Climate Practice Test

**Part A Knowledge and Understanding**

____ 1. Which statement is true regarding climate and weather?
   a. Climate changes; weather remains the same.
   b. Both climate and weather change.
   c. Weather changes, but climate remains the same.
   d. Neither weather nor climate change.

____ 2. The hydrosphere includes all of the following except
   a. water on the surface of Earth.
   b. water that is frozen.
   c. water that is in gaseous form.
   d. water on the space shuttle.

____ 3. Which features do biomes share?
   a. vegetation
   b. climatic data
   c. wildlife
   d. all of the above

____ 4. Canada’s only desert exists in
   a. British Columbia.
   b. Alberta.
   c. Quebec.

____ 5. Deforestation is a ____ phenomenon.
   a. natural
   b. anthropogenic
   c. atmospheric
   d. greenhouse gas

____ 6. Which of the following statements is *not* true about what happens to radiation from the Sun once it reaches Earth?
   a. A portion of it is reflected back to space by the clouds.
   b. Over half of it is absorbed by Earth’s surface.
   c. Nearly half of it transmits through Earth.
   d. A portion of it is absorbed by gases in the atmosphere.

____ 7. Which of the following gases are all able to trap infrared radiation?
   a. water vapour, nitrogen gas, methane
   b. carbon dioxide, water vapour, oxygen gas
   c. carbon dioxide, methane, oxygen gas
   d. water vapour, carbon dioxide, methane

____ 8. Oceans are considered
   a. heat sinks
   b. carbon sinks
   c. all of the above
   d. none of the above

____ 9. How far do the gases in the atmosphere reach above Earth’s surface?
   a. more than 100 km
   b. more than 1000 km
   c. about 10 km
   d. less than 1 km
10. The air we breathe is
   a. 78% oxygen, 21% nitrogen, 1% other gases
   b. 100% oxygen
   c. 78% nitrogen, 21% oxygen, 1% other gases
   d. 49% nitrogen, 49% oxygen, 2% other gases

11. In Canada, average national temperatures in the last 55 years have
   a. decreased by 1 °C
   b. decreased by 10 °C
   c. increased by 10 °C
   d. increased by 1 °C

12. When floating sea ice and icebergs melt, the global sea level
   a. rises significantly
   b. rises slightly
   c. decreases slightly
   d. remains relatively constant

13. In Canada, fossil fuels are used for which of the following?
   a. transportation
   b. heating
   c. production of electrical energy
   d. all of the above

14. Where is the Sun highest in the sky on March 21 (spring equinox)?
   a. equator
   b. Tropic of Cancer
   c. Tropic of Capricorn
   d. Artic Circle

15. What method of heat transfer produces the global circulation of air and water on Earth?
   a. conduction
   b. convection
   c. radiation
   d. reflection

16. Which of the following places receives 24 hours of sunlight in the summer?
   a. Toronto
   b. Australia
   c. north pole
   d. south pole

17. The amount of solar radiation that is reflected back into space is
   a. none
   b. 15%
   c. 30%
   d. almost half

18. Which of the following substances would take the longest to heat up?
   a. ethanol
   b. toluene
   c. water
   d. gold

19. The blanket of air and moisture that surrounds the Earth is called the:
   a. hydrosphere
   b. atmosphere
   c. geosphere
   d. space

20. In the greenhouse effect, some of the Sun's radiation is reflected into the atmosphere and is re-reflected at the Earth as this type of energy:
   a. microwave
   b. visible light
   c. infrared
   d. UV rays
21. Where does most weather occur?
   a. stratosphere  
   b. mesosphere  
   c. troposphere  
   d. thermosphere

22. Which of the following applies to the transfer of heat through a fluid?
   a. conduction  
   b. convection  
   c. radiation  
   d. condensation

23. A convection heating (furnace) system works on the principle that:
   a. warm air rises and cold air sinks  
   b. warm air sinks and cold air rises  
   c. warm air and cold air both rise  
   d. warm and cold air both sink

24. The most common gas in the atmosphere is
   a. carbon dioxide  
   b. oxygen  
   c. argon  
   d. nitrogen

Identify the term that best matches the definition or description given.
   a. atmosphere  
   b. climate  
   c. greenhouse effect  
   d. albedo  
   e. tectonic plate  
   f. anthropogenic  
   g. climatograph  
   h. biome  
   i. ecozone  
   j. ecoregion  
   k. hydrosphere  
   l. tropical rainforest

25. a movable piece of Earth’s outer shell
26. all the water on Earth
27. an effect caused by human activity
28. biome not present in Canada
29. subdivision characterized by local landforms
30. layer of gas surrounding a planet or moon
31. indicates monthly precipitation, among other information
32. characteristic pattern of weather in a region
33. a large biosphere division
34. a natural way of keeping Earth warm
35. a division using Earth’s surface
36. the fraction of light reflected back from a surface

Part B  Thinking and Investigation

37. Determine the amount of energy required to raise the temperature of 0.50 kg of water from 15°C to 85°C.

38. Why do coastal communities generally have warmer climates compared to their inland counterparts?

39. Describe how the problem of global warming will be increased if the polar ice caps melt. Use the term albedo in your answer.
40. What impact may global warming have on farming in Canada?

