What is a Geotechnical Engineer?

Draw and label a picture of a geotechnical engineer at work.

Explain your drawing of a geotechnical engineer:

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________
What is a Geotechnical Engineer?

Draw a picture of a geotechnical engineer at work. Label your picture.
Directions: For the questions 1 and 2 below, circle the BEST answer.

1. What is a geotechnical engineer MOST LIKELY to do for his or her work?
   A. fix car engines
   B. design batteries
   C. test the properties of soil
   D. build a stone wall for a garden

2. A town wants to build a new tall building. How would a geotechnical engineer help?
   A. decide where to put the building
   B. design what the building will look like
   C. repair trucks that dig the foundation of the building
   D. put together steel beams for the structures of the building

3. Name 2 things that a geotechnical engineer has to think about for his or her work.
   (1) ____________________________________________________
       ____________________________________________________
       ____________________________________________________

   (2) ____________________________________________________
       ____________________________________________________
Directions: For each question below, circle the BEST answer.

1. Where do geotechnical engineers work?
   A. outside
   B. on a train
   C. in a factory
   D. in a car repair shop

2. What would a geotechnical engineer think about for his or her job?
   A. why a car engine isn’t working
   B. if earthquakes will damage a building
   C. how to get electricity into a new building
   D. how to make car engines that use less gas

3. What does a geotechnical engineer have to know about?
   A. cars
   B. erosion
   C. electricity
   D. cell phones
Which of these things is a model? Circle **ALL** the models below.

- map of hiking trails
- battery
- suit of armor
- microscope
- miniature bridge
- bicycle
- guitar
- plastic globe
- doll house

What is YOUR definition of the word “model”?

___________________________________________________

___________________________________________________

___________________________________________________

___________________________________________________
Which of these things is a model? Circle **ALL** the models below.

<table>
<thead>
<tr>
<th>map of hiking trails</th>
<th>battery</th>
<th>suit of armor</th>
</tr>
</thead>
<tbody>
<tr>
<td>microscope</td>
<td>miniature bridge</td>
<td>bicycle</td>
</tr>
<tr>
<td>guitar</td>
<td>plastic globe</td>
<td>doll house</td>
</tr>
</tbody>
</table>
Directions: Decide whether each statement below is TRUE (😊 T) or FALSE (☐ F) and circle your answer.

| Models need to look like the real thing. | 😊 T | ☐ F |
| Models could help people test if a bridge will be strong enough. | 😞 T | 😞 F |
| Models help people learn how things work. | 😊 T | ☐ F |
| Models need to be smaller than the real thing. | 😊 T | ☐ F |
| Models can help people test different designs. | 😞 T | 😞 F |
| Models can help engineers skip the design process. | 😞 T | 😞 F |
| Models need to represent something about the real thing. | 😊 T | ☐ F |
| Models can help show people what a bridge will look like. | 😊 T | ☐ F |
1. A girl is designing a new kind of brace to protect broken fingers. Which model would be MOST useful for her to use? Circle the BEST answer below.

A. a model that bends like a real finger  
B. a model that looks exactly like a finger  
C. a model that feels soft like a real finger  
D. a model would not be useful here

2. A company is designing a new bridge. Describe 2 ways the workers at the company would use models. Write your answers below.

(1) ____________________________________________  

______________________________________________  

______________________________________________  

______________________________________________

(2) ____________________________________________  

______________________________________________  

______________________________________________  

______________________________________________
Directions: Write your answers on the lines provided.

1. A building tipped over and was damaged during an earthquake. What might be a reason the building tipped?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

2. Some people are designing a building in an area that has a lot of earthquakes. How could they design the foundation to help the building stay standing in an earthquake?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
The core sample shown below was taken from an area that has a lot of earthquakes.

1. If you wanted to build a bridge in this area, how deep would you make the foundation?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2. Explain why would you make it that deep.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Some students are deciding where to put a tetherball pole in their playground.

1. List 2 things they should think about before they decide on a place to build their tetherball pole.

(1) ______________________________________________________

(2) ______________________________________________________

2. The students chose 2 places that might work. One has rocky soil and one has sandy soil. If both of these places are equally good in every other way, which place should they choose for their tetherball pole? Explain your answer below.

________________________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

3. The students put up their tetherball pole, but it keeps falling over. What could they do to keep the tetherball pole from falling over?

