

**Part I: Climate Change Projections**

1. Which of the following best describes the greenhouse effect and its role in climate change? [1 point]
  - a. The greenhouse effect occurs when pollution blocks heat from escaping Earth, creating extreme weather patterns.
  - b. The greenhouse effect is a natural process in which gases like carbon dioxide trap heat in the atmosphere but have increased with human activities, leading to climate change.
  - c. The greenhouse effect is caused by the sun emitting more heat in recent decades, which has led to increased global temperatures.
  - d. The greenhouse effect only occurs in tropical regions, where high temperatures cause more gases like carbon dioxide to be released into the air, leading to climate changes.
  
2. Which of the following human activities does NOT contribute to climate change? [1 point]
  - a. Burning fossil fuels such as coal, oil and natural gas.
  - b. Deforestation and land-use changes.
  - c. Agricultural activities releasing methane and nitrous oxide.
  - d. Expanding urban tree cover.
  
3. Why do climate scientists use different climate models—such as global climate models, regional climate models, and Earth system models—when projecting future climate conditions? Choose the best answer. [1 point]
  - a. Using multiple models allows scientists to predict the weather in various regions.
  - b. Each model focuses only on short-term climate changes, so they don't help with long-term predictions.
  - c. Different models provide a range of perspectives and levels of detail, helping scientists make more accurate and reliable climate predictions.
  - d. Multiple models are only useful for predicting temperature changes and not for other climate factors like precipitation.

Use the Seventh Oregon Climate Assessment Executive Summary to answer questions 4-7. **Reforestation** means replanting trees in a forested area that has been depleted or damaged, while **afforestation** means creating new forested areas on land that was previously not forested.

4. According to the Seventh Oregon Climate Assessment, Oregon's forests have considerable potential for carbon storage. What is the projected carbon sequestration potential from reforestation in Oregon by 2030? [1 point]
  - a. 1.5 million metric tons
  - b. 2.9 million metric tons
  - c. 10 million metric tons
  - d. 15.7 million metric tons
5. What percentage of Oregon's statewide carbon sequestration goal for 2030 could be met by reforestation? [1 point]
  - a. 7%
  - b. 12%
  - c. 20%
  - d. 50%
6. Per the following table included in the full report, which land cover type in Oregon has the greatest potential for sequestering the most carbon by 2030? [1 point]
  - a. Shrub/scrub
  - b. Herbaceous
  - c. Pasture/hay
  - d. Evergreen forest

Type of forestation	Land cover type	Statewide extent (ha)	Forestable extent		Carbon sequestration (million metric tons CO2)	
			ha	percentage	By 2030	By 2050
Afforestation	Shrub/scrub	8,294,567	442,501	5.3	2,936,729	14,946,217
	Grass/herbaceous	4,244,769	212,511	5.0	1,846,270	8,635,651
	Pasture/hay	791,961	168,093	21.2	1,514,850	7,462,578
	Developed open space	388,665	44,974	11.6	355,256	1,860,549
	Barren	163,165	1,900	1.2	13,667	112,654
Total		13,883,127	869,979	6.3	6,666,772	33,017,648
Reforestation	Evergreen forest	8,357,951	364,785	4.4	2,818,015	15,068,941
	Mixed forest	579,351	10,833	1.9	61,589	427,361
	Deciduous forest	61,689	4,207	6.8	26,101	164,392
Total		8,998,991	379,824	4.2	2,905,705	15,660,694
Total		22,882,118	1,249,804	5.5	9,572,477	48,678,342

**Table 3.** Constrained carbon sequestration potential across land cover types in Oregon.

## Part II: Forest Health in a Changing Climate

7. Match each climate change effect with its corresponding consequence in forest ecosystems. [4 points]

Climate Change Effect	Consequence in Forest Ecosystems
<u>  c  </u> Increased wildfire frequency	a. Reduced tree growth
<u>  d  </u> Stronger storms	b. Expansion of invasive species
<u>  a  </u> Prolonged drought conditions	c. Loss of mature tree stands
<u>  b  </u> Shifting climate zones	d. Increased treefall

