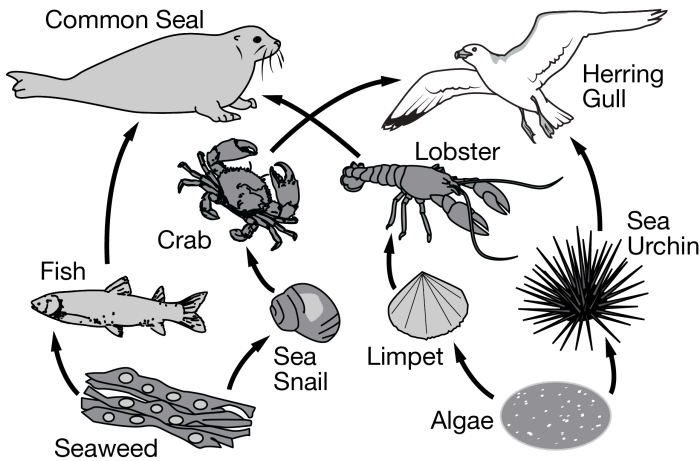


Ecosystems and Biodiversity Practice FRQ

Names:		Period:	
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- Write your answers in the spaces provided.
- Refer to the figure or diagram to answer the question.
- Where explanation or discussion is required, support your answers with relevant information and/or specific examples.



Refer to the food web shown by the diagram above to answer the following questions.

A. Analyze the food web.

i. **Identify** a primary producer.

ii. **Identify** a tertiary consumer.

iii. **Identify** two organisms that compete for the same food source.

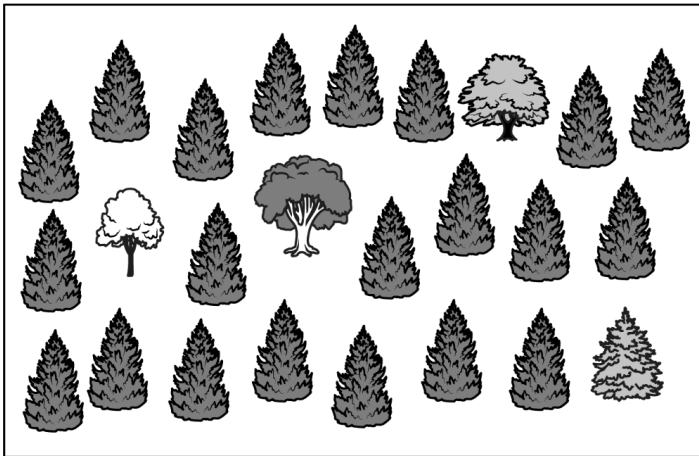
B. **Describe** the process of primary productivity.

C. **Calculate** the amount of energy from seaweed available to a Herring Gull when it eats a crab if the amount of energy contained in seaweed is 30 calories - according to the ten percent rule.

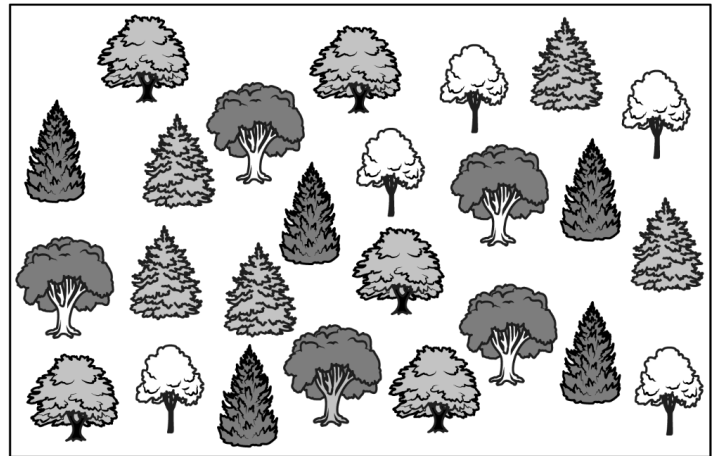
D. **Describe** one short-term, direct effect that overharvesting crabs would have on the food web shown above.

