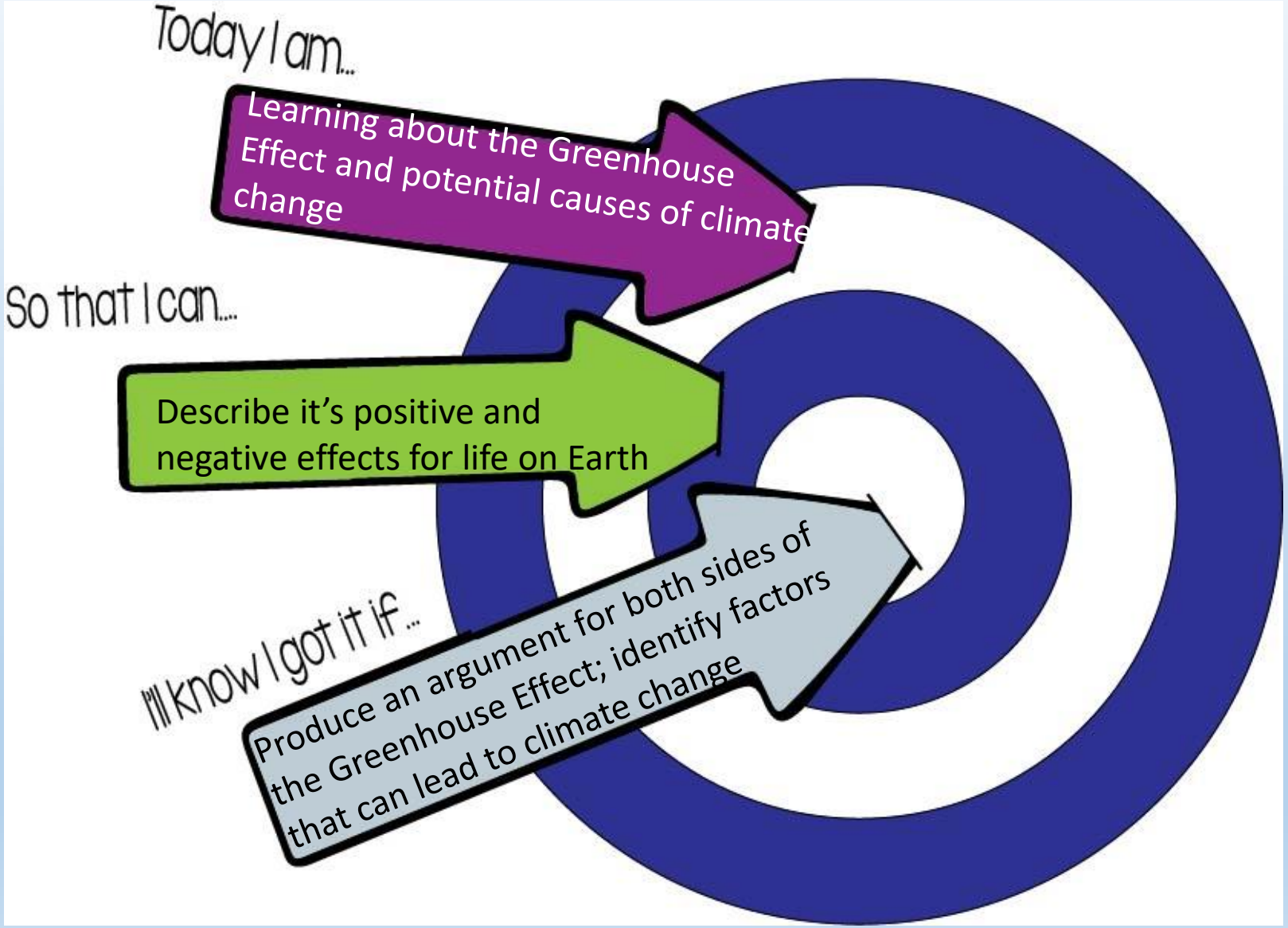
Disclaimer: This session will be recorded for learning purposes. Learning purposes include: a lesson review for students who are absent, students who want to review for a test, etc. and will be distributed for learning purposes.

WARM UP QUESTION:

How would life be different if it were always a few degrees colder around the world?

How would it be different if it were always a few degrees warmer around the world?

Learning Target



1.07 The Greenhouse Effect: The Pros

- Keeps temperatures on Earth within a range that living things can survive
- Allows water to exist in 3 phases on Earth
- Provides protection from the sun’s harmful radiation

1.07 The Greenhouse Effect: How it Works

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- Earth absorbs radiation from sun and transforms it into longer wavelength radiation
- The longer wavelength radiation cannot pass back out through greenhouse gases in the atmosphere
- Longer wavelength radiation (infrared) warms the lower atmosphere

1.07 The Greenhouse Effect: The Greenhouse Gases

- Major Greenhouse Gases:
    - Water vapor (94.7%)
    - Carbon dioxide (4%)
- Other Greenhouse Gases:
    - Methane
    - Nitrous oxide
    - Fluorocarbons

1.07 The Greenhouse Effect: Human Contribution

- What human activities increase the amount of greenhouse gases in the atmosphere?