________________________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________
Below is a map of a river with several sites marked along the riverbank. The arrows show which way the river flows.

Look at the map and use it to answer the questions below.

1. Put a CIRCLE around the site (A, B, C, or D) that is MOST likely to erode.

2. Why is it MOST likely to erode there?
   _________________________
   _________________________
   _________________________

3. Put an X over the site (A, B, C, or D) that is LEAST likely to erode.

4. Why is it LEAST likely to erode there?
   _________________________
   _________________________
   _________________________
Below is a map of a river with several sites marked along the riverbank. The arrows show which way the river flows.

Look at the map and use it to answer the questions below.

1. Put a CIRCLE around the site (A, B, C, or D) that is MOST likely to erode.

2. Put an X over the site (A, B, C, or D) that is LEAST likely to erode.
To the right is an aerial map showing the course of a river. The arrows indicate the direction that the river is flowing.

1. If people don't do anything to the river, what will it look like in 50 years? Circle the BEST answer.
   A. it will be the same  
   B. it will be straighter  
   C. it will have bigger bends  
   D. there is no way to know

2. Which of the pictures below MOST LIKELY shows what the course of the same river will look like in 50 years? Circle the BEST answer.

3. Explain your answers to questions 1 and 2:
   ______________________________________________________________
   ______________________________________________________________
   ______________________________________________________________
   ______________________________________________________________
   ______________________________________________________________
1. Some people are deciding where to put the foundations of a small bridge. Look at the properties below and circle the BEST place to put the bridge foundations.

<table>
<thead>
<tr>
<th>Site</th>
<th>Property 1</th>
<th>Property 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>On a curve of the river</td>
<td>Compacted rocky soil</td>
</tr>
<tr>
<td>2</td>
<td>On a straight part of the river</td>
<td>Compacted rocky soil</td>
</tr>
<tr>
<td>3</td>
<td>On a curve of the river</td>
<td>Far from where the villagers want the bridge</td>
</tr>
<tr>
<td>4</td>
<td>Loose organic soil</td>
<td>Near where the villagers want the bridge</td>
</tr>
</tbody>
</table>

2. Explain why you chose that site:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Design 2 Example:

Answer Key

Rock Sand Swamp Water

Picnic Area

Visitor Center
1. Fill in the table below using your second design:

<table>
<thead>
<tr>
<th>Plank</th>
<th>Type of Ground</th>
<th>Days of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>End 1</td>
</tr>
<tr>
<td>1</td>
<td>Rocky</td>
<td>Swampy</td>
</tr>
<tr>
<td>2</td>
<td>Swampy</td>
<td>Rocky</td>
</tr>
<tr>
<td>3</td>
<td>Rocky</td>
<td>Sandy</td>
</tr>
<tr>
<td>4</td>
<td>Sandy</td>
<td>Rocky</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>10</strong> days</td>
</tr>
</tbody>
</table>

2. Count how many animal circles your walkway crosses: **11** animals

3. Figure out your total score by filling in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(A) Animal Score</strong></td>
<td></td>
</tr>
<tr>
<td>Multiply the total number of animals by 2.</td>
<td>Number of animals X 2 = <strong>22</strong></td>
</tr>
<tr>
<td><strong>(B) Number of Hours Worked</strong></td>
<td></td>
</tr>
<tr>
<td>How many total hours did the ranger work?</td>
<td>Number of days = <strong>10</strong> days</td>
</tr>
<tr>
<td><strong>(C) Total Score</strong></td>
<td></td>
</tr>
<tr>
<td>Subtract your answer for B from your answer for A.</td>
<td>(A) <strong>22</strong> - (B) <strong>10</strong> = <strong>12</strong> Points</td>
</tr>
</tbody>
</table>

4. You can use the scale below to see how you did!

<table>
<thead>
<tr>
<th>Points</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-8</td>
<td>Try again!</td>
</tr>
<tr>
<td>9-11</td>
<td>Good job!</td>
</tr>
<tr>
<td>12+</td>
<td>Amazing!</td>
</tr>
</tbody>
</table>

Student Post Assessment
Lesson 4
Help a park ranger design a walkway from the Visitor Center to the Picnic Area that allows visitors to see lots of animals.

