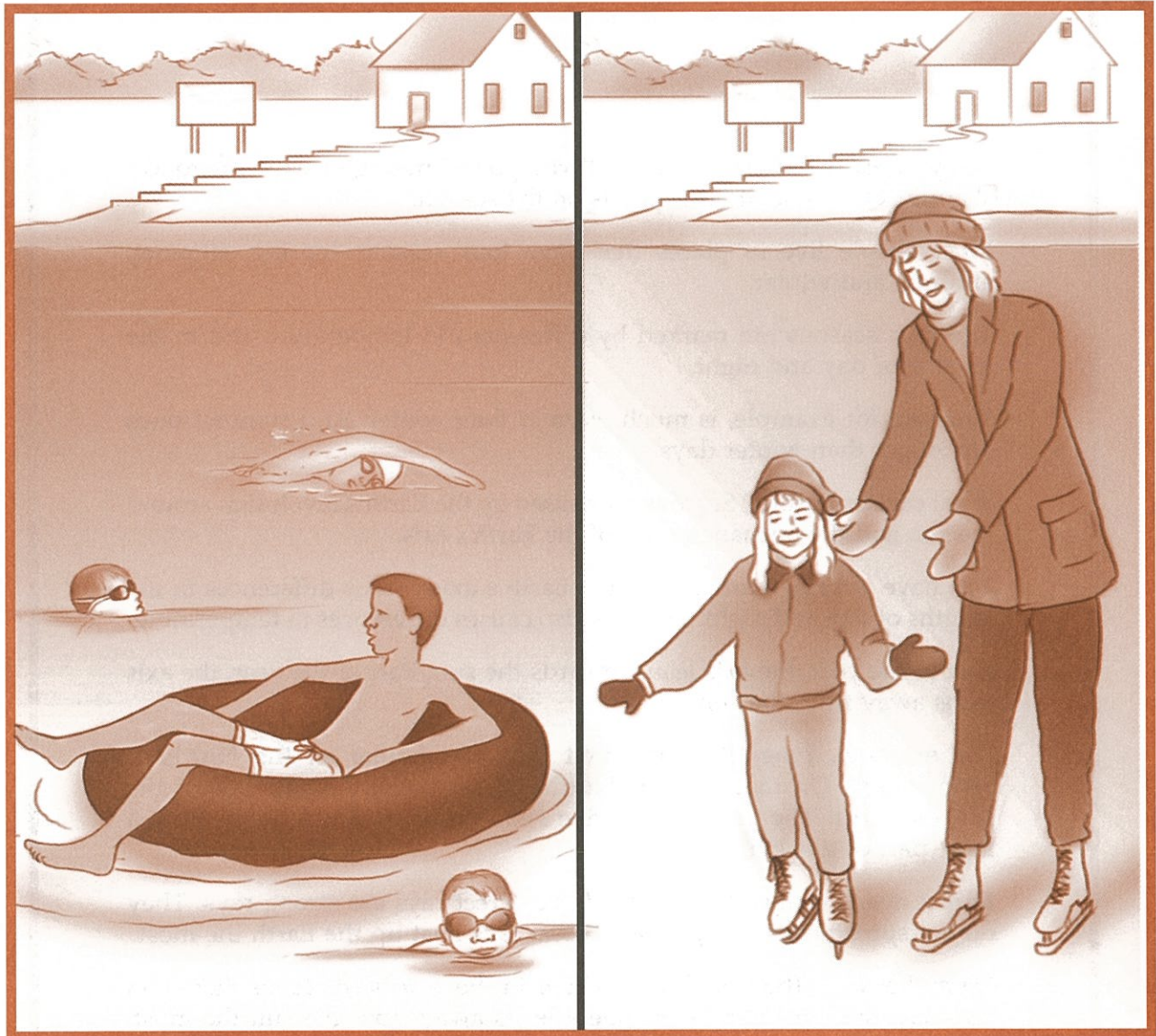


What causes the change of seasons?



KEY TERMS

direct rays: light rays that hit the Earth straight on

indirect rays: light rays that do not hit the Earth straight on

LESSON

14

What causes the change of seasons?

Are you ready for a vacation? Will you go swimming or will you go ice-skating? Of course, it all depends on the season.

Most people live in places that have four seasons—spring, summer, autumn, and winter.

