

## 1. What is the greenhouse effect?

- A. Certain gases in the atmosphere trap heat and warm the Earth
- B. Life on Earth 'exhales' gas that warms up the atmosphere
- C. The tilt of the Earth changes the amount of solar energy the Earth receives
- D. The Sun is putting out more radiant energy over time

**Answer A** - Certain gases in the atmosphere trap heat and warm the Earth

The greenhouse effect is a natural phenomenon. Certain gases in the atmosphere are able to absorb radiation that would otherwise escape into space. The greenhouse effect is somewhat like a blanket that retains your body heat and keeps you warm.

Gases that trap heat are called greenhouse gases and they include water vapor, carbon dioxide, methane, and nitrogen oxides. These gases can have potent effects even in small quantities.

Without this natural greenhouse effect, the Earth's average temperature would be below freezing!

## 2. Which activities are the largest contributors of greenhouse gases?

(multiple-answer-question)

- A. Deforestation
- B. Electricity generation
- C. Industry
- D. Transportation
- E. Landfills
- F. Agriculture

**ANSWER B&D** - Although all of the activities on the list cause greenhouse gas emissions, transportation and electricity generation are the biggest causes.

3. How much has CO<sub>2</sub> in the atmosphere increased since the Industrial Revolution? In the 10,000 years before the Industrial Revolution in 1751, carbon dioxide levels rose less than 1 percent. Since then, they've risen by:

- A. 11 percent
- B. 49 percent
- C. 62 percent

**Answer: B** - CO<sub>2</sub> in the atmosphere has risen 49 percent since 1751.

From 1751-2018, humans added 1,611 billion tons of carbon to the atmosphere in the form of carbon dioxide. Around 80% of all human-produced carbon dioxide comes from burning coal, natural gas, oil and gasoline.

When today's CO<sub>2</sub> trend is viewed in the context of 400,000 years of climate data, the result is even more stark. Humans have profoundly changed the composition of Earth's

atmosphere, and along with that, the energy balance of the planet.

4. What proportion of climate scientists has concluded that humans are the primary driver of today's climate warming?

- A. 34%
- B. 59%
- C. 76%
- D. 97% or more

Answer: D. 97% (or even more!)

The vast majority of climate scientists agree with the overwhelming evidence that humans are causing global warming. The reason there is a consensus of scientists is that there is a consensus of evidence.

5. How has the global average temperature changed since the Industrial Revolution?

- A. Cooler by 0.1 degree C (0.2 degree F)
- B. The temperature has gone up and down, but remains overall the same
- C. Warmer by 0.1 degree C (0.2 degree F)
- D. Warmer by more than 1 degree C (2.1 degrees F)
- E. Warmer by almost 2 degrees C (3.6 degrees F)

Answer D:

Answer: Warmer by more than 1 degree C (2.07 degrees F)

As of mid 2021, the Earth's average temperature (considering both land and water) has risen 1.19 degrees Celsius (2.14 degrees F) over the pre-industrial average (1880-1900).

Furthermore, the rate of temperature change is increasing: "The global annual temperature has increased at an average rate of 0.07°C (0.13°F) per decade since 1880 and over twice that rate (+0.18°C / +0.32°F) since 1981." (Quote from the NOAA page linked below).

6. When was the last time in Earth's history that CO<sub>2</sub> was as high as it is now?

- A. This is the highest it's ever been
- B. CO<sub>2</sub> was at least this high during the warm periods between the ice ages
- C. CO<sub>2</sub> has not been this high for almost one million years.
- D. The last time CO<sub>2</sub> was this high was 3 million years ago.

Answer D:

