

Misconception Perception

Uncovering Student
Misconceptions

Question #1. Where does most of the world's oxygen come from?

A. The rainforests



B. The Ocean



C. Land plants



Answer

Most of the earth's oxygen production, PERHAPS as much as 90%, is from the sea plants through photosynthesis within the top 100 m of the ocean water where there is enough sunlight for the process to take place.

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Source of Half Earth's Oxygen Gets Little Credit

John Roach
for National Geographic News
June 7, 2004

Fish, whales, dolphins, crabs, seabirds, and just about everything else that makes a living in or off of the oceans owe their existence to phytoplankton, one-celled plants that live at the ocean surface.

Phytoplankton are at the base of what scientists refer to as oceanic biological productivity, the ability of a water body to support life such as plants, fish, and wildlife.

"A measure of productivity is the net amount of carbon dioxide taken up by phytoplankton," said Jorge Sarmiento, a professor of atmospheric and ocean sciences at Princeton University in New Jersey.

The one-celled plants use energy from the sun to convert carbon dioxide and nutrients into complex organic compounds, which form new plant material. This process, known as photosynthesis, is how phytoplankton grow.

Herbivorous marine creatures eat the phytoplankton. Carnivores, in turn, eat the herbivores, and so on up the food chain to the top predators like killer whales and sharks.

But how does the ocean supply the nutrients that phytoplankton need to survive and to support everything

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According to one 2002 study by NASA and U.S. National Oceanic and Atmospheric Administration scientists, phytoplankton concentrations have declined by as much as 30 percent in northern oceans since the early 1980s. Above, a world map compares satellite data collected during the summer between 1978 and 1997 to 1997 to 2000. The colors represent phytoplankton concentrations.

Question #2. True or False

The Earth's proximity to the sun is the reason for the seasons.

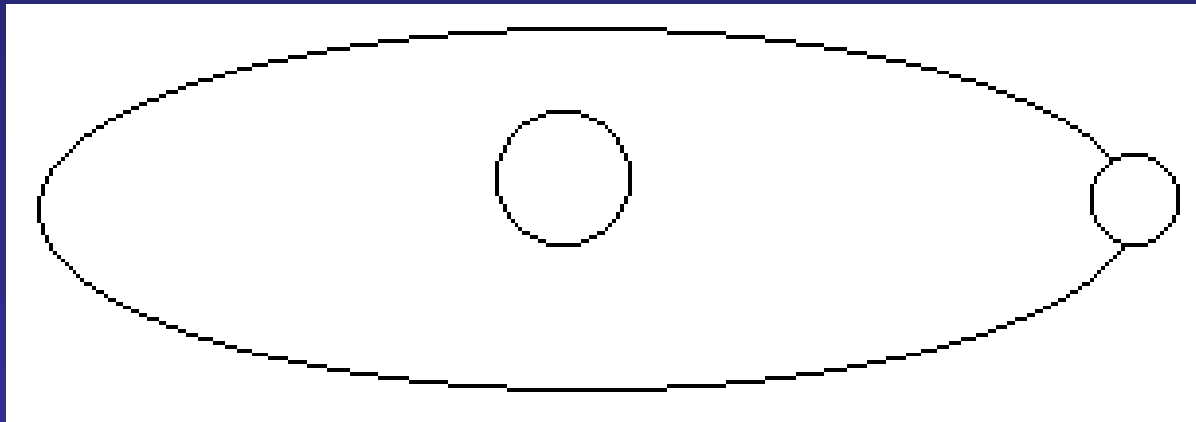


Answer

So what is the cause of the Earth's seasons? It's the tilt of the Earth on its axis. The tilt of the Earth is constant throughout the year at 23.5° from perpendicular. During summer in the United States, the northern hemisphere is tilted toward the sun and receives more direct rays from the sun. During winter in the United States, the southern hemisphere is tilted toward the sun receiving the more direct rays. That is why seasons in the northern and southern hemisphere are always the opposite of one another.

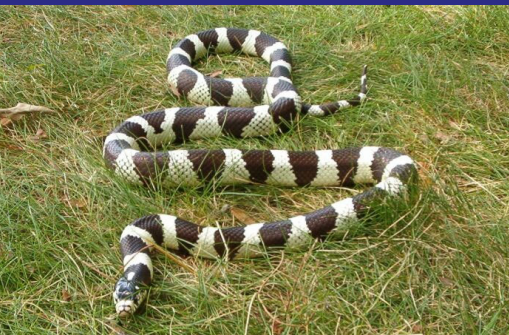
Textbook Induced Misconception

- The orbit of the Earth around the sun is a slight ellipse. Textbook diagrams, however, typically show an exaggerated ellipse as in Figure below.



