**Astronomy Assessment and TPS Questions:**

**Greenhouse Gas Effect**

1. Which of the following is a primary characteristic of greenhouse gases?
	1. They absorb more molecules in the atmosphere than they give off.
	2. They concentrate sunlight as it travels through the atmosphere.
	3. They can completely trap forms of light in the atmosphere.
	4. They absorb some forms of light but allow other forms of light to pass through.
	5. They absorb more light than they give off.
2. Which of the following is not part of the greenhouse effect?
	* 1. Visible light from the Sun is absorbed by Earth’s surface.
		2. Due to the Ozone hole UV light can significantly increase the surface temperature of Earth.
		3. Earth’s surface and atmospheric gases give off infrared light.
		4. The amount of light given off by Earth is equal to the amount of light absorbed from the Sun.
3. Which of the following is part of the Earth’s natural greenhouse effect?
4. Earth’s atmosphere continually becomes thicker with greenhouse gases.
5. Infrared light becomes permanently trapped in our atmosphere by greenhouse gasses.
6. The ozone hole causes significant increases in surface temperature.
7. Earth’s surface and atmospheric gases absorb energy and then give off infrared light.
8. Heat is transferred in the atmosphere through the circulation of greenhouse gasses.
9. Earth’s surface is primarily heated by which two forms of energy?
10. ultraviolet and visible
11. ultraviolet and infrared
12. x-ray and ultraviolet
13. visible and radio
14. visible and infrared
15. Which of the following is an effective greenhouse gas?
16. water
17. oxygen
18. ozone
19. nitrogen
20. If Earth’s atmosphere were able to completely absorb visible light, which of the following would be true?
21. The Earth’s surface temperature would be warmer than it is today.
22. The Earth’s surface temperature would be cooler than it is today.
23. The Earth’s surface temperature would be the same temperature as it is today.
24. There is not enough information to answer this question.
25. Which of the following forms of light from the Sun provides the greatest amount of energy INPUT to the Earth’s surface?
26. radio
27. infrared
28. visible
29. ultraviolet
30. x-ray
31. If the energy output of the Sun were to change so that it produced the same amount of visible light as it currently does ultraviolet light, which of the following would be true?
32. The Earth’s surface temperature would be the same temperature as it is today.
33. The Earth’s surface temperature would be cooler than it is today.
34. The Earth’s surface temperature would be warmer than it is today.

Use the graph below to answer the following question.



1. Which type of light do the molecules in Earth’s atmosphere absorb most effectively?
2. Infrared
3. Visible
4. Ultraviolet
5. If our atmosphere absorbed visible light in the same way it absorbs X-rays, which of the following would be true?
6. the surface of the earth would be cooler than it is today
7. the surface of earth would be warmer than it is today
8. the surface of the earth would be the same temperature as it is today
9. Which of the following is important for the Greenhouse Effect?
10. Ozone layer heats up atmosphere by absorbing ultraviolet light.
11. The atmosphere is more transparent to visible light than to infrared light.
12. Heat energy is trapped in circulation patterns of the ocean.
13. The atmosphere shelters earth’s surface from solar wind.
14. Humidity from water vapor makes the atmosphere feel hotter.
15. What is the definition for a greenhouse gas?
	1. A molecule that is transparent to visible light but absorbs infrared light
	2. A molecule that absorbs both infrared and ultraviolet light
	3. A molecule that emits energy in the form of heat
	4. A molecule that permanently traps heat in Earth’s atmosphere
16. What kind of radiation do greenhouse gases absorb by the greatest percentage?
	1. UV
	2. Visible
	3. Infrared
	4. None of the above
17. The amount of energy that comes to Earth from the Sun is \_\_\_\_\_\_\_\_ the amount of energy that leaves Earth and goes into space.
	1. more than
	2. less than
	3. equal to
18. Earth’s surface is primarily heated by energy that comes from where?
	1. Directly from the Sun
	2. From the core of Earth
	3. From Earth’s atmosphere
19. Which of the following is a greenhouse gas?
	1. Hydrogen
	2. Oxygen
	3. Carbon Dioxide
	4. Helium
	5. More than one of the above
20. Earth’s surface is primarily heated by which forms of light?
	1. Visible and Ultraviolet
	2. Infrared and Visible
	3. Ultraviolet and Infrared
	4. Visible, Ultraviolet and Infrared
21. Which of the following is not an effective greenhouse gas?
	1. Water
	2. Oxygen
	3. Ozone
	4. Nitrogen
22. Which of the following best describes the function of greenhouse gases?
	1. They protect the ozone layer
	2. They trap sunlight within Earth’s atmosphere
	3. They absorb some forms of light and allow other forms of light to pass through
	4. They concentrate sunlight as it passes through Earth’s atmosphere
23. The total amount of light given off by Earth into space is equal to
	1. the amount of visible light that reflects off its surface.
	2. the amount of light coming to Earth from the Sun.
	3. the amount of IR light given off by the Sun.
24. If Earth’s atmosphere contained no greenhouse gases, what would occur?
	1. Earth’s temperature would increase dramatically
	2. Earth’s temperature would decrease dramatically
	3. Earth’s temperature would become very unstable
	4. Earth’s temperature would not be affected
25. What type of light does Earth’s surface emit at night?
	1. Visible
	2. Infrared
	3. Ultraviolet
	4. Radio
	5. Earth’s surface does not give off light at night
26. The total amount of energy leaving Earth into space is \_\_\_\_\_\_\_\_\_.
	1. greater than the total amount coming in
	2. equal to the total amount coming in
	3. less than the total amount coming in
27. People get sunburns because
	1. a large amount of infrared light from multiple sources is able to produce enough energy to burn skin.
	2. when infrared and visible light combine, they have enough energy to burn skin.
	3. people create and release into the atmosphere harmful radiation like UV and X-rays, which causes burns.
	4. a small amount of ultraviolet light reaches the surface of Earth and burns skin.
28. The surface of Earth is warmer than it would be without greenhouse gasses because
	1. the surface receives energy from sunlight and from light emitted by the greenhouse gasses in the atmosphere.
	2. the greenhouse gasses permanently trap UV and infrared light, which continue to move around in the atmosphere, making it very warm.
	3. when light tries to escape Earth’s surface, it is reflected back to the surface by the greenhouse gasses.
	4. None of the above
29. If you view the blackbody curve of Earth, what form of light would it peak in?
	1. Visible
	2. IR
	3. UV
	4. None of the above
30. How do greenhouse gases affect Earth’s atmosphere?
	1. They trap infrared light in the atmosphere
	2. They absorb sunlight reflected off of Earth’s surface
	3. They prevent light from escaping Earth’s atmosphere
31. Why is UV light not an important energy source for heating Earth’s surface?
	1. The Sun does not emit much UV light
	2. UV light is not very energetic
	3. UV light is almost entirely absorbed by Earth’s atmosphere
	4. UV light does not reach Earth’s surface at all
	5. A & C
	6. B& D
32. Using the graph below, which form of light has the least percentage of absorption by Earth’s atmosphere?
	1. UV
	2. Visible
	3. IR