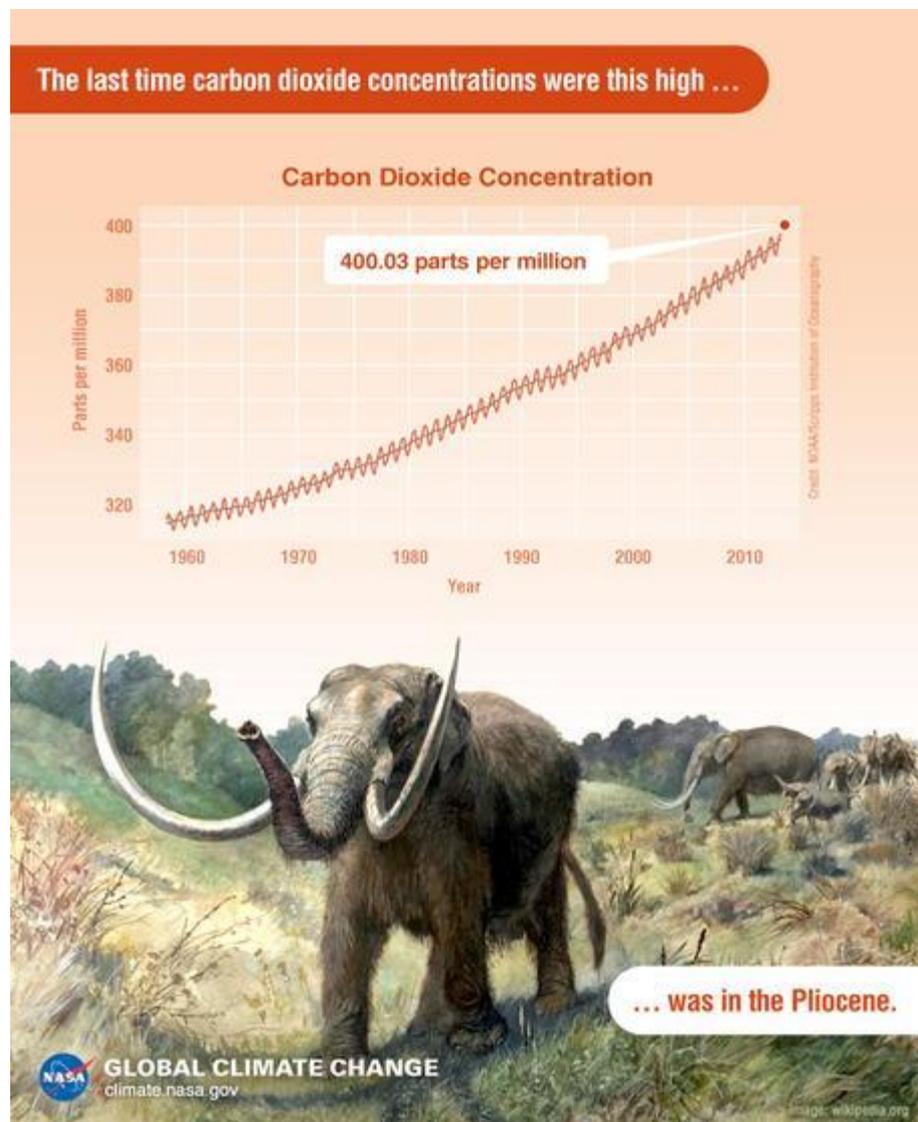
As of 2020, the atmosphere contained 409 to 416 parts per million of carbon dioxide. This number goes out of date quickly, as CO<sub>2</sub> levels continue to rise; check the latest data from Scripps.

Throughout all of the cool-downs and warm-ups of the last ice ages, CO<sub>2</sub> never topped 300 ppm. So we're way above anything that happened during the ice ages. To look for the last time Earth's atmosphere had more than 400 ppm of CO<sub>2</sub> we have to go farther back. Way farther back, to the Pliocene, 3 to 5 million years ago.

How was the climate back then? The temperature was 2 to 4 degrees Celsius (3.6 to 7.2

degrees Fahrenheit) warmer than today, and sea level was 50 to 80 feet higher!

On the other hand, there were giant camels, so that part sounds pretty good.



7. Which country has emitted the most CO<sub>2</sub> over time? In other words, which nation has the most responsibility for the greenhouse gases that are currently residing in the atmosphere?

- A. China
- B. USA
- C. Russia
- D. European Union
- E. Saudi Arabia

Answer D :

While China is currently the largest emitter of greenhouse gases, cumulative emissions are an important way to look at our overall contribution to global warming.

China's greenhouse gas emissions per year have only recently surpassed the US. Over time, the USA has been the largest emitter of greenhouse gases to the atmosphere. In fact, we've emitted twice as much CO<sub>2</sub> as China.

This matters because greenhouse gases have a long life span in the atmosphere. CO<sub>2</sub> in the atmosphere lasts for 50 to 100 years or more (as explained in this article in Yale Climate Connections). The reason why it's so important to curb emissions quickly is because greenhouse gases have a long-lasting effect. It's also why we can't sit back and blame China for their high emissions. All nations need to work together to address climate change.

8. How long does CO<sub>2</sub> remain in the atmosphere?

- A. CO<sub>2</sub> washes out of the atmosphere seasonally.
- B. CO<sub>2</sub> remains in the atmosphere for 5-10 years.
- C. CO<sub>2</sub> remains in the atmosphere for up to 200 years, or more.