The four seasons are marked by differences in temperature and in the lengths of day and night.

Summer, for example, is much warmer than winter. And summer days are longer than winter days.

What causes seasons? Seasons are caused by the Earth's revolution around the sun and the unchanging tilt of the Earth's axis.

You have already learned how the Earth's axis causes differences in the lengths of day and night. The axis also causes differences in temperature.

Part of the year, the axis leans towards the sun. Part of the year, the axis leans away from the sun.

For example, June 21 is the first day of summer in the Northern Hemisphere. On that day, the Northern Hemisphere leans toward the sun the most. The sun's rays strike head-on or nearly head-on over a large part of this hemisphere.

Direct rays are rays that are head on. Direct rays are strong rays. They do not spread over a large area. Direct rays heat up the Earth the most.

December 21 is the first day of winter in the Northern Hemisphere. On that day, the Northern Hemisphere leans away from the sun the most. The sun's rays do not strike head-on. They spread over a large area.

Rays that spread out are called **indirect rays**. Indirect rays are weak rays. They heat up the Earth the least.

UNDERSTANDING DIRECT AND INDIRECT RAYS

Figure A shows direct rays and indirect rays. Study it. Then answer the questions or fill in the blanks.

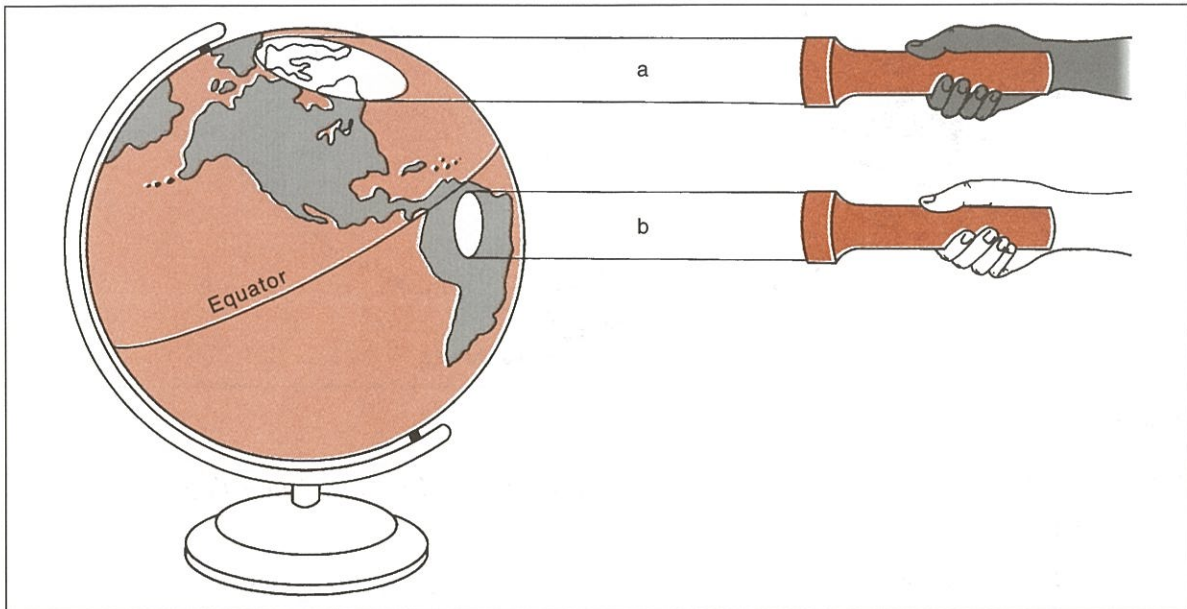


Figure A

1. Which rays are direct? _____
a, b

2. Which rays are indirect? _____
a, b

Answer "direct" or "indirect."