E. Besides banning all harvest of crabs, **describe** one potential *realistic* strategy to increase the population of crabs.

Community A



Community B



Refer to the two communities shown by the diagram above to answer the following questions.

F. **Identify** *two* different scales on which biodiversity can be measured.

G. Use the diagram to **describe** one *difference* in biodiversity between Community A and Community B.

H. **Describe** one *regulating* service provided by a community like the one shown above.

I. An ecologist is interested in the effect that fire intensity has on the biodiversity of tree communities.

- i. **Describe** the control group for an experiment that examines the effect of fire intensity on the biodiversity of tree communities.

- ii. The diagram illustrates some of the results of the experiment. The experimental group with the highest-intensity fire after twenty years is shown in *Community A*. The experimental group with the lowest-intensity fire after twenty years is shown in *Community B*. Based on this information, **state** the likely original *hypothesis*.

Ecosystems and Biodiversity Practice FRQ **KEY**

- Responses must be written in full sentences, no bullet point lists or sentence fragments.
- Appropriate scientific vocabulary must be used, not described or implied.
- If multiple responses are given, consider only the first applicable response to a question.
- If calculations are required, work must be shown for full credit.

Part (a)(i) - 1 Point

The response indicates algae or seaweed.

Part (a)(ii) - 1 Point

The response indicates a common seal or herring gull.

Part (a)(iii) - 1 Point

The response identifies one of the following groups of two organisms that compete for the same food source.

- Fish and Sea Snail (compete for seaweed)
- Limpet and Sea Urchin (compete for algae)

Part (b) - 1 Point

The response must describe, not just identify, the process of primary productivity.

The response describes primary productivity in one of the following ways.

- The *rate* of photosynthesis over time
- The *rate* at which solar energy (sunlight) is converted into organic compounds (such as sugars) over time
- The *rate* at which plants/autotrophs/photosynthetic organisms produce organic compounds

Part (c) - 1 Point

- 0.03 Calories

Part (d) - 1 Point

The response describes, not just identifies, one short-term direct effect of overharvesting crab on the food web shown. The response provides one of the following descriptions of a short-term direct effect.

- The number of herring gulls would decrease.
- The number of sea snails would increase.

Part (e) - 1 Point

The response describes, not just identifies, one potential *realistic* strategy to increase the population of crabs. The response cannot describe banning the harvest of all crabs. The response provides any of the following descriptions of a potential realistic strategy to increase the population of crabs.

- Passing laws to cap the number of boats that can enter fisheries
- Passing laws to cap the number of crabs that can be harvested by each boat
- Improving existing habitat for crabs
- Creating habitat (sea grasses) for young crabs to escape predators
- Reducing pollution that can create dead zones, which kill the organisms crabs can eat

Part (f) - 2 Points

The response must include two different scales to earn two points.

The response indicates two of the following scales on which biodiversity can be measured.

- genetic
- species
- habitat
- ecosystem

Part (g) - 1 Point

The response refers to the diagram when describing that Community B is more diverse than Community A because Community B has a higher species evenness than Community A.

Part (h) - 1 Point

The response must describe, not just identify, the regulating service provided by a community shown in the figure. The regulating service must be a service provided by a forest ecosystem.

- regulates local climate by increasing the amount of shade/water availability
- regulates local air quality by removing pollutants from atmosphere/increasing the amount of shade
- stores carbon in plant biomass
- sequesters carbon/removes atmospheric carbon dioxide through photosynthesis
- moderates extreme weather events
- filters water

Part (i)(i) - 1 Point

The response describes, not just identifies, the control group in the experiment. The response describes the control group as an unburned area that has no fire intensity/a fire intensity of zero that can be used as a comparison for the baseline amount of biodiversity.

Part (i)(ii) - 1 Point

The response states a likely original hypothesis for the study, such as:

- High-intensity fires decrease the biodiversity of tree communities/forest ecosystems.
- Low-intensity fires increase the biodiversity of tree communities/forest ecosystems.