41. Which biome is described below? Explain.
   - Houses in this biome allow for warm breezes to flow through them, cooling the air inside.
   - People need to wear clothing that is both light and relatively waterproof.
   - The terrain is quite muddy and rugged due to significant rainfall, so people often travel in four-wheel drive vehicles.

42. Explain what causes the oceans’ currents.

43. Explain how trees act as carbon sinks.

44. Carbon dioxide in the atmosphere is produced in two ways and removed in two ways. What are these ways?

Part C Application

45. What would the North Pole be like if Earth’s tilt were 90° instead of 23.5°?

46. What would life on Earth be like without the greenhouse effect?

47. Explain how the greenhouse effect affects Earth’s temperature.

48. Using the information provided in the graph, rank the following from most effective to least effective in terms of reducing greenhouse gases. Show your work.
   - A. a 50% decrease in cattle methane
   - B. a 5% decrease in national energy use
   - C. a 75% decrease in industrial processes
49. Do you think people living near the equator, where effects of climate change are expected to be felt the least, need to be concerned about it? Explain the reason for your answer.
Climate Practice Test

Answer Section

1. **ANS: B**
   Weather changes in the short term, while climate changes over very long periods of time (for example, an ice age).

   PTS: 1
   OBJ: 3-1
   STA: D2.1
   TOP: 7.1
   MSC: T/I

2. **ANS: D**
   The hydrosphere includes all water part of Earth and its systems. The shuttle has left the system.

   PTS: 1
   OBJ: 3-1
   STA: D2.1
   TOP: 7.1
   MSC: K/U

3. **ANS: D**
   PTS: 1
   OBJ: 3-1
   STA: D3.1
   TOP: 7.2
   MSC: K/U

4. **ANS: A**
   PTS: 1
   OBJ: 3-1
   STA: D3.1
   TOP: 7.2
   MSC: K/U

5. **ANS: B**
   PTS: 1
   OBJ: 3-2
   STA: D2.1
   TOP: 7.3
   MSC: K/U

6. **ANS: C**
   PTS: 1
   OBJ: 8.3
   STA: D3.1
   TOP: 8.3
   REF: K/U
   LOC: D3.1
   MSC: What Do You Remember?

7. **ANS: D**
   PTS: 1
   OBJ: 8.6
   STA: D3.1
   TOP: 8.6
   REF: K/U
   LOC: D3.3
   MSC: What Do You Remember?

8. **ANS: C**
   PTS: 1
   OBJ: 8.8
   STA: D3.1
   TOP: 8.8
   REF: K/U
   LOC: D2.6
   MSC: What Do You Remember?

9. **ANS: A**
   PTS: 1
   OBJ: 8.4
   STA: D3.1
   TOP: 8.4
   REF: K/U
   LOC: D3.1
   MSC: What Do You Remember?

10. **ANS: C**
    PTS: 1
    OBJ: 8.4
    STA: D3.1
    TOP: 8.4
    REF: K/U
    LOC: D3.1
    MSC: What Do You Remember?

11. **ANS: D**
    PTS: 1
    OBJ: 9.1
    STA: D2.4
    TOP: 9.1
    REF: K/U
    LOC: D2.4
    MSC: What Do You Remember?

12. **ANS: D**
    PTS: 1
    OBJ: 9.1
    STA: D1.1
    TOP: 9.1
    REF: A
    LOC: D1.1
    MSC: What You Understand?

13. **ANS: D**
    PTS: 1
    OBJ: 9.5
    STA: D3.5
    TOP: 9.5
    REF: K/U
    LOC: D3.5
    MSC: What Do You Remember?

