Modeling Gravity

Name: _____

Student quiz—Answer Key

Date: _____

Directions: Answer the questions below.

1. Imagine that you are standing on the ground floor of a very tall building. Would you expect to "feel" gravity pulling you up when you are inside the building? Explain why or why not.

   I will not feel gravity pulling me up when I'm inside the building. Even though the building is very large and heavy by human standards, it is still so much lighter than the Earth that the gravitational force it exerts on my body is too small to notice.

2. Pretend that the force of gravity suddenly disappeared from our solar system. Describe what would happen to the motion of the planets.

   The planets would fly off into space instead of continuing in their orbits, because there would be no more force pulling them towards the Sun in the center of the solar system.

Modeling Gravity—Page 2

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3. In class, you made a model of gravity in our solar system using a stretchy sheet, pool balls, and marbles. How did the model demonstrate the effect of mass on gravitational forces?

- In order for two objects to be attracted to each other, at least one of them had to have a large mass.
- For example, a marble would be attracted to a pool ball, but two marbles would not be attracted to each other.

4. List at least one potential limitation of the model you used in class. In other words, how was your model different from the "real thing"?

Answers may include, but are not limited to, the following:

- The model was not to scale. A scale model of the solar system would have had the planets much farther away from the sun, and the sun would have been much bigger and heavier (or the planets much smaller and lighter compared to the sun).
- The model had a lot of friction that caused the marbles to slow down and spiral into the middle ball. The planets in our solar system move through a vacuum and experience much less friction. They can keep orbiting around the sun without spiraling into the middle.
- The model is in two dimensions, our solar system is in three dimensions.
- We pushed the marbles (planets) so they had a sideways speed. Real planets received their sideways speed at the time they were formed. It was a result of the rotation of the dust cloud that collapsed and formed our solar system.

Modeling Gravity—Page 3

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Directions: Answer the questions below.

5. Why is a model like the one we used in class useful for studying gravity and our solar system? Give at least one reason.

Answers may include, but are not limited to, the following:

- We cannot see the entire solar system at once. A smaller model allows us to "see" the whole solar system in our classroom.
- We cannot do experiments with the real planets (for example, we can't change the mass or position of the Earth). A model allows us to do an experiment where we can change these variables.