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- What human activities increase the amount of greenhouse gases in the atmosphere?

  - Burning of fossil fuels (transportation, energy)
  - Burning of biomass
  - Deforestation
  - Factories
  - Waste (landfills produce methane)
  - Agriculture
  - Natural gas mining and pipelines (methane leaks)
  - Refrigerants (refrigerators, cooling systems in cars – depletion of ozone)

And Now For a Short Break!

- Please help me out by completing this survey by the end of the week:

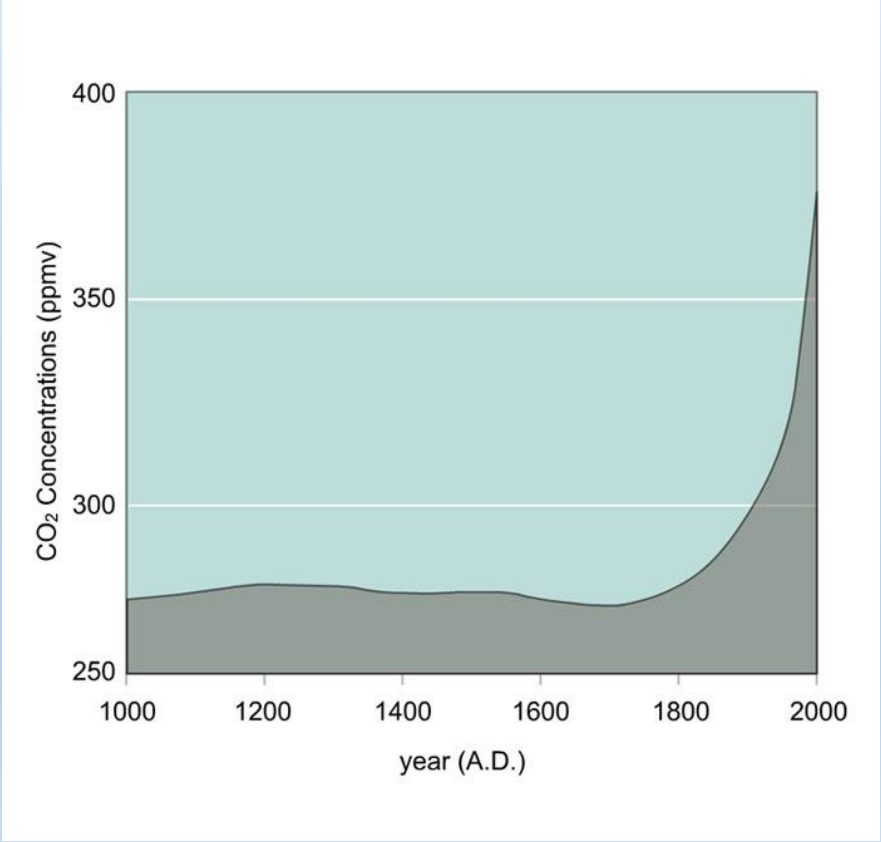
https://www.surveymonkey.com/r/B3SDX6Y

1.07 The Greenhouse Effect: Cons

- Too much can be a bad thing
  - Global Warming
  - Increased atmospheric pressure

1.08 Greenhouse Effect Analyses

- Carbon dioxide concentrations over time



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  - Measurements taken in more recent times

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Yes but very gradually

(i.e. Ice Ages)

By Source, Fair use, https://en.wikipedia.org/w/index.php?curid=33070247

1.10 Climate Change: Evidence

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  - Fossils
    - What lived when
  - Tree Rings
    - Thickness of annual rings is dependent on temperature and moisture
  - Pollen
    - What grew when

1.10 Climate Change: Evidence

- There have been at least 4 major ice ages in the past 2 million years

Last ice age ended about 10,500 years ago

Ice ages tend to last about 100,000 years

1.10 Climate Change: The Culprits

- Why do climate changes occur?

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- Why do climate changes occur?
  - Earth's position relative to the sun
  - Changes in energy from the sun – sunspot activity, volcanic activity
  - Tectonic plate movement
  - Changes in tilt of Earth's axis
  - Changes in the shape of Earth's orbit around the sun
  - Asteroid impacts – blockage of sun from dust
  - Changes in atmospheric and oceanic circulation

1.10 Discussion Post: Climate Change

- Visit the following website and take the carbon footprint questionnaire:

https://www3.epa.gov/carbon-footprint-calculator/

- Post your discussion by sharing your results and how you can personally reduce your release of greenhouse gases into the atmosphere