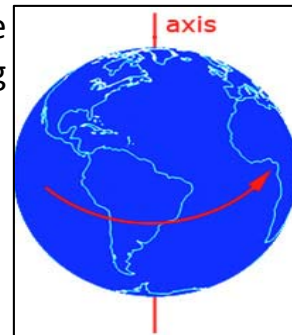


Why Is It Colder in the Winter Than in the Summer?

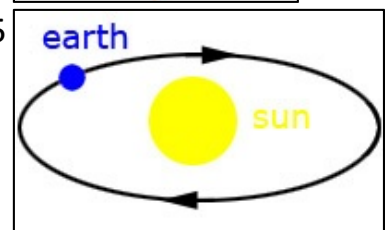
By Dr. Hany Farid, Dartmouth College

The earth's axis of rotation is tilted relative to the earth's path around the sun. As a result we are tilted towards the sun in the summer and away from the sun in the winter. Read on for a more detailed explanation.

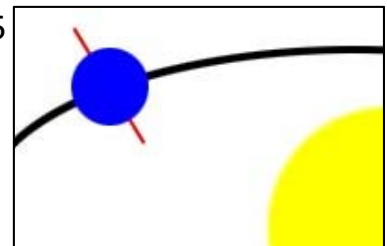
Fact 1. The earth rotates about its axis once every 24 hours. In the morning we are facing towards the sun, and at night we are facing away from the sun.



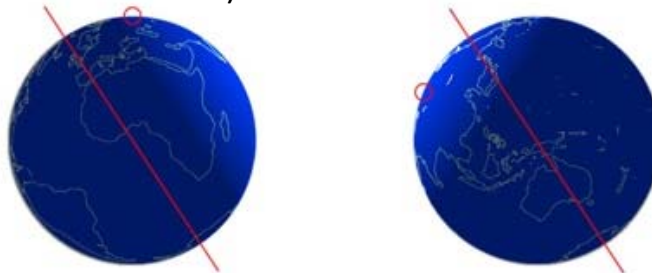
Fact 2. The earth rotates around the sun (approximately) every 365 days or 1 year.



Fact 3. The axis about which the earth rotates is tilted (by 23.5 degrees) relative to the earth's path around the sun.



Shown below are two diagrams of the earth at the same time of day. On the left it is winter and on the right it is summer (in the northern hemisphere). Notice that the same spot (red circle) in the winter receives much less light than in the summer. As a result, it is colder in the winter than in the summer. (Note: in this diagram, the earth's axis is 33 degrees, instead of 23.5, so as to better illustrate the effect.)



Name: _____ Date: _____

1. What is tilted relative to the earth's path around the sun, according to the article?

- A the sun's position in space
- B the sun's axis of rotation
- C the earth's axis of rotation
- D Mars's axis of rotation

2. How does the earth's tilt in the summer contrast with its tilt in the winter?

- A The earth is tilted towards the sun in the summer but away from the sun in the winter.
- B The earth is tilted away from the sun in the summer but towards the sun in the winter.
- C The earth is tilted slightly towards the sun in the summer and much farther towards the sun in the winter.
- D The earth is tilted slightly away from the sun in the summer and much farther away from the sun in the winter.

3. Read Fact 1 and look at the image next to it.

"The earth rotates about its axis once every 24 hours. In the morning we are facing towards the sun, and at night we are facing away from the sun."

Based on this information, what can you conclude about the curved arrow in the diagram?

- A The arrow represents the earth's axis.
- B The arrow represents the earth's rotation.
- C The arrow represents the earth's equator.
- D The arrow represents the earth's tilt.

4. Look at the two diagrams of the earth at the end of the article. What might the red line in each diagram represent?

- A a place on the earth that receives less light in winter than in summer
- B the earth's axis
- C the earth's rotation
- D the earth's path around the sun

5. What is the main idea of this text?

- A The earth rotates around its axis once every 24 hours.
- B The earth rotates around the sun approximately every 365 days.
- C The axis around which the earth rotates is tilted by 23.5 degrees relative to the earth's path around the sun.
- D Winter is colder than summer because earth's axis of rotation is tilted.

6. Read these sentences from the text.

"The earth rotates about its axis once every 24 hours. In the morning we are facing towards the sun, and at night we are facing away from the sun."

What is the meaning of "rotates" as it is used here?

- A rises
- B falls
- C shrinks
- D turns

7. Read these sentences from the text.

"The earth's axis of rotation is tilted relative to the earth's path around the sun. As a result we are tilted towards the sun in the summer and away from the sun in the winter."

Which word or phrase could replace "as a result" without changing the meaning of these sentences?

- A for example
- B consequently
- C however
- D primarily

8. Look at the two diagrams of the earth at the end of the article. They show the same spot (red circle) in the winter and in the summer. What is the difference between the amount of light the same spot receives in the winter and in the summer?

9. What is an effect of the difference between the amount of light the same spot (red circle) receives in the winter and in the summer?

10. Imagine that the earth's axis of rotation changed so that the same spot (red circle) received the same amount of light in the winter and in the summer. What effect might that change have on the temperature in that spot? Support your answer with evidence from the text.