The ranger has 4 wooden planks. The planks need supports at each end to make the walkway stable. The less solid the ground, the longer it takes to build the supports.

The table shows how long it takes the ranger to set up the planks on the different types of ground.

<table>
<thead>
<tr>
<th></th>
<th>End 1</th>
<th>End 2</th>
<th>Days of work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock</td>
<td>Rock</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Rock</td>
<td>Sand</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Rock</td>
<td>Swamp</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Sand</td>
<td>Sand</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Sand</td>
<td>Swamp</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Swamp</td>
<td>Swamp</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

Directions: Design a walkway by cutting out the planks on the next page and taping them on the map.

Follow these rules:

• Each plank needs to touch another plank

• All of the black part of the plank must be in one type of ground, because this is where the supports will go.

• You get 2 points for every animal the visitors can see. A plank must cross the circle around an animal for visitors to see it.

• You lose 1 point for every hour the ranger needs to work.

• One plank must touch the circle marked “Visitor Center”.

• One plank must touch the circle marked “Picnic Area”.
1. Fill in the table below using your finished design:

<table>
<thead>
<tr>
<th>Plank</th>
<th>Type of Ground</th>
<th>Days of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>End 1</td>
<td>End 2</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>_____</td>
<td>_____days</td>
</tr>
</tbody>
</table>

2. Count how many animal circles your walkway crosses: ________animals

3. Figure out your total score by filling in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(A) Animal Score</strong></td>
<td>Multiply the total number of animals by 2.</td>
</tr>
<tr>
<td></td>
<td>Number of animals X 2 = ______</td>
</tr>
<tr>
<td><strong>(B) Number of Hours Worked</strong></td>
<td>How many total days did the ranger work?</td>
</tr>
<tr>
<td></td>
<td>Number of hours = _____days</td>
</tr>
<tr>
<td><strong>(C) Total Score</strong></td>
<td>Subtract your answer for B from your answer for A.</td>
</tr>
<tr>
<td></td>
<td>(A) _____ - (B) _____ = _____Points</td>
</tr>
</tbody>
</table>

4. You can use the scale below to see how you did!

<table>
<thead>
<tr>
<th>Points Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-8 points</td>
<td>Try again!</td>
</tr>
<tr>
<td>9-11 points</td>
<td>Good job!</td>
</tr>
<tr>
<td>12+ points</td>
<td>Amazing!</td>
</tr>
</tbody>
</table>

EiE: Evaluating a Landscape
© Museum of Science, Boston
Duplication Permitted
Help a park ranger design a walkway from the Visitor Center to the Picnic Area that allows visitors to see lots of animals.

The ranger has 4 wooden planks. The planks need supports at each end to make the walkway stable. The less solid the ground, the longer it takes to build the supports.

The table shows how long it takes the ranger to set up the planks on the different types of ground.

<table>
<thead>
<tr>
<th>End 1</th>
<th>End 2</th>
<th>Days of work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock</td>
<td>Rock</td>
<td>1</td>
</tr>
<tr>
<td>Rock</td>
<td>Sand</td>
<td>2</td>
</tr>
<tr>
<td>Rock</td>
<td>Swamp</td>
<td>3</td>
</tr>
<tr>
<td>Sand</td>
<td>Sand</td>
<td>3</td>
</tr>
<tr>
<td>Sand</td>
<td>Swamp</td>
<td>4</td>
</tr>
<tr>
<td>Swamp</td>
<td>Swamp</td>
<td>5</td>
</tr>
</tbody>
</table>

Directions: Design a walkway by cutting out the planks on the next page and taping them on the map.

Follow these rules:

• Each plank needs to touch another plank

• All of the black part of the plank must be in one type of ground, because this is where the supports will go.

• You get 2 points for every animal the visitors can see. A plank must cross the circle around an animal for visitors to see it.

• You lose 1 point for every hour the ranger needs to work.

• One plank must touch the circle marked “Visitor Center”.