1. Use the graph above to answer. The form of light that has the most difficult time passing through the atmosphere also has the \_\_\_\_\_\_\_\_
	1. least energy.
	2. longest wavelength.
	3. highest frequency.
	4. lowest frequency.
2. What would occur if there were no greenhouse gases?
	1. Visible and infrared light would have a harder time passing through the atmosphere.
	2. Infrared light would never pass through the atmosphere.
	3. All light forms would be absorbed by the atmosphere.
	4. UV, visible and infrared light from the Sun would pass completely through the atmosphere.
3. If the atmosphere were transparent to IR light, what would happen to Earth’s surface temperature?
	1. It would increase due to the increased amount of light hitting the surface and being absorbed by it
	2. It would decrease because the greenhouse gases aren’t there to absorb and reemit the light
	3. It would stay the same, because the light our atmosphere isn’t absorbing would be counteracted by the surface absorbing more



1. Use the above diagram to answer. Which of the following is not a greenhouse gas?
	1. O3
	2. O2
	3. CO2
	4. H2O
	5. All of the above are greenhouse gases.
2. Use the above diagram to answer. In the infrared portion, the dips in the graph indicate what?
	1. Certain infrared wavelengths are absorbed less by greenhouse gasses and pass through the atmosphere more easily.
	2. Earth receives less of certain infrared wavelengths from the Sun than of others.
	3. The dips mean that the corresponding wavelength is not let through the atmosphere as easily as the wavelengths where the curve is higher.
3. Use the above diagram to answer. Which of the following greenhouse gasses absorbs light of only the highest frequency wavelength sent by the Sun?
	1. H20
	2. CO2
	3. O2
	4. O3
4. Rank the following three forms of light by the percentage of energy given off by the Sun, from least percentage to greatest percentage: UV, Visible, and IR
	1. UV < Visible < Infrared
	2. Visible < Infrared < UV
	3. Visible < UV < Infrared
	4. Infrared < UV < Visible
	5. None of the above
5. Rank the following three forms of light given off by the Sun by their energy levels, from least energetic to most energetic: UV, Visible, and Infrared
	1. UV < Visible < Infrared
	2. Visible < Infrared < UV
	3. Visible < UV < Infrared
	4. Infrared < UV < Visible
	5. None of the above
6. Rank the following three forms of light given off by the Sun by the amount by which each is absorbed by the Earth’s atmosphere, from most absorbed to least absorbed. UV, Visible, IR
	1. Visible > IR > UV
	2. UV > IR > Visible
	3. UV > Visible < IR
	4. IR > Visible > UV
	5. None of the above