3. Which rays spread out? _____

4. Which rays do not spread out? _____

5. Which rays are stronger? _____

6. Which rays are weaker? _____

7. Which rays heat a place more? _____

8. Which rays heat a place less? _____

9. Winter rays are _____ rays.

10. Summer rays are _____ rays.

11. Which of the rays in Figure A can stand for winter rays? _____
a, b

12. Which of the rays in Figure A can stand for summer rays? _____
a, b

UNDERSTANDING THE CHANGING SEASONS

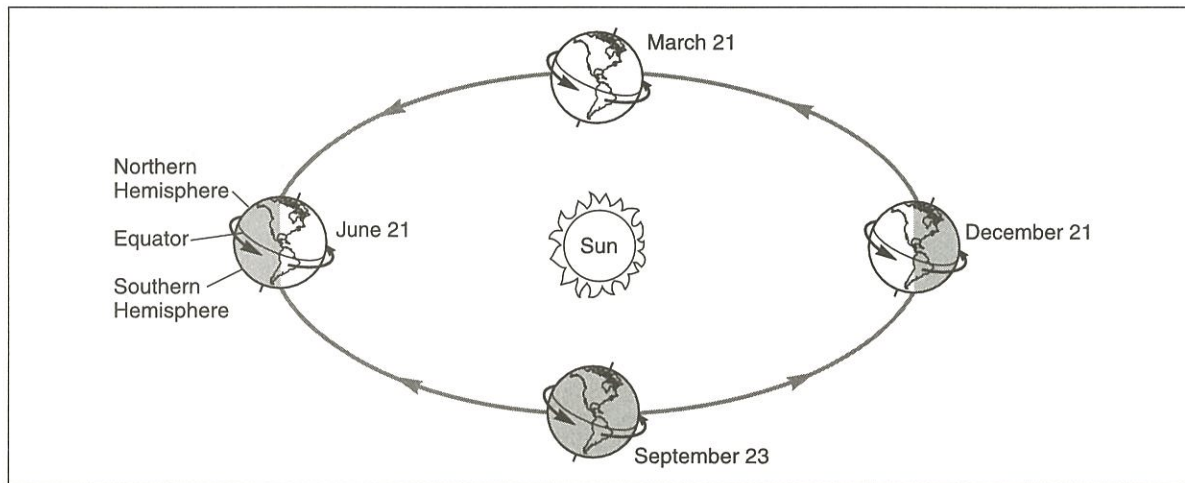


Figure B

TAKE A TRIP. Follow the Earth for one revolution around the sun. Study Figure B. Then fill in the blanks.

1. The Earth revolves around the sun in a _____ direction.
clockwise, counterclockwise
2. As the Earth revolves around the sun, the Earth's axis _____ change.
does, does not
3. **On June 21, the Northern Hemisphere . . .**
 - a) faces _____ the sun.
toward, away from
 - b) has mainly _____ weather.
cold, warm
 - c) has _____ hours of daylight than the Southern Hemisphere.
more, fewer
 - d) receives _____ rays. These are _____ rays.
direct, slanting strong, weak
 - e) has the first day of _____ .
summer, fall, winter, spring
4. **Between June 21 and September 22, . . .**
 - a) the Northern Hemisphere still leans toward the sun, but every day the lean becomes _____ .
greater, less
 - b) the rays become _____ direct and spread out _____ .
more, less more, less
 - c) the days become _____ and the nights become _____ .
longer, shorter longer, shorter

5. On September 23 . . .

- a) the Earth's axis is tilted _____ the sun.
toward, away from, neither toward nor away from
- b) the sun's rays are _____.
direct, indirect, neither direct nor indirect
- c) _____ starts in the Northern Hemisphere.
summer, fall, winter, spring
- d) every place on Earth has _____ hours of day and
_____ hours of night.

6. Between September 23 and December 20 . . .

- a) the Northern Hemisphere starts to lean _____ the sun.
toward, away from
- b) the sun's rays become more _____. These rays are
_____.
direct, indirect
stronger, weaker
- c) days become _____ and nights become _____.
longer, shorter
longer, shorter

7. On December 21 the Northern Hemisphere . . .

- a) faces _____ the sun.
toward, away from
- b) has mainly _____ weather.
cold, warm
- c) has _____ hours of daylight than the Southern Hemisphere.
more, fewer
- d) receives _____ rays. These are _____ rays.
direct, indirect
strong, weak
- e) has the first day of _____.
summer, fall, winter, spring

8. Between December 21 and March 20 . . .

- a) the Northern Hemisphere leans away from the sun, but every day the lean
becomes _____.
more, less
- b) the rays become _____ slanting.
more, less
- c) the days become _____ and the nights become _____.
longer, shorter
longer, shorter