• One plank must touch the circle marked “Picnic Area”.
Example:

Picnic Area

Visitor Center

Answer Key

Rock
Sand
Swamp
Water
1. Fill in the table below using your finished design:

<table>
<thead>
<tr>
<th>Plank</th>
<th>Type of Ground</th>
<th>Days of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>End 1</td>
<td>End 2</td>
</tr>
<tr>
<td>1</td>
<td>Rocky</td>
<td>Rocky</td>
</tr>
<tr>
<td>2</td>
<td>Rocky</td>
<td>Sandy</td>
</tr>
<tr>
<td>3</td>
<td>Sandy</td>
<td>Rocky</td>
</tr>
<tr>
<td>4</td>
<td>Rocky</td>
<td>Swampy</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td><strong>8</strong> days</td>
</tr>
</tbody>
</table>

2. Count how many animal circles your walkway crosses: _10_ animals

3. Figure out your total score by filling in the table below.

<table>
<thead>
<tr>
<th>(A) Animal Score</th>
<th>Answer</th>
</tr>
</thead>
</table>
| Multiply the total number of animals by 2. | Number of animals X 2 = _20_

<table>
<thead>
<tr>
<th>(B) Number of Hours Worked</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many total hours did the ranger work?</td>
<td>Number of days = <strong>8</strong> days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(C) Total Score</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtract your answer for B from your answer for A.</td>
<td>(A) <strong>20</strong> - (B) <strong>8</strong> = <strong>12</strong> Points</td>
</tr>
</tbody>
</table>

4. You can use the scale below to see how you did!

0-8 points: Try again!  9-11 points: Good job!  12+ points: Amazing!
What is a Geotechnical Engineer?

Draw and label a picture of a geotechnical engineer at work.

A good picture would show someone helping to determine the best locations for building structures. They may be shown testing and/or analyzing the properties of soil and rock into which structures (bridges, skyscrapers, roads, homes, etc.) are built.

Examples include: someone gathering or analyzing core samples, someone figuring out or making recommendations about how deep to make a foundation so that a structure will be safe, etc.

Explain your drawing of a geotechnical engineer:

Answers will vary, but may include: Someone who uses what he or she knows about science, math and the layers of the earth to help determine the best locations for building structures.
What is a Geotechnical Engineer?

Draw a picture of a geotechnical engineer at work. Label your picture.

A good picture would show someone helping to determine the best locations for building structures. They may be shown testing and/or analyzing the properties of soil and rock into which structures (bridges, skyscrapers, roads, homes, etc.) are built.

Examples include: someone gathering or analyzing core samples, someone figuring out or making recommendations about how deep to make a foundation so that a structure will be safe, etc.
Directions: For the questions 1 and 2 below, circle the BEST answer.

1. What is a geotechnical engineer MOST LIKELY to do for his or her work?
   - A. fix car engines
   - B. design batteries
   - C. test the properties of soil
   - D. build a stone wall for a garden

2. A town wants to build a new tall building. How would a geotechnical engineer help?
   - A. decide where to put the building
   - B. design what the building will look like
   - C. repair trucks that dig the foundation of the building
   - D. put together steel beams for the structures of the building

3. Name 2 things that a geotechnical engineer has to think about for his or her work.

   Answers will vary, but may include: the properties of earth materials, erosion, how an earthquake will affect a building, etc.
Directions: For each question below, circle the **BEST** answer.

1. Where do geotechnical engineers work?
   - (A) outside
   - (B) on a train
   - (C) in a factory
   - (D) in a car repair shop

2. What would a geotechnical engineer think about for his or her job?
   - (A) why a car engine isn’t working
   - (B) If earthquakes will damage a building
   - (C) how to get electricity into a new building
   - (D) how to make car engines that use less gas

3. What does a geotechnical engineer have to know about?
   - (A) cars
   - (B) erosion
   - (C) electricity
   - (D) cell phones
Which of these things is a model? Circle **ALL** the models below.

- map of hiking trails
- battery
- suit of armor
- microscope
- miniature bridge
- bicycle
- guitar
- plastic globe
- doll house

What is YOUR definition of the word “model”?

*A model is a representation of an object, system, or phenomenon.*
Which of these things is a model? Circle **ALL** the models below.

