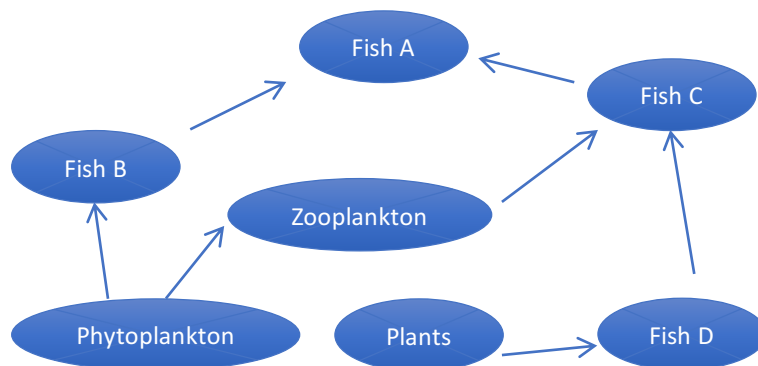


SCIENCE OLYMPIAD ECOLOGY
ANSWER KEY

1. **B.**
2. i.



Subtract 1 point for each inaccuracy (missing arrow, species omitted, arrow in the wrong place).

- ii. **D.**
3. i. Eutrophication or algal/algae bloom
ii. Blocking of sunlight by algae [1] and nutrient depletion [1], resulting in the death of plants at the basis of the food chain the fish rely on [1]. 1 pt for answers that mentioned lack of oxygen
iii. Biotic: the presence or absence of predators or food [1].
Abiotic: water temperature, pH of the water, or any other valid point [1 each].
4. Deeper water may not allow sufficient sunlight to reach the plant [2] and The plant needs to have its roots in the soil at the bottom of the water, so the water cannot be too deep [2].
5. **A.**
6. Natural selection (2 points) (give 1 point for “selection” or “selection pressure”);
Directional (2 points)
7. 47%; good eyesight/vision
(Award 2 points for the correct percentage. Award 1 point for calculation if percentage is incorrect. Award 1 point for correct phenotype answer)
8. 92%. [Award 1 point for calculation if answer is incorrect. Award 2 points if the participant answered 8% (percentage of population with poor eyesight), 51% (prevalence of genotype QQ), or 41% (prevalence of genotype Qq).]
9. **A.**
10. The endangered fish may be caught inadvertently in nets meant for fishing for other species [2]; if species that endangered fish rely on for food are being fished for, the endangered fish may be left without sufficient food [2]. Accept another valid explanation. Award 1 point for the suggestion that the fishing industry is illegally continuing to catch these endangered fish.
11. **C. and D.** [2 points for each correct answer]

Tiebreaker

12. Award 1 point per correct answer. Possible answers: initially hostile environment; increase in humus content of soil; increase in mineral content of soil; increase in number of niches in ecosystem; increase in number of habitats in ecosystem.

Tiebreaker

13. **Phosphorous cycle** (1 point): making of chemical fertilizers (1 point); contribute to greenhouse emissions through release of nitrous oxide (N₂O) into atmosphere
Carbon cycle (1 point): fossil fuel combustion (1 point); releases CO₂, contributing to global warming through the greenhouse effect (1 point)
(Other possible answers include rising sea levels, ocean acidification, fiercer storms, changes in seasonal events, increasing ocean temperature stratification)
14. **C.**
15. **B.**
16. Large padded feet for running on snow (1 point)
Thick fur coats or layers of fat to keep warm (1 point)
Changing fur color for camouflage (1 point)
17. Migration; hibernation (1 point each)
18. Seasonal changes in leaves OR lose their leaves in autumn
19. Adds dead organic matter to the soil, enriching it for plants to grow
20. **C.**
21. **B.**
22. i. **A.**
ii. Both (1 point if JUST either primary or secondary succession)
iii. Fire (surface fires is ALSO acceptable)
23. **A.**
24. **C.**
25. **A.**
26. Type II
27. Type III
28. Type I
29. i. **D.**
ii. Grow; winds (2 points each)
30. **A.**
31. **B.**
32. **B. and E.**
33. **C.**
34. **D.**
35. i. **A. and D.**
ii. **C.**
36. Any TWO of these answers will be accepted:
- **Use of contour farming and wind breaks**
 - **Leaving unploughed grass strips between ploughed lands**
 - **Ensuring that soil is rich in organic matter**
 - **Allowing indigenous plants to grow on riverbanks**
 - **Plant several different types of plants together**

- **Planting trees/vegetation/deep-rooted plants to improve soil stability**
- 37. **B.**
- 38. **C.**
- 39. **D.**
- 40. **A.**
- 41. **D.**
- 42. **A.**
- 43. **B.**
- 44. **E.**
- 45. **8.01 days**
(1 point w/ incorrect significant figures). If calculation was shown give 1 point
- 46. **E.**
- 47. **D.**
- 48. **5.38 years** (5.54 years ALSO acceptable)
(1 point if units are incorrect or missing)
(1 point subtracted for incorrect sig figs)
- 49. **C.**
- 50. **B.**
- 51. **C.**
- 52. **0.123; 21,150 individuals**
(3 points for correct r value; 2 points for correct population size)
(2 points if birth and death rates are calculated; 1 point if units are missing or incorrect)
(1 point for calculations even if everything else is wrong)
- 53. **C.**
- 54. **D.**
- 55. **0.14 individuals/(individual*day)** (2 points if units are missing or incorrect)
(1 point for calculations if answer and units are incorrect or missing)
- 56. **D.**
- 57. i. Act as carbon sinks that store carbon into their biomass
ii. Carbon dioxide, nitrous oxide, methane (2 points each)
iii. **A.**
- 58. **B. and E.**

Tiebreaker

59. Any THREE of these answers will be accepted:
- **Habitat destruction/biodiversity loss**
 - **Habitat fragmentation caused by roads dividing habitat into smaller areas**
 - **Microclimate caused by paved surfaces absorbs heat/solar energy**
 - **Bank erosion/turbidity/loss of aquatic organisms caused by excessive runoff**
 - **Groundwater depletion because water runs off rather than infiltrating soil**
 - **Drying of soil/subsidence/formation of sinkholes because of surface runoff**
 - **Erosion caused by flooding/excessive runoff**
 - **Flooding caused by lack of infiltration of storm water into soil**

Tiebreaker

60. i. Phosphorus has to be weathered from rocks and minerals

- ii. Any TWO of these answers will be accepted:
- **Phosphorus is a component of ATP/nucleotides in cells**
 - **Necessary for the formation of nucleic acids/DNA and RNA**
 - **Phospholipids are major parts of cell membranes**
 - **Found in/gives strength to bones and/or enamel of mammal teeth**