Question #3: Which animal causes the greatest number of human fatalities annually?

- A. Sharks
- B. Dogs
- C. Snakes
- D. Mountain Lions
- E. Deer (Vehicular Collisions)



Answer

A.	Sharks	50
B.	Dogs	218
C.	Snakes	315
D.	Mountain Lions	41
E.	Deer (Vehicular Collisions)	1130

Media Induced Misconception

False Shark Sightings On The Rise

April 8, 2005

Release from: WESH.com

The swimmers assumed the fins belonged to sharks, but they were actually fins from dolphins. Beach patrol said this year it is seeing one worst shark paranoias since "Jaws" came out or 2001, the so-called summer of the shark. It believes the video of hundreds of sharks swimming north from South Florida is causing the widespread panic. Sheryl Blocus doesn't want her boys in water.

"We've seen the movies, seen the news of them biting people, them killing people," she said.

...If you see a fin going up and down in the water, it is usually a dolphin, said experts. Surprisingly, sharks don't swim with their fin out of the water like they do in movies.



What are misconceptions?

How can you tell if two adults eating dinner at a restaurant are in love?

"Just see if the man picks up the check. That's how you can tell if he's in love." -- Bobby, age 9

"Lovers will just be staring at each other and their food will get cold... Other people care more about the food." -- Bart, age 9

Why does love happen between two particular people?

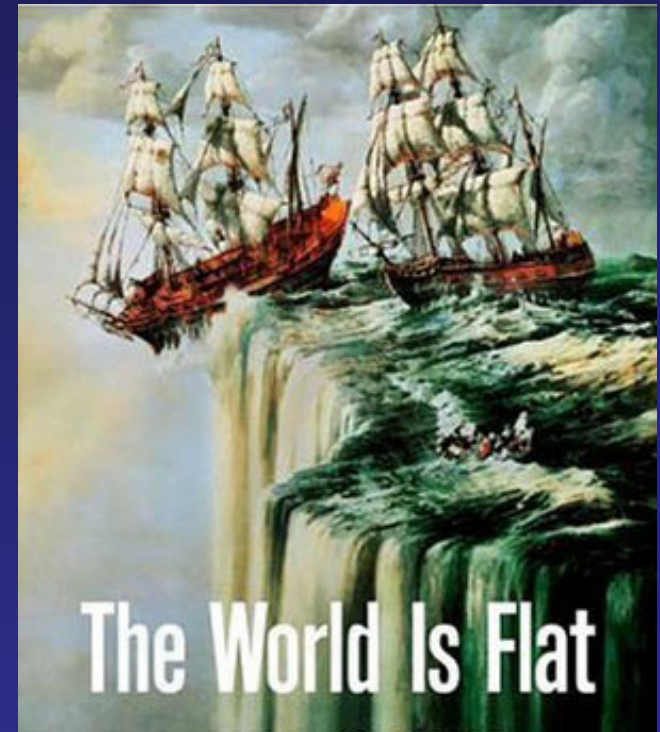
"One of the people has freckles and so he finds somebody else who has freckles too." -- Andrew, age 6

"No one is sure why it happens, but I heard it has something to do with how you smell ... That's why perfume and deodorant are so popular." -- Mae, age 9

"I think you're supposed to get shot with an arrow or something, but the rest of it isn't supposed to be so painful" --Manuel, age 8

What are misconceptions?

- In science these are cases in which something a person knows and believes does not match what is known to be scientifically correct.
- Most people who hold misconceptions are NOT aware that their ideas are incorrect. When they are simply *told* they are wrong, they often have a hard time giving up their misconceptions.
- What is especially concerning about misconceptions is that we continue to **build knowledge** on our **current understandings**. Possessing misconceptions can have serious impacts on our learning.



How do Students form Misconceptions?

- Our everyday language is often at odds with science; common vernacular doesn't always match the precise language used by scientists. While it's perfectly acceptable to say, *the toast burned* it is highly unlikely a chemist would agree with your observation.

The most erroneous stories are those we think we know best-- and therefore never scrutinize or question.

-Stephen Jay Gould