the summer the Sun is higher in the sky, and in the winter the Sun is lower in the sky.

sm27. Look at the illustration. Judging by the shadow, what time of day is it?
(Circle the one best answer.)

A. sunrise
B. noon
C. sunset

sm28. What affects the length of a flagpole’s shadow?
(Mark all the correct answers.)

X the time of day
___ the temperature
X the season
X the height of the flagpole
___ the distance from the Sun

sm29. In the morning, you are facing west. Where will your shadow be?
(Circle the one best answer.)

A. pointing east
B. behind you
C. in front of you
I-CHECK
Investigation 2

sm30. What is the name of the satellite that orbits the Earth?
(Circle the one best answer.)

A. Mercury
B. Mars
C. Moon

sm31. Why does the Moon look a little bit different every night?

As the Moon revolves around Earth, we see a different part of the lighted side.

sm32. Which of the following objects can be seen in the night sky?
(Mark all the correct answers.)

[ ] a new Moon
[ ] stars
[ ] a crescent Moon
[ ] Venus
[ ] Saturn
[ ] the Sun

sm33. Why does the Moon look like it shines?

The light from the Sun shines on the Moon, and the sunlight reflects back to us.

sm34. How long does it take for the Moon to orbit Earth?
(Circle the one best answer.)

A. one week
B. one month
C. one year
I-CHECK
Investigation 2

Awan began keeping a Moon calendar at home. Monday night was a new Moon. The calendar for his first week is shown below.

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>7:15pm</td>
<td>6:45pm</td>
<td>6:55pm</td>
<td></td>
<td>7:30pm</td>
<td>7:20pm</td>
<td>7:30pm</td>
</tr>
</tbody>
</table>

a. What is the name of the Moon phase shown on Tuesday? (Circle the one best answer.)

A. full Moon
B. waxing crescent
C. waning gibbous

d. Which Moon did Awan probably draw incorrectly? (Circle the one best answer.)

A. Tuesday
B. Wednesday
C. Friday

c. Was the Moon waxing or waning in the first week of Awan's Moon calendar? waxing

What is your evidence for this? The Moon is getting bigger each day.
sm36. Galileo Galilei was the first scientist to use a telescope to see
(Mark all the correct answers.)

_____ Earth.
X___ the moons of Jupiter.
X___ craters on the Moon.
____ a black hole.
X___ planets as spheres.

sm37. What is a star?

_____ a ball of burning gas that gives off light and heat

sm38. a. Why do the stars appear to move across the sky at night?
(Circle the one best answer.)

A___ Earth rotates on its axis.
B___ The Moon revolves around Earth.
C___ Earth revolves around the Sun.

b. Why do you see different stars in winter and summer?
(Circle the one best answer.)

A___ Earth rotates on its axis.
B___ The Moon revolves around Earth.
C___ Earth revolves around the Sun.

sm39. How does a telescope help you see the stars better?

_____ Telescopes help you see more stars, and they appear to be closer.
sm40. a. Why are big telescopes usually found on top of mountains?

The sky is darker, there is less light from the ground, and there is less dust and pollution to get in the way.

b. Why are telescopes in space, like the Hubble Telescope, even better?

In space it is even darker, and there is no atmosphere so the view is clearer.

sm41. a. Which of the following would be a good time to go outside and look at the stars near your home?

(Circle the one best answer.)

A. during a full Moon
B. just before sunset
C. during a new Moon

b. Why did you pick that time?

The sky would be the darkest because there would be no light from the Moon.

sm42. a. Why do stars in the night sky look so small?

because they are so far away

b. Why does the Sun look bigger than the other stars?

because it is so close to Earth
sm43. What can you do to see more stars at night?
(Mark all the correct answers.)

X Look through a telescope.
____ Go to a well-lit parking lot.
X Go to a dark field away from the city.
____ Go to the top of the tallest building in town.
X Look through binoculars.

sm44. Why don't you see constellations during the daytime?

