

## ANSWERS FOR MULTIPLE-CHOICE QUESTIONS

Using the table below, score your test. You will find explanations of the answers on the following pages.

1. E	21. E	41. C	61. C	81. D
2. B	22. C	42. E	62. C	82. C
3. D	23. E	43. C	63. D	83. E
4. A	24. C	44. E	64. B	84. D
5. C	25. A	45. E	65. B	85. A
6. E	26. E	46. D	66. B	86. D
7. B	27. E	47. A	67. A	87. A
8. C	28. D	48. B	68. A	88. D
9. B	29. B	49. B	69. D	89. A
10. B	30. C	50. C	70. E	90. C
11. A	31. A	51. C	71. B	91. C
12. D	32. C	52. D	72. E	92. A
13. E	33. B	53. D	73. C	93. C
14. E	34. D	54. C	74. A	94. D
15. D	35. B	55. A	75. D	95. A
16. A	36. D	56. A	76. E	96. E
17. B	37. B	57. A	77. D	97. D
18. E	38. A	58. C	78. D	98. B
19. E	39. E	59. D	79. D	99. E
20. B	40. D	60. D	80. B	100. C

- ANSWER: E.** New Zealand has regularly been under masses of ozone-depleted air that float northward from over Antarctica. The masses may linger for weeks and they expose all life to damaging levels of UV-B radiation (*Living in the Environment*, 16th ed., page 523 / 17th ed., page 521).
- ANSWER: B.** Iceland is above the mid-Atlantic trench and gets about 75% of its energy and 95% of its electricity from geothermal sources (*Living in the Environment*, 16th ed., page 399 / 17th ed., page 425).
- ANSWER: D.** Japan has the world's tenth-largest population with about 128 million people—far more than any of the other islands labeled (*Living in the Environment*, 16th ed., page 126 / 17th ed., page 138).

and ozone depletion slows down to its normal pace (*Living in the Environment*, 16th ed., page 523 / 17th ed., page 521).

## SCORING GUIDELINES FOR FREE-RESPONSE QUESTIONS

1. (a) The ad makes reference to the golden toads of Monteverde. Explain why this reference is made.

**1 point can be earned**—Golden toads are extinct

- (b) A large share of the world's ecotourism takes place in developing countries. Describe TWO ways in which ecotourism can help reduce poverty in these countries.

**2 points can be earned**—1 point for each poverty reduction method with a description

Method	Description
Job creation	Construction jobs building infrastructure Jobs as guides Service industry jobs
Income to provide children with a nutritious diet	Money from jobs can provide a nutritious diet for families.
Income to provide adequate shelter for children	Money from jobs can provide shelter for families.
Revenue to provide clean water	Clean water needed to attract tourists is made available to locals.
Improved health care	Adequate health care needed to treat tourists in emergencies is made available to locals.
Revenue to build schools	State tourism tax revenue can be used to build schools.

- (c) Discuss the conflict between people living in poverty and efforts to conserve biodiversity.

**2 points can be earned**—1 point for each item discussed

- Bushmeat is harvested for food.
- Habitat is slashed and burned for subsistence agriculture.
- Fuelwood may be gathered unsustainably.
- Illegal hunting (poaching) is practiced to earn money.
- Marginal land is used as pasture or placed under cultivation increasing desertification.

- (d) Other than those listed above, identify a specific endangered species that people might be willing to pay to visit and the location of the species' native habitat.



3. (a) Identify and describe the series of energy transformations (conversions) that are used to generate electricity in a hydroelectric power plant.

**4 points can be earned**—1 point for each correct energy transformation with a correct description

Energy Transformation	Description
Potential energy to kinetic energy	Water flows out of an elevated reservoir (downhill), converting potential energy to kinetic energy.
Kinetic energy of water to kinetic energy of a turbine	The kinetic energy of the water is used to push a turbine, transferring kinetic energy from the water to the turbine.
Kinetic energy to electrical energy	The kinetic energy of the turbine (water is acceptable if the previous transformation was missed) is converted to electricity through a generator connected to the rotating shaft of the turbine (electric potential energy).
Potential and/or kinetic energy to heat	Potential energy and kinetic energy are both converted to heat (waste heat) at each step.

- (b) Explain why the energy provided by existing hydropower dams is virtually free.

**1 point can be earned** for a correct explanation

- The global water cycle returns water to the elevated reservoir (returns its potential energy) at no cost.
- The ecosystem service is provided by the sun that evaporates the water and returns it to the reservoir.
- No fuel purchases are required.

(Similar explanations are acceptable, but they must include the free return of water to the reservoir by nature.)

- (c) Identify ONE species whose numbers have diminished as the result of a hydropower project and describe how the project led to the decline in their population.

**2 points can be earned**—1 point for the identification of a correct species and 1 point for a correct description

Species	Description
Salmon	Migration route is blocked by dams.
Baiai (River) Dolphin	Habitat fragmentation limits food supply.
River Sturgeon	Changes in water temperature, habitat fragmentation.
Steelhead	Migration route blocked by the dam.

- (d) Identify ONE infectious disease that could spread more rapidly among people as a result of a hydropower project and explain how the project could lead to an increase in the spread of the disease.

**2 points can be earned**—1 point for a correct disease and  
1 point for a correct explanation

**CORRECT DISEASES**

- Typhoid fever
- Cholera
- Dysentery
- Hepatitis B
- Giardiasis
- Cryptosporidium
- Schistosomiasis

**EXPLANATION**

- The reservoir stops the flow of water and keeps the river from flushing pathogens downstream.
- Reservoirs have stratified layers and the water does not mix well.

