The Blue Marble Pre-Assessment

Answer the questions in the space provided. Do your best to answer each question as thoroughly as possible. It’s okay if you do not know all of the answers!

1. Draw a diagram of our Solar System. Be as detailed as possible, and include labels.

2. What is gravity? Give some examples of the effect of gravity.

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3. Study the diagram below, depicting different layers of rock in a section of the Earth. Which of the layers is oldest and which is youngest? Explain your reasoning.

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4. Describe what you know about meteor impacts.

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5. Throughout this unit, you will be developing models and using computational programming to create and analyze those models. Use some of the commands inside the blocks to solve the problem given.

Problem: You are trying to create a Ping-Pong video game. Write the instructions/commands to make the game: 1) start and 2) to stop every time the ball goes out of bounds (out of a particular area).

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Escape the Attraction

If gravity pulls objects towards Earth, how can we send spacecraft to faraway places in the universe? You will conduct an experiment to understand the requirements needed to get outside the Earth’s orbit (or another object’s orbit).

A. Activity Prep (Day 1: 10 minutes)

1. Pass one end of the string through the metal spring of the clothespin and tie a double knot so the clothespin is hanging from the end of the string.

2. Clip the “beanbag” onto the clothespin (make sure the “beanbag” is supported and does not fall easily).

3. Make sure your group has a stopwatch (use the stopwatch on one student’s smartphone or the one provided by the teacher).

4. Each group should have a worksheet or science notebook to record observations and results and, if available, a digital device to record each of the trials of the experiment.

B. Data Collection (Day 1: 35 minutes)

1. To ensure consistency, for each test, use the measuring tape to measure the length of the string from the clothespin to where it is being held.

2. Have one of your group members stand away from the rest of the group so they can swing the “beanbag” without hitting anyone.

3. Conduct the first test by having the group member with the string start slowly swinging the “beanbag” in a circle (but still fast enough that the “beanbag” is off the ground). They should swing the “beanbag” for 10 seconds. Have another group member keep track of the time with the stopwatch while the rest of the group counts how many times the “beanbag” travels around the student during those 10 seconds.

4. Make sure to record your observations (the number of times the “beanbag” goes around in the 10 seconds).

5. Repeat this procedure for the rest of the tests, having the student with the string speed up the rotations slightly each time until the “beanbag” comes off the clothespin.

6. After your group completes the tests, exchange roles so different members swing the “beanbag.”
Observations:

<table>
<thead>
<tr>
<th>Student Name</th>
<th>Length of the String</th>
<th>First Test # of Rotations</th>
<th>Second Test # of Rotations</th>
<th>Third Test # of Rotations</th>
<th>Fourth Test # of Rotations</th>
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C. Data Analysis (Day 2: 25 minutes)

1. Calculate the escape velocity of each of the tests:

   Circumference = Diameter x Pi = (2 x length of your string) x 3.14

   \[
   \frac{\text{# of Rotations}}{\text{Time}} \times \text{Circumference} = \text{Escape Velocity}
   \]

<table>
<thead>
<tr>
<th>Student Name</th>
<th># of Rotations at Final Speed (When the “beanbag” was released)</th>
<th>Time (seconds)</th>
<th>Circumference (feet)</th>
<th>Escape Velocity (feet/second)</th>
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2. Answer the following questions (use complete sentences).

Explain what happened to the space object ("beanbag") as the rotation speed changed.

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Explain what you think would happen if you repeated the experiment and increased the
weight of the “beanbag.” *Hint: Think about how the components of the escape velocity
equation would change with a heavier “beanbag.”*

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When a spacecraft or a space object gets far away from Earth, does the magnitude of
Earth’s "pull" on the object change? Are other forces acting on the object too? *Hint: Think
about the components of the solar system and how they relate to each other.*

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Exploring Early Earth
Concept Checkpoint #2
Concept Checkpoints

• The items on the following pages are written in the style of ‘ConcepTests’ — multiple choice questions that are specifically written to capture student misconceptions.

• They work best when students try to answer them on their own and anonymously ‘vote’. Then they discuss with peers and re-vote.

• When discussing, it helps to call on students to ask them to explain why a particular choice is incorrect because it allows the class to explicitly address misconceptions.
Grade 8 Unit 1
Lessons 1.14 - 1.16
In your own words, describe the relationship between distance and magnetic force.

The strength of the magnetic force decreases as distance increases.
In your own words, describe the relationship between distance and gravity.

The strength of the gravitational force decreases as distance increases.
Which graph best shows the relationship between force and distance?

As the distance increases, the magnetic force gets smaller. Answer: A
# Earth Through the Ages – Teacher Review Rubric

<table>
<thead>
<tr>
<th>Criteria</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>0-1</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td><strong>Overall use of Scratch/Effective Communication</strong> (SEP-8)</td>
<td>The team uses Scratch in an effective and creative way, and all visual representations are clear and accurate. The animation is easy to understand.</td>
<td>The use of Scratch is effective but not necessarily creative. At least one visual representation is unclear/inaccurate making the animation somewhat challenging to understand.</td>
<td>The use of Scratch is minimally effective in telling the story of Earth through the ages and multiple representations are unclear/inaccurate.</td>
<td>The use of Scratch is not effective in telling the story of Earth through the ages.</td>
<td>/4</td>
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<tr>
<td><strong>Science Content (as outlines in project)</strong> (ESS1-2; ESS1-4)</td>
<td>The animation includes at least one of the required science areas and the description of the science is accurate.</td>
<td>The animation includes at least one of the required science areas and the description of the science is largely accurate.</td>
<td>The animation includes at least one of the required science areas and the description of the science is only partially or not at all accurate.</td>
<td>The animation does not include any of the required science areas.</td>
<td>/4</td>
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<tr>
<td>Protecting Earth’s Future (EP&amp;C Principle V)</td>
<td>The animation clearly describes a measure to protect the Earth’s future based on links to human or natural systems.</td>
<td>The animation includes a measure to protect the Earth’s future based on links to human or natural systems.</td>
<td>The animation only has a limited description of a measure to protect the Earth’s future based on links to human or natural systems.</td>
<td>The animation does not include a description of a measure to protect the Earth’s future.</td>
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<td>Presentation/Evaluation</td>
<td>The team effectively presents their animation and explains why they chose the key events and representation of future Earth. Students thoughtfully fill in peer evaluations.</td>
<td>The team effectively presents their animation, but the explanation of why they chose key events or the representation of future Earth is minimal. Students fill in peer evaluations.</td>
<td>The team presents their animation but does not explain why they chose the key events and representation of future Earth. Peer evaluations are incomplete.</td>
<td>The team has difficulty presenting their animation and students do not fill in peer evaluations.</td>
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<td>Total</td>
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