The Sun is so close and bright you can't see the stars in constellations around it.

sm45. Different constellations are visible in summer and winter. Why can't you see the winter constellations in summer?
(Circle the one best answer.)

A. They change into different constellations.
B. They are on the other side of the Moon from Earth.
C. They are on the other side of the Sun from Earth.
SUN, MOON, AND STARS

sm1. a. In what direction did the Sun rise this morning? east
    b. In what direction will the Sun set this evening? west
    c. Does the Sun rise and set in the same directions each day? yes

sm2. Which of the following Moon drawings is a crescent moon?
(Circle the one best answer.)

A. [Crescent Moon]
B. [Full Moon]
C. [Crescent Moon]

sm3. What times might you be able to see the Moon in the sky?
(Mark all the correct answers.)

X at night
X during a new moon
X early in the morning
X just before sunset
X just after sunrise

sm4. What instrument makes faraway objects seem closer?
(Circle the one best answer.)

A. microscope
B. telescope
C. periscope
SUN, MOON, AND STARS
Survey/Posttest

sm5. How many weeks are between full Moons?
   (Circle the one best answer.)
   A. one week
   B. two weeks
   C. four weeks

sm6. What information can a shadow give you?
   (Mark all the correct answers.)
   X the position of the Sun
   X the time of day
   X how tall you are
   X where east and west are

sm7. a. When will your shadow be the longest?
   (Circle the one best answer.)
   A. noon in winter
   B. sunrise in winter
   C. noon in summer

   b. When will your shadow be the shortest?
   (Circle the one best answer.)
   A. noon in winter
   B. sunrise in winter
   C. noon in summer
sm8. Look at the picture below.
   a. Draw an outline of the student's shadow.

   Shadows are always on the opposite side from the Sun.

   b. Why did you draw the shadow where you did?

sm9. a. Why does the shape of the Moon appear to change each night?
   (Circle the one best answer.)
   A. The Moon revolves around Earth.
   B. The Earth revolves around the Moon.
   C. The Earth rotates on its axis.

   b. Why does the Moon appear to move across the sky each night?
   (Circle the one best answer.)
   A. The Moon revolves around Earth.
   B. The Earth revolves around the Moon.
   C. The Earth rotates on its axis.
SUN, MOON, AND STARS
Survey/Posttest

sm10. What star is closest to Earth?  

the Sun

sm11. Which flagpole shows a shadow in the late afternoon?  
(Circle the one best answer.)

sm12. a. Which of the following would be a good location to build a telescope?  
(Circle the one best answer.)

A. downtown Los Angeles
B. a mountaintop in the Sierra Nevada
C. a beach near San Francisco

b. Why did you select this location?  
less light from people, less pollution and fog, and a darker sky
SUN, MOON, AND STARS

Survey/Posttest

sm13. What causes day and night on Earth?
   (Circle the one best answer.)
   A. Earth rotates on its axis.
   B. Earth revolves around the Sun.
   C. The Moon revolves around Earth.

sm14. What tool that makes distant objects look closer did Galileo Galilei use?
   (Circle the one best answer.)
   A. microscope
   B. telescope
   C. periscope

sm15. Describe the movement of the stars in the sky during night.

   The stars rise in the east, move across the sky, and set in the west.

sm16. A group of stars that forms a pattern that has a name is called
   (Circle the one best answer.)
   A. a constellation.
   B. a solar system.
   C. a galaxy.

sm17. Where is the Sun at noon?
   (Circle the one best answer.)
   A. at the horizon
   B. at the equator
   C. at its highest point in the sky
SUN, MOON, AND STARS

Survey/Posttest

ANSWERS

sm18. Where will your shadow be if the Sun is behind you?
(Circle the one best answer.)

A. in front of you
B. behind you
C. beside you

sm19. Compare the motion of the stars at night and the Sun during the day.

a. How are they the same?
   The stars and the Sun move across the sky from east to west each day.

b. How are they different?
   We see different stars in winter and summer, but we see the Sun every day of the year.