Multiple Choice

1. The four inner planets are rocky and small. Which description best fits the next four outer planets?

   A. They are also rocky and small.
   B. They are very large and made of ice.
   C. They are small and made of ice.
   D. They are very large and made of gases.

2. Which two planets are out or order in this list of our solar system? The planets are listed in order of distance from the sun.

   Mercury-Earth-Venus-Mars-Jupiter-Saturn-Uranus-Neptune-Pluto

   A. Mercury and Earth
   B. Earth and Venus
   C. Saturn and Jupiter
   D. Uranus and Neptune

3. What is a special characteristic of Jupiter, Saturn, Neptune and Uranus?

   A. They are planets in our solar system.
   B. They spin slowly
   C. They revolve around the sun.
   D. They have rings.

4. How does a telescope help us understand the moon?

   A. It tells us how it was formed.
   B. It tells us how hot it is there.
   C. It helps us see surface features.
   D. It can tell us what the moon is made of.

5. A probe landed on Mars and did soil tests. What information did it discover?

    A. There are no living organisms in Martian soil.
    B. Mars is slightly oval in shape.
    C. Mars is about one-fourth the size of Earth.
    D. The gravity on Maris is much less than on Earth.

6. Pictures from space are sent to Earth. How are they printed?

    A. On paper from film sent from the probe.
    B. A computer reads a code and places dots on paper.
    C. They are drawn by hand as the information is received.
    D. They are sent through space by rockets and are already printed.

7. Why is space travel difficult for people?

    A. We cannot take the air or food we need into space.
    B. The distances are very great; it is dangerous and expensive.
    C. It is impossible to escape the sun's or Earth's gravity.
    D. We do not have a destination to visit that we know will support life.

8. What holds the planets in their orbits around the sun?

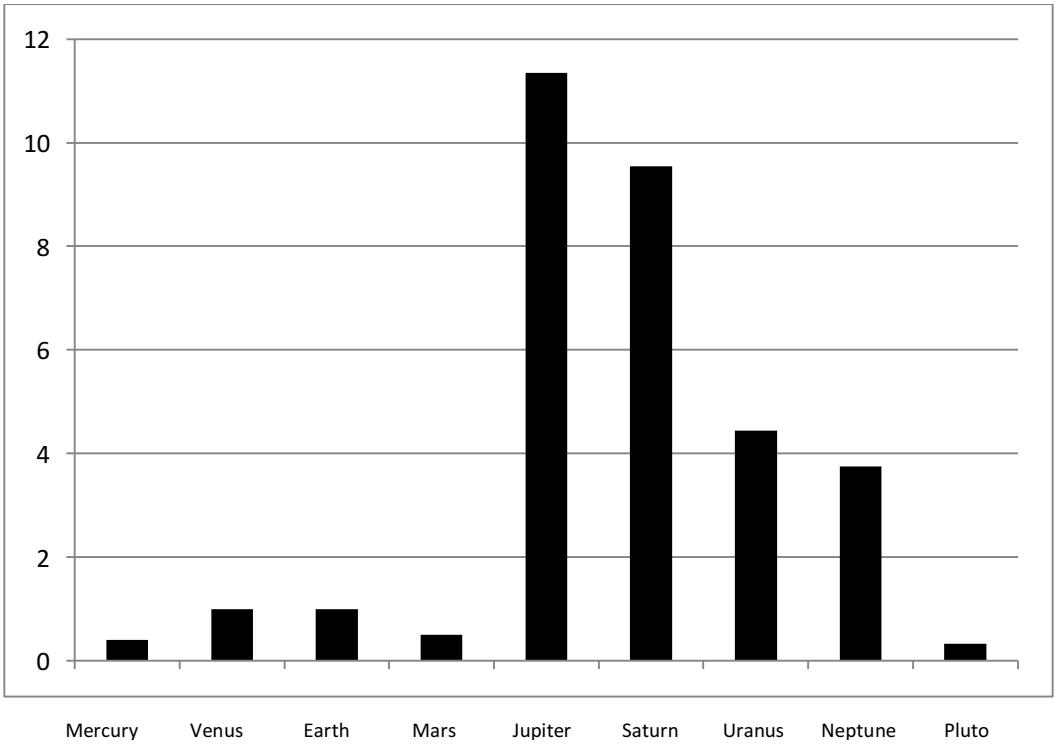
    A. Gravity
    B. Speed
    C. String
    D. Air currents

9. Which object has the most gravity?

    A. Earth
    B. Moon
    C. Jupiter
    D. Sun

10. Without gravity, what would be the shape of the solar system?

    A. Planets would revolve in perfect circles.
    B. Much different than it is now.
    C. Planets' orbits would cross.
    D. All planets would be in the same orbit.



11. Does this graph show relative size or distance from the sun of the planets?

A. It shows both size and distance.
B. It does not show size or distance
C. It shows distances from the sun.
D. It shows relative size.

Constructed Response

1. What is the difference between an asteroid and a meteor?

2. How do we know about our solar system?

3. How are the orbits of Earth around the sun and the orbit of the moon around Earth alike?

Answers Standard 3 – Unit Test 1:

Multiple Choice

1. D
2. B
3. D
4. C
5. A
6. B
7. B
8. A
9. D
10. B
11. D

Constructed Response

1. Asteroids are chunks of rock in orbit around the sun. Meteors are chunks of rock that fall through Earth's atmosphere.