8. How does climate change cause an increase in the incidence of invasive pests like the Mountain Pine Beetle in Oregon? Choose the best answer. [1 point]
- a. Climate change causes invasive pests to evolve faster, making them immune to natural predators.
  - b. Melting ice from climate change releases ancient invasive pests that were trapped for centuries.
  - c. Climate change increases soil acidity, which makes trees more attractive to invasive pests.
  - d. Warmer temperatures allow invasive pests to survive and reproduce in regions that were previously too cold.
9. Wildfire affects Oregon's eastern and western forests differently. Which of the following statements best describes the difference between the historical wildfire regimes of Oregon's western and eastern forests? [1 point]
- a. Western forests experience frequent, low-intensity fires, while eastern forests experience infrequent, high-intensity fires.
  - b. Eastern forests experience frequent, low-intensity fires, while western forests experience infrequent, high-intensity fires.
  - c. Both eastern and western forests experience wildfires at the same frequency and intensity.
  - d. Neither region is significantly affected by wildfires due to fire suppression efforts.

10. While wildfire can have devastating effects for human communities, some plant and animal species in Oregon depend on fire for their survival or regeneration. Which of the following best explains how climate change could threaten fire-dependent species in Oregon? [1 point]

- a. Increased wildfire frequency could destroy all suitable habitats for these species.
- b. Temperatures and altered precipitation patterns may shift fire regimes beyond what these species are adapted to.
- c. Fire-dependent species will naturally adapt to any changes in fire frequency or severity.
- d. Climate change has no significant effect on fire-dependent species.

11. In the face of climate change, what is the main objective of sustainable forest management? [1 point]

- a. Keeping all forest areas natural without human intervention
- b. Maintaining healthy forest resources and supporting long-term resilience
- c. Maximizing timber production
- d. Preventing all forest fires

### **Part III: Indigenous Knowledge and Relationship with the Land**

12. What is Indigenous Knowledge? Choose the best response. [1 point]

- a. Knowledge and beliefs that were held by Indigenous Peoples in pre-historic times.
- b. A universal set of cultural practices shared by all Indigenous Peoples.
- c. **Oral and written knowledge, practices, and beliefs of Indigenous Peoples shaped by experience with the environment.**
- d. A set of laws and customs governing Indigenous communities.

13. Match each Indigenous land stewardship principle with the benefit it brings to present-day forest management. [4 points]

<b>Indigenous Land Stewardship Principle</b>	<b>Primary Benefit</b>
<b><u>_d_</u></b> Reciprocity (mutual care between people and nature)	a. Helps maintain balanced ecosystems by reducing excessive fuel loads
<b><u>_b_</u></b> Place-based knowledge	b. Provides deep insight into local environmental changes over time
<b><u>_c_</u></b> Intergenerational learning	c. Ensures the continued protection and responsible use of forests for the future.
<b><u>_a_</u></b> Cultural fire use	d. Encourages a respectful relationship with forests

14. Explain the concept of Two-Eyed Seeing. [2 points]

**1 point for mentioning integration of Indigenous Knowledge and Western science, and 1 point for describing its value, such as fostering a more comprehensive understanding of the world, particularly with complex environmental and social issues.**

15. How does integrating Indigenous steward practices with Western scientific approaches benefit forest management in a changing climate? [1 point]

- a. By helping to revert to historical forest conditions
- b. By combining diverse knowledge systems to develop adaptive strategies
- c. By avoiding any form of human intervention in forest ecosystems
- d. By applying the same adaptation strategy to every forest in the state