Answer C:

As you know from the carbon cycle, some processes, like photosynthesis, use up carbon dioxide quickly, while others, like carbon dioxide captured by weathering of rocks, operate over many thousands of years. Thus, you can't put your finger on the exact life span of a given molecule of CO<sub>2</sub> in the atmosphere.

The bottom line is that once emitted, CO<sub>2</sub> continues to affect the climate for decades to millennia. That's why reducing emissions quickly is important. Because of the existing CO<sub>2</sub> in the atmosphere, the Earth will continue to warm even after we stop burning fossil fuels. The complexity of CO<sub>2</sub> residence time is summed by Zeke Hausfather in Yale Climate Connections:

"Using a combination of various methods, researchers have estimated that about 50 percent of the net anthropogenic pulse would be absorbed in the first 50 years, and about 70 percent in the first 100 years. Absorption by sinks slows dramatically after that, with an additional 10 percent or so being removed after 300 years and the remaining 20 percent lasting tens if not hundreds of thousands of years before being removed."

9. If we stopped burning fossil fuels today, what would happen to the climate?

- A. Earth's average temperature would continue to rise.
- B. Temperatures would continue to warm, then begin to cool down in 100 years or more.
- C. Temperatures would fluctuate but stay the same on average.
- D. Temperatures would stop increasing once greenhouse gas concentrations stopped increasing.

Answer D:

The science is evolving on this question, and this quiz was updated in 2021 to reflect those changes. Among all the bad news on climate change, this is a bit of good news. There is general agreement among scientists that when emissions fall to net zero, then the amount of greenhouse gases in the atmosphere will stop increasing. At that point, the global increase in temperature will slow or stop.

Carbon Brief has an excellent, well-referenced article that explains why the science - and the messaging - around this topic has changed.

There are a few factors to keep in mind:

Air pollution - caused largely by burning fossil fuels - actually cools the planet by reflecting some incoming solar radiation. It's likely that there would be a temporary increase in temperature if airborne pollution were stopped. Overall, reducing air pollution would save millions of lives and trillions of dollars, so the benefit is still very worthwhile.

Often, the differing messaging on this topic is due to different questions being posed. For example, Earth's temperatures should stop increasing when greenhouse gases stop increasing, but an actual cool-down could take longer because of the long residence time of greenhouse gases in the atmosphere.

This remains an active area of climate research.

10. How fast do we need to stop burning fossil fuels to limit global temperature rise to 2 degrees C? (3.6 degrees F)

A. We need to stop burning fossil fuels by 2100.

B. We need to stop burning fossil fuels by 2040.

C. Fossil fuels don't matter, the Sun will cool and so will the Earth.

D. It's already too late to stay below the 2-degree threshold. We should have stopped burning fossil fuels in the early 2000s.

Answer B:

Climate scientists Stefan Rahmstorf and Anders Levermann estimated that we need to dramatically decrease emissions starting by 2020 and drop off quickly to near zero by around 2040.

This quiz question was written in 2018. The 'deadline' of 2020 has come and gone, so we can observe our progress on reducing emissions. The world consumed less fossil fuels in 2020, and less energy overall, largely due to the Covid-19 pandemic. So far in 2021, it appears that consumption is rebounding past 2020 levels. If we intend to minimize dramatic effects on Earth's climate system, we face a monumental challenge to overhaul the world's energy use within just a few years.

Note that there are other factors that can influence this estimate, such as CO<sub>2</sub> removal from the atmosphere. The degree to which direct carbon capture could reduce the buildup of atmospheric greenhouse gases remains speculative at this point.

In 2017 Rahmstorf and Levermann concluded, "It is still possible therefore to meet the Paris temperature goals if emissions peak by 2020 at the latest.... We will need an enormous amount of action and scaled up ambition to harness the current momentum in order to travel down the decarbonisation curve at the necessary pace; the window to do that is still open."

Since the statement above was made, emissions have risen, fallen, then risen again.

11. Which gas makes up 78% of our atmosphere?

- A. oxygen
- B. Carbon dioxide
- C. nitrogen
- D. argon

13. Greenhouse gases only bring harmful effects to the Earth.

- A. True
- B. False

Answer B:

Greenhouse gases help to keep the Earth at an optimum temperature by absorbing radiation from the sun, however when the carbon cycle is disrupted and more greenhouse gases are emitted, it will cause global warming

14. Which of these is not a greenhouse gas?

- A. Carbon dioxide
- B. Oxygen
- C. Methane
- D. Sulfur dioxide

Answer B

15. Which of these is false?

- A. Sulfur dioxide and nitrogen dioxide causes respiratory problems which may lead to cancer or respiratory illnesses.
- B. When acidic rain gets onto buildings and structures, they help to polish the surface.
- C. When acidic rain seeps through the soils, it acidifies the soil, which in turn destroy plants growing on the acidic soil.
- D. When acidic rain gets into water bodies, it changes the pH of the water, causing aquatic life to die as the environment is too acidic.