<table>
<thead>
<tr>
<th>Map of hiking trails</th>
<th>Battery</th>
<th>Suit of armor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microscope</td>
<td>Miniature bridge</td>
<td>Bicycle</td>
</tr>
<tr>
<td>Guitar</td>
<td>Plastic globe</td>
<td>Doll house</td>
</tr>
</tbody>
</table>

**Answer Key**

- Map of hiking trails
- Miniature bridge
- Bicycle
- Plastic globe
- Doll house
Directions: Decide whether each statement below is TRUE ( ☑️ T) or FALSE ( ☐️ F) and circle your answer.

| Models need to look like the real thing. | ☑️ T ☐️ F |
| Models could help people test if a bridge will be strong enough. | ☑️ T ☐️ F |
| Models help people learn how things work. | ☑️ T ☐️ F |
| Models need to be smaller than the real thing. | ☑️ T ☐️ F |
| Models can help people test different designs. | ☑️ T ☐️ F |
| Models can help engineers skip the design process. | ☑️ T ☐️ F |
| Models need to represent something about the real thing. | ☑️ T ☐️ F |
| Models can help show people what a bridge will look like. | ☑️ T ☐️ F |
1. A girl is designing a new kind of brace to protect broken fingers. Which model would be MOST useful for her to use? Circle the **BEST** answer below.

A. a model that bends like a real finger  
B. a model that looks exactly like a finger  
C. a model that feels soft like a real finger  
D. a model would not be useful here

2. A company is designing a new bridge. Describe 2 ways the workers at the company would use models. Write your answers below.

*Answers will vary, but may include*: to test the strength of their bridge design, to show other people how the bridge will look, to figure out what will happen to the bridge in an earthquake, etc.
Directions: Write your answers on the lines provided.

1. A building tipped over and was damaged during an earthquake. What might be a reason the building tipped?

   Answers will vary, but may include: The foundation was not deep enough, the foundation was not the right type, the soil around the foundation was shaken and became loose, the building material was not strong enough, the building was too tall and skinny, etc.

2. Some people are designing a building in an area that has a lot of earthquakes. How could they design the foundation to help the building stay standing in an earthquake?

   Answers will vary, but may include: make the foundation as deep as possible, go down to bedrock, compact the soil/earth around the foundation, make the foundation out of a strong material, etc.
The core sample shown below was taken from an area that has a lot of earthquakes.

1. If you wanted to build a bridge in this area, how deep would you make the foundation?

   *Answers will vary, but students should at least go down to the clay level.*

2. Explain why would you make it that deep.

   *Answers will vary, but students should explain that in order to be stable the foundation should be deep enough and rooted in stable ground, so it will need to go down at least to the clay level.*
Some students are deciding where to put a tetherball pole in their playground.

1. List 2 things they should think about before they decide on a place to build their tetherball pole.

   *Answers will vary, but may include: what the soil is like at different places, where it will be most convenient for playing tetherball (making sure there’s enough space to play, but so that students don’t have to go too far to play), etc.*

2. The students chose 2 places that might work. One has rocky soil and one has sandy soil. If both of these places are equally good in every other way, which place should they choose for their tetherball pole? Explain your answer below.

   *The students should choose the rocky soil because the tetherball pole will be more stable there.*

3. The students put up their tetherball pole, but it keeps falling over. What could they do to keep the tetherball pole from falling over?

   *Answers will vary, but may include: add supports, push the pole deeper into the ground, compact the soil, etc.*
Below is a map of a river with several sites marked along the riverbank. The arrows show which way the river flows.

Look at the map and use it to answer the questions below.

1. Put a CIRCLE around the site (A, B, C, or D) that is MOST likely to erode.

3. Why is it MOST likely to erode there?
   
   *Because the river is curved the most at this point.*

3. Put an X over the site (A, B, C, or D) that is LEAST likely to erode.

4. Why is it LEAST likely to erode there?
   
   *Because the river is straightest at this point.*
Below is a map of a river with several sites marked along the riverbank. The arrows show which way the river flows.

Look at the map and use it to answer the questions below.

1. Put a CIRCLE around the site (A, B, C, or D) that is MOST likely to erode.

2. Put an X over the site (A, B, C, or D) that is LEAST likely to erode.
To the right is an aerial map showing the course of a river. The arrows indicate the direction that the river is flowing.

1. If people don't do anything to the river, what will it look like in 50 years? Circle the BEST answer.
   A. it will be the same  
   B. it will be straighter  
   C. it will have bigger bends  
   D. there is no way to know

2. Which of the pictures below MOST LIKELY shows what the course of the same river will look like in 50 years? Circle the BEST answer.