14. **ANS: A**
    PTS: 1

15. **ANS: B**
    PTS: 1

16. **ANS: C**
    PTS: 1

17. **ANS: C**
    PTS: 1

18. **ANS: C**
    PTS: 1

19. **ANS: B**
    PTS: 1

20. **ANS: C**
    PTS: 1
21. ANS: C  PTS: 1
22. ANS: B  PTS: 1
23. ANS: A  PTS: 1
24. ANS: D  PTS: 1
25. ANS: E  PTS: 1  OBJ: 3-1  STA: D2.1
   TOP: 7.1  MSC: K/U
26. ANS: K  PTS: 1  OBJ: 3-1  STA: D2.1
   TOP: 7.2  MSC: K/U
27. ANS: F  PTS: 1  OBJ: 3-2  STA: D2.1
   TOP: 7.1  MSC: K/U
28. ANS: L  PTS: 1  OBJ: 3-1  STA: D2.1
   TOP: 7.2  MSC: K/U
29. ANS: J  PTS: 1  OBJ: 3-1  STA: D2.1
   TOP: 7.2  MSC: K/U
30. ANS: A  PTS: 1  OBJ: 3-1  STA: D2.1
   TOP: 7.1  MSC: K/U
31. ANS: G  PTS: 1  OBJ: 3-1  STA: D2.1
   TOP: 7.2  MSC: K/U
32. ANS: B  PTS: 1  OBJ: 3-1  STA: D2.1
   TOP: 7.1  MSC: K/U
33. ANS: H  PTS: 1  OBJ: 3-2  STA: D2.1
   TOP: 7.2  MSC: K/U
34. ANS: C  PTS: 1  OBJ: 3-1  STA: D2.1
   TOP: 7.1  MSC: K/U
35. ANS: I  PTS: 1  OBJ: 3-2  STA: D2.1
   TOP: 7.2  MSC: K/U
36. ANS: D  PTS: 1  OBJ: 3-1  STA: D2.1
   TOP: 7.1  MSC: K/U

38. ANS:
   Since the ocean acts as a heat reservoir, oceans can buffer the temperature. When it is cold, large bodies of water release heat, moderating the temperature. When the weather is warmer, the water stores extra energy, to be released when the local temperature drops.
   PTS: 2  OBJ: 3-1  STA: D2.1  TOP: 7.1
   MSC: K/U

39. ANS:
   Albedo refers to the amount of energy absorbed by a substance. Since water has a much higher albedo than ice and snow, the conversion of ice and snow to water would mean that the world would retain more heat from the Sun, leading to an increase in average global temperature.
   PTS: 3  OBJ: 3-2  STA: D2.1  TOP: 7.1
   MSC: A

40. ANS:
   Global warming may cause some areas that are currently suited to farming to become too hot or dry to continue. Conversely, areas that are presently too cold may become warm enough for a viable farm operation.
   PTS: 2  OBJ: 3-3  STA: D1.2  TOP: 7.2
   MSC: A
41. **ANS:**
High levels of precipitation and warm temperatures are typical of the tropical rain forest.

PTS: 2  OBJ: 3-1  STA: D3.1  TOP: 7.2  MSC: T/I

42. **ANS:**
Warm water is less dense than cold water. Therefore, a current forms when water is unevenly heated. Colder, denser water falls and pushes the warmer, less dense water up.

PTS: 1  REF: K/U  OBJ: 8.8 Energy Transfer Within the Climate System: Air and Ocean Circulation  LOC: D2.7  MSC: What Do You Understand?

43. **ANS:**
Trees capture carbon dioxide during photosynthesis and use it to grow. When trees decompose or burn, the carbon is released back into the atmosphere as carbon dioxide.

PTS: 1  REF: C  OBJ: 8.6 The Greenhouse Effect  LOC: D3.5  MSC: What Do You Understand?

44. **ANS:**
*Produced:* respiration and burning fossil fuels  
*Removed:* photosynthesis and dissolving in the ocean

PTS: 4  OBJ: 3-1  STA: D3.4  TOP: 8.2  MSC: K/U

46. **ANS:**
Life on Earth would be a lot colder, because most of the Sun’s energy would be reflected back into outer space.

PTS: 2  OBJ: 3-1  STA: D3.3  TOP: 7.2  MSC: K/U

47. **ANS:**
The greenhouse effect helps to keep Earth warm by trapping thermal energy radiated by Earth.

PTS: 1  REF: A  OBJ: 8.6 The Greenhouse Effect  LOC: D3.7  MSC: What Do You Understand?

48. **ANS:**
A = 3.5% reduction in gas  
B = 4.1% reduction in gas  
C = 3% reduction in gas  
The most effective would be B, then A, and then C.

PTS: 4  OBJ: 3-4  STA: D3.5  TOP: 8.2  MSC: A

3
49. ANS:
Answers may vary. Sample answer: Climate change will affect everyone, regardless of where you live. Therefore, even people living in areas that are expected to be least affected need to be concerned and do their part to help. Many of the projected effects of climate change alter the entire planet. Effects that begin in the Arctic will cause widespread changes around the globe. That is what makes reducing the effects of climate change a worldwide issue.

PTS: 1  REF: T/I  OBJ: 10.2 Global Impacts of Climate Change
LOC: D2.4  MSC: Create and Evaluate

37. ANS:  

PTS: 1

45. ANS:
If Earth was tilted at 90° the North Pole would feel like the equator on June 21. By December 21st, it would have seen a long period of time with very little heat or light, making habitation very difficult. The spring and fall seasons would be very cold, as the Sun would be always on the horizon at best.

Note to teacher: Marks for this question should be given to students demonstrating an understand of the tilt as well as thought relating to it implications.

PTS: 3  OBJ: 3-1  STA: D1.1  TOP: 7.1
MSC: A