Specification for Assessment #6

Explaining Complex Biological Relationships

Competency

Student can explain complex relationships between biotic and abiotic factors in an ecosystem.

Focus of this assessment:

- ☑ Declarative knowledge
- ☐ Procedural knowledge
- ☐ Problem solving

Evidence

Students are presented with 10 factors (6 biotic and 4 abiotic) existing within a familiar ecosystem. Using a graphic organizer, students describe scientifically accurate relationships between pairs of factors. Each student's performance is scored in terms of (1) the total number of scientifically accurate relationships that are described and (2) the inclusion of each of the 10 factors in at least one relationship.

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Example Task

In this activity, you will describe relationships between some biotic (living) and abiotic (nonliving) factors. The following 10 biotic and abiotic factors can be found in many river ecosystems in Florida, like the one pictured:

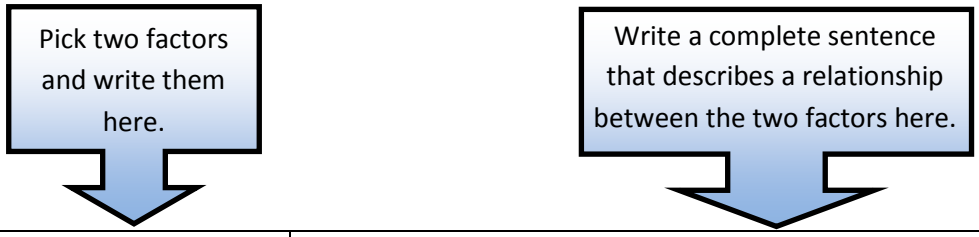
- alligators
- aquatic plants
- fish
- fresh water
- insects
- manatees
- oxygen
- sand
- sunlight
- turtles

Think of how one factor affects another factor in this ecosystem. The relationship might be something one factor does *to* the other factor. Or, the relationship might be something one factor does *for* the other factor.

On the following pages, you will see 18 boxes like the one below. To write your response,

- Pick two factors from the 10 factors listed above and write them in the small boxes.
- In the larger box, write a complete sentence that describes a relationship between the two factors.

Here is how you should fill in your answers:



Factor	Relationship between these two factors
Factor	

- Use **each** of the 10 factors in the list **at least once**.
- You can use factors more than once, but you must write a **different relationship** each time.
- You should complete as many relationships as you can, up to 18.

Example Task (continued)

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Example Task (continued)

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Example Task (continued)

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Factor	Relationship between these two factors
Factor	

Did you use each of the 10 factors at least once? Check now before you finish your work.

Scoring Plan for the Example Task

Number of Relationships

Student earns one point for each of the 18 relationships that • relates two of the listed factors and • states an accurate action or effect of one factor on the other, and • is not a restatement of a previously written relationship between the same two factors. Examples: • *Sunlight* provides energy to *aquatic plants*, which is necessary for photosynthesis. • *Aquatic plants* provide shelter to *fish*. • *Fish* feed on *insects*. **Note 1:** A relationship between a biotic factor and another factor may only be accurate for a subset of those types of organisms. In these cases, award credit if the description written in the box is accurate for at least some of those types of organisms. For example, some fish eat aquatic plants, whereas others do not. If a student describes the relationship "fish eat aquatic plants," that relationship should be awarded credit. **Note 2:** The instructions to students indicate that each relationship should be written as a complete sentence. This is done to promote the articulation of each response, but the completeness of the sentence is not to be scored.	18 pts. max

Number of Factors

A valid relationship is given (i.e., one meeting the above criteria) for *alligators*.	1 pt.
A valid relationship is given for *aquatic plants*.	1 pt.
A valid relationship is given for *fish*.	1 pt.
A valid relationship is given for *fresh water*.	1 pt.
A valid relationship is given for *insects*.	1 pt.
A valid relationship is given for *manatees*.	1 pt.
A valid relationship is given for *oxygen*.	1 pt.
A valid relationship is given for *sand*.	1 pt.
A valid relationship is given for *sunlight*.	1 pt.
A valid relationship is given for *turtles*.	1 pt.

Procedure for Creating Parallel Tasks

Parallel tasks will reference a different ecosystem and include a different list of factors. **The directions to the student, however, will remain the same across all tasks.**

- Select an ecosystem that has been covered in students' curriculum. Examples of ecosystems include coral reefs, freshwater swamps, pine forests, sand dunes, mangroves, the deep ocean, rivers, etc.
- Select **four abiotic and six biotic** factors that exist within the ecosystem. List these in alphabetical order when presented to students.
- For the biotic factors, use general types of organisms rather than particular species where possible. For example, use the term *turtle* or even *pond turtle*, but do not use *red-eared slider*. However, many organisms may be known to students by a species-specific name and, in these cases, that name is permissible. For instance, the example task uses the terms *manatees* and *alligators*.
- There must be enough relationships among the selected factors to ensure that a highly competent student has the opportunity to describe up to 18 relationships among the factors. After the 10 factors have been selected, state at least 18 relationships using those factors to ensure that it is reasonable for a knowledgeable 7th-grade student to do the same.

Scoring Plan for Parallel Tasks

Scoring plan used for the example task	Generic scoring criteria for all parallel tasks

Number of Relationships

Same as generic (However, examples will include factors specific to each task.)	Student earns one point for each of the 18 relationships that • relates two of the listed factors and • states an accurate action or effect of one factor on the other, and • is not a restatement of a previously written relationship between the same two factors. Examples: • *Sunlight* provides energy to *aquatic plants*, which is necessary for photosynthesis. • *Aquatic plants* provide shelter to *fish*. • *Fish* feed on *insects*. **Note 1:** A relationship between a biotic factor and another factor may only be accurate for a subset of those types of organisms. In these cases, award credit if the description written in the box is accurate for at least some of those types of organisms. For example, some fish eat aquatic plants, whereas others do not. If a student describes the relationship "fish eat aquatic plants," that relationship should be awarded credit. **Note 2:** The instructions to students indicate that each relationship should be written as a complete sentence. This is done to promote the articulation of each response, but the completeness of the sentence is not to be scored.	18 pts. max

Number of Factors

A valid relationship is given (i.e., one meeting the above criteria) for *alligators*.	Student earns one point for each of the 10 factors for which a valid relationship (i.e., one meeting the above criteria) is stated.	10 pts. max
A valid relationship is given for *aquatic plants*.		
A valid relationship is given for *fish*.		
A valid relationship is given for *fresh water*.		
A valid relationship is given for *insects*.		
A valid relationship is given for *manatees*.		
A valid relationship is given for *oxygen*.		
A valid relationship is given for *sand*.		
A valid relationship is given for *sunlight*.		
A valid relationship is given for *turtles*.		