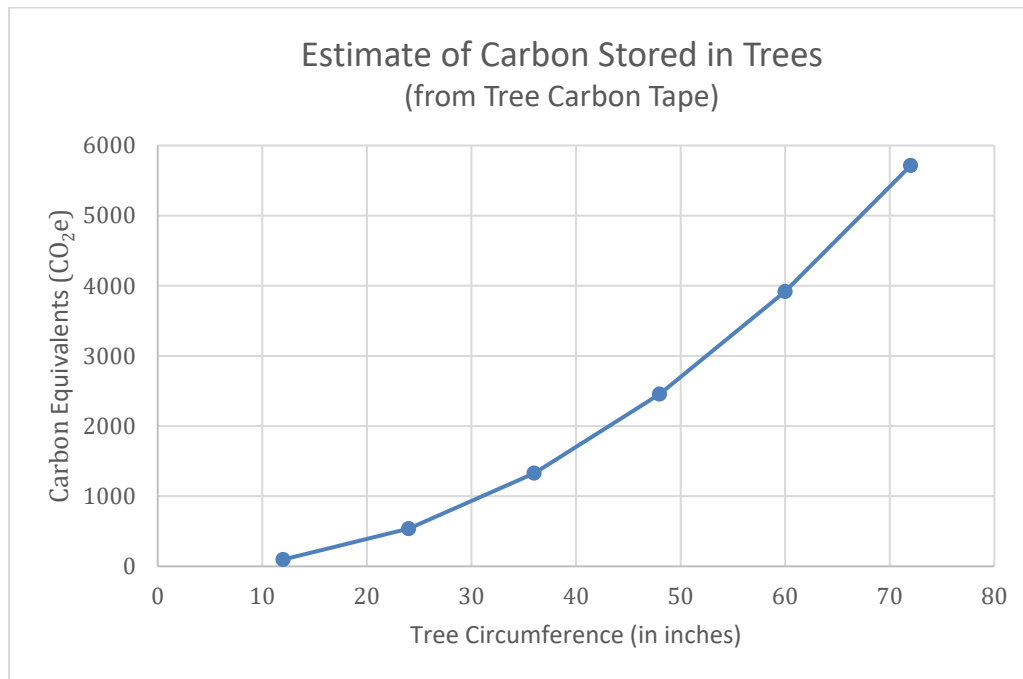
\_\_\_\_/ 1 point

#### **IV: Vulnerability Assessments and Adaptation Strategies**

16. A forest manager in Oregon wants to assess the vulnerability of a forest to climate change. Which of the following would be the most effective approach? [1 point]
- a. Researching historical weather data
  - b. Estimating how many tourists visit the forest each year
  - c. Counting the total number of trees in the forest
  - d. Monitoring changes in tree species composition, soil moisture, and wildfire frequency
17. Which of the following scenarios best illustrates the impact of increased drought severity on Oregon's forest ecosystems? [1 point]
- a. Enhanced growth of native plant species
  - b. Decreased frequency of wildfires
  - c. Increased tree mortality and susceptibility to pests
  - d. Improved soil moisture retention
18. As climate change progresses, certain species in Oregon's forests may no longer be suited to their current locations. One strategy for addressing this concern is assisted species migration, which is the human-aided movement of species within their range or beyond to help them adapt to climate change. What is the biggest potential drawback of assisted species migration as an adaptation strategy? [1 point]
- a. The process is too slow to have an impact on forest health
  - b. Introducing species to new areas may disrupt existing ecosystems
  - c. Trees cannot grow in new locations due to lack of sunlight
  - d. Forest managers have no way of predicting future climate conditions
19. Forest managers in Northwest Oregon are deciding how to adapt to rising temperatures and drier summers. Which of the following strategies would best enhance long-term forest resilience? [1 point]
- a. Planting a mix of tree species with different drought tolerances
  - b. Clearcutting older forests to reduce fire risk
  - c. Replacing native species with fast-growing non-native trees
  - d. Allowing all wildfires to burn without intervention

For questions 20 and 21:

A high school class used a Tree Carbon Tape, like the one provided, as a tool for estimating the amount of carbon stored in trees. To use it, they wrapped the tape around a tree at breast height and read the carbon equivalents ( $\text{CO}_2\text{e}$ ) for that circumference. The following graph shows their results for 6 different trees that had 6 different circumferences.



20. Looking at the class's results, what relationship do you observe between the circumference of trees and the carbon equivalents they store? [2 points]

1 point: if correctly state that the carbon equivalents ( $\text{CO}_2\text{e}$ ) increases as circumference increases. 2 points if provide more specificity about the increase, e.g., as circumference doubles,  $\text{CO}_2\text{e}$  quadruples.

21. Based on the carbon tape data, what is one forest management strategy you would recommend to maximize carbon storage in a forest? [2 points]

2 points if identify a suitable strategy. Possible strategies: afforestation or planting more trees; increasing density of urban tree cover; managing for a healthy forest to keep it resistant to fire and pests.