Answer B

16. Which of these is not a property of ozone?

- A. It is a greenhouse gas.
- B. It forms the ozone layer which absorbs and blocks harmful radiation of the sun into the Earth.
- C. Each ozone molecule is made up of 2 oxygen molecules
- D. It helps to keep the Earth warm

Answer C

17. Which of these is not an impact of global warming?

- A. A rise in sea level
- B. Desert area will increase
- C. The Earth will become colder
- D. Melting of ice caps

Answer C

19. The ozone layer protects us from

- A. UV rays
- B. CFCs
- C. Increased atmospheric heat
- D. Decreased atmospheric heat

Answer A

20. The ozone layer is damaged by

- A. CFCs
- B. Increase in greenhouse gases
- C. Increased global temperatures
- D. Sulfuric and nitric acids

Answer A:

CFCs are gases that were widely used in the past in things such as aerosols and refrigerators and can cause damage to the ozone layer. CFC is an abbreviation for 'chlorofluorocarbon'.

21. Greenhouses gases

- A. Absorb and radiate heat
- B. Destroy the ozone layer
- C. Cause respiratory problems
- D. Create smog

Answer A

22. Which of the following are greenhouse gases?

- A. Carbon dioxide
- B. Methane
- C. Water vapor
- D. All answers are correct

Answer D

23. \_\_\_\_\_ are pollutants released into the air.

- A. Emissions
- B. Ozone molecules
- C. Hazardous wastes
- D. Acid rains

Answer A

24. Particles in the air that are now considered to have the most serious health effects are:

- A. PM 1
- B. PM 2.5
- C. PM 10
- D. PM 100

Answer B:

Particle pollution - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- \* increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing, for example;
- \* decreased lung function;
- \* aggravated asthma;
- \* development of chronic bronchitis;
- \* irregular heartbeat;
- \* nonfatal heart attacks; and
- \* premature death in people with heart or lung disease.

People with heart or lung diseases, children and older adults are the most likely to be affected by particle pollution exposure. However, even if you are healthy, you may experience temporary symptoms from exposure to elevated levels of particle pollution.

27. Cap and Trade is a system designed to reduce pollution in our atmosphere.

The cap on greenhouse gas emissions that drive global warming is a firm limit on pollution. The cap gets stricter over time.

The trade part is a market for companies to buy and sell allowances that let them emit only a certain amount, as supply and demand set the price.

**Which is a strength of Cap and Trade?**

- A. "Cap" is self adjusting - no problem if inaccurate
- B. Cost Effective
- C. Not efficient - takes a lot of initial management
- D. Hot spots

Answer B:

The total amount of the cap is split into allowances, each permitting a company to emit one ton of emissions. (You'd have to drive 2,400 miles, roughly the distance between New York and Las Vegas, to emit that much carbon dioxide.)

The government distributes the allowances to the companies, either for free or through an auction.

The cap typically declines over time, providing a growing incentive for industry and businesses to reduce their emissions more efficiently, while keeping production costs down.

28. Hazardous air pollutants are

- A. Also known as air toxics
- B. Are known or suspected causes of serious health problems
- C. Are known or suspected causes of serious environmental damage
- D. All of the above

Answer D

32. Which of the following is one of the secondary air pollutants among the following?

- A. Ozone
- B. CO
- C. CO<sub>2</sub>
- D. PANs

Answer A:

Explanation: Ozone is formed when hydrocarbons (HC) and nitrogen oxides (NO<sub>x</sub>) combine in the presence of sunlight

33. In case of pollution due to high Ozone levels one must take which of the following precautions?

- i) Drink lots of water and fluid
- ii) Expose oneself less to sunlight

- A. Only i
- B. Only ii
- C. Both i and ii
- D. None of the above

Answer C:

In case of ozone pollution, one must not go outside in the sunlight and keep hydrating him/herself for better safety.

35. What is particulate matter causing air pollution called?

- A. Smog
- B. Soot
- C. Foam
- D. None of the above

Answer B:

Soot is also known as particulate matter. It is made up of tiny particles of chemicals, soil, smoke, dust, or allergens.