- (e) Hydroelectric dams have a limited lifetime. Identify and describe two natural processes that could lead to the end of the effective lifetime of a hydroelectric dam.

**2 points can be earned**—1 point for each process with a correct description

Silting – Silt accumulates behind the dam eventually filling the dam.

Flooding – A catastrophic flood could cause the dam to fail.

Earthquake – A massive earthquake could cause the dam to fail.

4. (a) Unsustainable commercial fishing practices for wild species receive much of the blame for the depletion of the world's fisheries. Identify and describe ONE commercial fishing practice that is used to catch wild species and ONE negative environmental consequence of that practice.

**3 points can be earned**—1 point for a correct identification of a practice, 1 point for a correct description, and 1 point for a correct consequence

Practice	Description	Consequence
Long-line fishing	Miles of fishing line with thousands of baited hooks are let out behind ships and then hauled aboard with their catch.	Bycatch includes turtles, dolphins and other threatened or endangered species.  Lines break and continue hooking and killing fish for years.
Drift netting	Huge drifting nets tens of miles long are let out behind a ship and then hauled aboard with their catch.	Bycatch includes turtles, dolphins, sea birds and threatened or endangered species.  Nets break loose or are lost and continue catching and killing fish for years.



Practice	Description	Consequence
Purse-seine fishing	A huge net is used to encircle a school of fish and the net is cinched closed like a giant purse capturing everything inside.	Bycatch includes large numbers of dolphins that are actively feeding on the school of fish when it was caught.  Nets break loose or are lost and continue catching and killing fish for years.
Trawler fishing or bottom trawling	Huge weighted nets shaped like bags are dragged across the ocean floor to scoop up bottom-dwelling fish and shellfish.	Destruction of most species on the ocean floor including coral reefs.  Bycatch includes everything that was on the ocean floor including juvenile fish and shellfish and threatened or endangered bottom-dwelling species.

(b) Identify and describe TWO negative environmental consequences of fish farming.

**2 points can be earned**—1 point for each consequence

- Excess food enriches nutrient levels in coastal areas, leading to eutrophication/hypoxia.
- Fish wastes enrich nutrient levels in coastal areas, leading to eutrophication/hypoxia.
- The farming of carnivorous species requires fishing for large numbers of prey species as feed.
- Habitat destruction of coastal areas to create fish farms.
- Escaped farmed fish contaminate the genetic diversity of wild species.
- Diseases in farm stock passed to wild species.
- Escape of non-native species occurs when they are farmed outside their native habitat.

(c) Discuss the effect that an El Niño-Southern Oscillation event can have on fisheries.

**2 points can be earned**—1 point for each item discussed

- The upwelling of nutrient-rich water is stopped.
- Primary productivity is reduced.
- The base of the aquatic food web is diminished.
- Fish species that depend on phytoplankton in these regions decline dramatically.
- Eastern Pacific/west coast of South America is most affected.

(d) Some of the world's fish have high concentrations of mercury in their flesh.

**3 points can be earned**—1 point can be earned in [i] for a correct source and 2 points can be earned in [ii] for a correct explanation

(i) Identify a major source of the mercury.

**1 point can be earned** for a correct source

- Emissions from coal-burning power plants
- Emissions from incinerators
- Emissions from volcanoes and other natural sources

(ii) Explain why the concentration of mercury differs from species to species.

**2 points can be earned** for a correct explanation

- Mercury accumulates or bioaccumulates in tissues throughout the life of an organism; therefore, long-lived species will have higher mercury concentrations as they get older.
- Mercury magnifies or biomagnified in food chains, so organisms feeding at lower trophic levels will have less mercury in their tissues.
- In aquatic ecosystems, mercury can be converted to methylmercury, which is a potent teratogen and very hazardous.
- Species that live in water or eat fish are subject to higher concentrations of mercury.
- Predatory fish and birds have especially high levels of mercury in their tissues.
- Species in the Arctic have especially high levels (polar bears, seals, and toothed [carnivorous] whales).

## CALCULATING YOUR SCORE

This scoring worksheet is based on the 2008 AP Environmental Science released exam. While the AP grade conversion chart is NOT the same for each testing year, it gives you an approximate breakdown.

### SECTION 1: MULTIPLE CHOICE

$$\frac{\text{Number Correct (out of 100)}}{\text{Number Correct (out of 100)}} \times 0.90 = \text{Weighted Section I Score}$$

### SECTION II: FREE RESPONSE

$$\text{Document-Based Question} \frac{\text{Score (out of 10)}}{\text{Score (out of 10)}} \times 1.50 = \text{(Do not round)}$$

$$\text{Data-Set Question} \frac{\text{Score (out of 10)}}{\text{Score (out of 10)}} \times 1.50 = \text{(Do not round)}$$

$$\text{Synthesis \& Evaluation Question} \frac{\text{Score (out of 10)}}{\text{Score (out of 10)}} \times 1.50 = \text{(Do not round)}$$

$$\text{Synthesis \& Evaluation Question} \frac{\text{Score (out of 10)}}{\text{Score (out of 10)}} \times 1.50 = \text{(Do not round)}$$

$$\text{Sum} = \text{Weighted Section II Score}$$

### COMPOSITE SCORE

$$\frac{\text{Weighted Section I Score}}{\text{Weighted Section I Score}} + \frac{\text{Weighted Section II Score}}{\text{Weighted Section II Score}} = \text{Composite Score}$$

### AP GRADE CONVERSION CHART

Composite Score Range	AP Grade
107–150	5
87–106	4
75–86	3
62–74	2
0–61	1