   [Diagram of river courses]

3. Explain your answers to questions 1 and 2:

   The curved portions of the riverbank will erode more quickly than the straighter segments, so the changes in curved segments over time are much more pronounced. This means the river will have bigger bends after 50 years.
1. Some people are deciding where to put the foundations of a small bridge. Look at the properties below and circle the BEST place to put the bridge foundations.

<table>
<thead>
<tr>
<th>Site</th>
<th>Property 1</th>
<th>Property 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>On a curve of the river</td>
<td>Compacted rocky soil</td>
</tr>
<tr>
<td>2</td>
<td>On a straight part of the river</td>
<td>Compacted rocky soil</td>
</tr>
<tr>
<td>3</td>
<td>On a curve of the river</td>
<td>Far from where the villagers want the bridge</td>
</tr>
<tr>
<td>4</td>
<td>Loose organic soil</td>
<td>Near where the villagers want the bridge</td>
</tr>
</tbody>
</table>

2. Explain why you chose that site:

The straight part of the river will experience less erosion over time than the curvy part of the river and compacted rocky soil will keep the foundation more stable than loose organic soil.

Note: students may also choose site 4, but would need to mention that they would compact the soil.
Help a park ranger design a walkway from the Visitor Center to the Picnic Area that allows visitors to see lots of animals.

The ranger has 4 wooden planks. The planks need supports at each end to make the walkway stable. The less solid the ground, the longer it takes to build the supports.

The table shows how long it takes the ranger to set up the planks on the different types of ground.

<table>
<thead>
<tr>
<th>End 1</th>
<th>End 2</th>
<th>Days of work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock</td>
<td>Rock</td>
<td>1</td>
</tr>
<tr>
<td>Rock</td>
<td>Sand</td>
<td>2</td>
</tr>
<tr>
<td>Rock</td>
<td>Swamp</td>
<td>3</td>
</tr>
<tr>
<td>Sand</td>
<td>Sand</td>
<td>3</td>
</tr>
<tr>
<td>Sand</td>
<td>Swamp</td>
<td>4</td>
</tr>
<tr>
<td>Swamp</td>
<td>Swamp</td>
<td>5</td>
</tr>
</tbody>
</table>

Directions: Design a walkway by cutting out the planks on the next page and taping them on the map.

Follow these rules:

- Each plank needs to touch another plank
- All of the black part of the plank must be in one type of ground, because this is where the supports will go.
- You get 2 points for every animal the visitors can see. A plank must cross the circle around an animal for visitors to see it.
- You lose 1 point for every hour the ranger needs to work.
- One plank must touch the circle marked “Visitor Center”.
- One plank must touch the circle marked “Picnic Area”.

EiE: Evaluating a Landscape © Museum of Science, Boston Duplication Permitted
Example:
1. Fill in the table below using your finished design:

<table>
<thead>
<tr>
<th>Plank</th>
<th>Type of Ground</th>
<th>Days of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>End 1</td>
<td>End 2</td>
</tr>
<tr>
<td>1</td>
<td>Rocky</td>
<td>Rocky</td>
</tr>
<tr>
<td>2</td>
<td>Rocky</td>
<td>Sandy</td>
</tr>
<tr>
<td>3</td>
<td>Sandy</td>
<td>Rocky</td>
</tr>
<tr>
<td>4</td>
<td>Rocky</td>
<td>Swampy</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>8</strong> days</td>
</tr>
</tbody>
</table>

2. Count how many animal circles your walkway crosses: **10** animals

3. Figure out your total score by filling in the table below.

<table>
<thead>
<tr>
<th>(A) Animal Score</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiply the total number of animals by 2.</td>
<td></td>
</tr>
<tr>
<td>Number of animals $\times$ 2 = <strong>20</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(B) Number of Hours Worked</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many total hours did the ranger work?</td>
<td></td>
</tr>
<tr>
<td>Number of days = <strong>8</strong> days</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(C) Total Score</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtract your answer for B from your answer for A.</td>
<td></td>
</tr>
<tr>
<td>(A) <strong>20</strong> - (B) <strong>8</strong> = <strong>12</strong> Points</td>
<td></td>
</tr>
</tbody>
</table>

4. You can use the scale below to see how you did!

- **0-8 points**: Try again!
- **9-11 points**: Good job!
- **12+ points**: Amazing!