36. Which of the following is considered to be the major sources of CFC?

- i) Refrigerants
- ii) Aircraft Halon
- iii) Aerosol Sprays

- A. i and ii
- B. i and iii
- C. ii and iii
- D. I and ii and iii

Answer D: The causes of release of Chlorofluorocarbons can be refrigerants, halon used in aircrafts and many aerosol sprays.

37. What is true about AQI (Air Quality index) ?

- i) It informs about the color and odour in the air
- ii) It can inform about the ozone levels in any area along with particulate matter

- A. Only i
- B. Only ii
- C. Both i and ii
- D. None of the above

Answer B: Air Quality Index informs about the content and quality of air in any area. That is based on the quantitative presence of various hazardous gases and not the colour or odour of the air.

38. Photochemical smog mainly is

- A. H<sub>2</sub>O<sub>2</sub>
- B. Methyl Chlorate
- C. Ozone
- D. Peroxyacetyl nitrate

Answer C: Ozone is the main source of photochemical smog. It is basically haze in the atmosphere accompanied by high levels of ozone and nitrogen oxides due to the effect of sunlight on pollutants.

39. Air pollution exposure is responsible for what percentage of all deaths from lung cancer globally every year?

- A. 5%
- B. 11%
- C. 19%
- D. 30%

Answer C:

In 2019, air pollution is estimated to have contributed to nearly 7 million deaths worldwide. Air pollution is estimated to be responsible for 19% of all lung cancer deaths, 40% if all deaths from chronic obstructive pulmonary disease, 20% of diabetes deaths, and 26% of fatal strokes.

40. What percentage of people around the world affected by air pollution?

- A. 80%
- B. 90%
- C. 100%

Answer C:

According to the World Health Organization, 91% of the world population live in places where the WHO air quality guideline levels for fine particulate matter (PM<sub>2.5</sub>) were not met. However, even low-levels of air pollution affects everyone -including you – but it has the most impact on young children, the elderly and people with existing lung or heart conditions. It is therefore worth learning more about how you can protect yourself, your family and community.

41. How is air pollution linked to climate change?

- A. Air pollutants and greenhouse gases are often emitted from the same sources
- B. Most air pollutants, impact the climate through in more complex ways than long-lived greenhouse gases such as carbon dioxide
- C. Some greenhouse gases, such as methane, contribute to the formation of ground-level ozone air pollution, affecting health and crop production
- D. All of the above

Answer D:

The interlinkages between air pollution and climate change provide an opportunity to amplify the benefits of our action and catalyst even greater mitigation ambition, Plans and strategies to rapidly reduce warming, must therefore integrate actions to reduce all air pollutants and greenhouse gases that contribute to both near-term and long-term climate impacts. This will put the world on a trajectory that maximizes benefits, reduce the risk of policy failure, and delivers national development priorities.

42. Does exposure to PM<sub>2.5</sub> air pollution increase the risk of more serious impacts from COVID-19 and other respiratory viruses?

- A. Yes
- B. No

Answer A:

Long-term exposure to outdoor air pollution (PM, NO<sub>2</sub>, and O<sub>3</sub>) is likely to increase COVID-19 infection risk and severity. Air pollution is known to have detrimental effects on the respiratory and cardiovascular system, as well as impacts on other diseases that have been shown to raise the risk of COVID-19 severity. It is crucial to consider improved air quality as an additional measure, to help reduce the burden placed on people's health, as well as healthcare system.

43. What are the two main causes of air pollution?

- A. Manmade and Natural
- B. Natural resources and waste disposal
- C. Natural and waste
- D. Manmade and natural resources

Answer: A

44. List three effects of air pollution that harms the environment.

- A. Destroy Eco system, acid rain destroy the habitats and climate changes
- B. Corrode buildings, affect photosynthesis and cause poor visibility
- C. Destroy plants, destroy Eco system and cause soil erosion
- D. Cause climate changes, cause natural disasters and the air destroy habitats

Answer A

45. Which combination of three effects describe the effect of air pollution on human health.

- A. Insomnia, Rhinitis and cardiac
- B. Asthma, Rhinitis and high blood pressure
- C. Pulmonary, cardiac and vascular
- D. Diabetics, Rhinitis and heart attack

Answer C

49. What is an example of natural air pollution?

- A. Acid rain
- B. Vehicle emission of harmful gases
- C. Volcanic eruption
- D. Burning fuels

Answer C