## **Part V: Legislation and Regulations**

22. Match each forest law or regulation with its **primary** goal in Oregon. [4 points]

<b>Law or Regulation</b>	<b>Primary Goal</b>
<u>  b  </u> Oregon Forest Practices Act (OFPA)	a. To protect water quality by regulating activities near streams and wetlands
<u>  a  </u> Federal Clean Water Act (as applied to forests)	b. To ensure sustainable forestry, while protecting soil, water, fish, and wildlife resources
<u>  d  </u> Federal Endangered Species Act (ESA)	c. To reduce wildfire risk and promote long-term forest health
<u>  c  </u> Oregon's 20-Year Landscape Resiliency Strategy	d. To safeguard wildlife by limiting activities in areas with critical habitats

23. Some critics argue that Oregon's forest regulations are too strict, while others claim they are not strict enough. Which of the following would be an appropriate way to assess the effectiveness of Oregon's forest laws? [1 point]

- a. Comparing Oregon's forestry laws with those in other states to evaluate their relative strictness
- b. Interviewing logging companies to see if they feel restricted by current laws
- c. Measuring long-term forest health indicators, such as reforestation success and biodiversity levels**
- d. Asking residents of forested areas whether they personally feel the laws are helpful

24. The Oregon Forest Practices Act (OFPA) was the first law in the U.S. to regulate private forest management. How does it contribute to forest sustainability? [1 point]

- a. It requires all harvested forests to be replanted to maintain continuous forest cover.**
- b. It allows unrestricted logging on private lands to maximize economic growth.
- c. It prohibits all logging activities in Oregon's forests to protect biodiversity.
- d. It mandates that all forests remain untouched to preserve their natural state.

25. Match each forest management practice with its expected benefit under Oregon's 20-Year Landscape Resiliency Strategy. [4 points]

Forest Management Practice	Expected Benefit
<u>  c  </u> Thinning overcrowded forests	a. Reduces competition for resources, promoting healthier tree growth
<u>  a  </u> Removing invasive species	b. Enhances water quality and provides habitat for fish and wildlife
<u>  b  </u> Protecting riparian buffers	c. Lowers the risk of high-intensity wildfires by reducing excess fuel
<u>  d  </u> Encouraging diverse tree species in replanting efforts	d. Increases biodiversity and improves resilience to pests and disease

## **Part VI: Oregon Forests**

26. Many of Oregon's fire-dependent species live in Eastern Oregon, where forests historically experienced frequent, low-intensity fires. Match each fire-dependent Oregon species with a specific adaptation that allows it to thrive in fire-prone environments. [4 points]

<b>Fire-adapted Species</b>	<b>Adaptation</b>
<b>_d_</b> Lodgepole pine	a. Moves into burned areas to feed on increased insect populations that thrive in fire-damaged forests.
<b>_a_</b> Lewis's woodpecker	b. Can resprout from its root system even after being burned, allowing it to quickly recover after a fire.
<b>_c_</b> Mule deer	c. Benefits from post-fire plant regrowth, which provides fresh forage in the years following a fire.
<b>_b_</b> Oregon white oak	d. Cones are sealed with resin and only open in high temperatures, ensuring seed dispersal occurs after fire

27. How does forest certification contribute to the long-term sustainability of Oregon's forests? Choose the best response. [1 point]

- a. It promotes clear-cutting as the fastest way to regenerate forests.
- b. It ensures that forests are managed using practices that maintain biodiversity, protect water quality, and reduce environmental impact.**
- c. It requires that forests be left untouched to allow for natural growth.
- d. It limits public access to certified forests to prevent human disturbance.

28. How does the use of mass timber products, like cross laminated timber (CLT) produced in Oregon, contribute to sustainability? Choose the best response. [1 point]

- a. Mass timber stores carbon and reduces the need for concrete and steel, which produce higher carbon emissions.**
- b. Mass timber absorbs more carbon after being used in buildings.
- c. Mass timber ensures that harvested trees are replaced with synthetic materials.
- d. Mass timber prevents wildfires by reducing the number of trees in forests.

29. In January 2025, the State of Oregon released a new Wildfire Hazard Map and a new “defensible space” code, which will require homeowners in fire-prone areas to demonstrate that they have taken action to reduce wildfire risk for their home and the area around their home.

Imagine you are the homeowner of this house here in the Oregon Garden (called the Fire Safe House). Identify 4 ways in which the house features and surrounding space help to meet the defensible space code. [4 points]

- a. Any of these possibilities or other reasonable responses:
  - Property free of fallen leaves, needles, debris close to house and under decks
- b.
  - Propane tanks located a distance from house
  - No trees hanging over the house
  - Wood pile located a distance from house
  - Screen underside of deck
- c.
  - Fire-resistant roof
  - Zone 1 (close to house) Only fire-resistant plants with proper spacing, kept watered and mulched
- d.
  - Zone 2 (from 30 feet to 100 feet of house) – a fire break with only low-growing fire-resistant plants and any flammable trees limbed up well above the ground.