2. From information gathered through telescopes, probes, satellites, radio telescopes, and space stations.

3. Both rely on the greater gravitational pull of the more massive object and their own forward motion to match and keep them in orbit.

Multiple Choice

1. What do planets revolve around?

   A. Each other
   B. A star or sun
   C. A moon
   D. A galaxy

2. If you could live on Jupiter, what would you see in the sky at night besides stars?

   A. Many moons
   B. The inner planets
   C. The sun
   D. Earth's moon

3. Which two planets are out of order in this list of our solar system? The planets are listed in order as they go out from the sun.

Mercury-Venus-Earth-Mars-Jupiter-Saturn-Uranus-Pluto-Neptune

   A. Mercury and Earth
   B. Earth and Venus
   C. Saturn and Jupiter
   D. Neptune and Pluto

4. Mary looked in her science book at a picture of the solar system. The planets were large and colorful, but she knew it was not an accurate model. Why?

   A. The planets should have been much farther apart.
   B. The planets are not colorful. They are white.
   C. We don't know exactly what the planets look like, so it was a guess.
   D. Planets are oval and not round.

5. What is an important function of space probes, such as Voyager, as they travel in space?

   A. To land on each planet and report the conditions there
   B. To take pictures and send them back to Earth
   C. To see if other stars have planets
   D. To see if life exists on other planets

6. What have probes orbiting on Venus recently discovered?

   A. The atmosphere appears white
   B. It is the third planet from the sun
   C. There are volcanoes on its surface
   D. Venus is larger than Earth

7. Which of the following instruments could best see the rings on Saturn?

   A. Your eye
   B. Binoculars
   C. A telescope
   D. A magnifying glass

8. Some objects are invisible in space yet astronomers know they exist. On what do they base their knowledge?

   A. They give off radio or X-rays that we can analyze.
   B. They were once visible and people recorded it.
   C. Astronomers have a "sixth" sense that helps them know.
   D. Telescopes can see things that people cannot.

9. What would happen to Earth if it started going faster around the sun?

   A. If would fall into the sun
   B. It would travel away from the sun.
   C. Its gravity would decrease.
   D. Its gravity would increase.

10. What do objects that have more mass also have more of?

A. Volume
B. Size
C. Gravity
D. Speed

Constructed Response

1. Pick a planet (other than Earth) and describe 5 characteristics that you know about it. Be as specific as possible.

2. Space probes have not landed on Pluto yet. Describe three types of information you would collect if you were designing the probe. Tell what you think the results of each test might be.

3. How have computers aided our understanding of space?

4. How is spinning a weight tied to a string around your head similar to the orbit of a planet around the sun?

Answers Standard 3-Unit Test 2:

Multiple Choice

1. B
2. A
3. D
4. A
5. B
6. C
7. C
8. A
9. B
10. C

Constructed Response

1. Students should have 5 correct characteristics of the planet they picked.

2. Students may mention temperatures, movement of crust, composition of crust, type of atmosphere, gravity, presence of life etc. The results of these tests would indicate that Pluto is very cold, mostly ice, little or no atmosphere, small gravity and no life.

3. They are able to take large amounts of data and process it quickly.

4. The spinning speed is the same as the velocity of a moving planet, the string is like gravity holding it in orbit.

Grade 6 **Standard 3** **Performance Test 1**

Telemetry

Activity Description: Students will send a message to a partner who will decode it similar to real space communications.

Materials Needed: grid sheet, pictures of simple objects

Prior to Assessment: Students should know that messages traveling through space must be sent via electromagnet rays such as light or radio waves. A picture is sent using a code which a computer then decodes. The computer places a dot of the correct shade in a space (called a pixel) and makes row after row of dots. A picture emerges.

Time needed: one and one-half hours

Procedure

1. Students must work in pairs. Each should have a worksheet with a picture to "send" and an empty grid to "receive".
2. Both students need to code their picture. Each square needs to be assigned to a number.

Use a key like this:

0 = no color or white
1 = gray
2 = black

3. Students will have to decide if partially filled squares count as a color or not. They cannot be partially filled.
4. One student should "send" their picture to the other by reading off the numbers they established. The "receiving" student should fill in their grid and try to guess what the picture is.
5. When one student has finished the other can "send".
6. See attached worksheets.

Grading Scale

1. Student successfully codes own picture …….. 5 pts.
2. Student successfully receives and decodes partner's picture…… 5 pts.
3. Student correctly answers questions on worksheet …….. 5 pts
    1. Answers will vary.
    2. The translated picture is blocky and not very clear.
    3. They are sent by sound waves.
    4. No, they are sent by light or radio waves
    5. The picture would be destroyed.

Student worksheets:

Directions:

1. One grid on your paper has a picture on it. Assign a number to each square on the grid. Use this code:

   0 = white or no color
   1 = gray
   2 = black

2. Read your numbers to your partner who will fill in the empty grid on the bottom of his/her paper. He/she will guess what the picture is.

3. Reverse the process and have your partner read you his/her numbers.

4. Answer the questions when you are finished.

Questions:

1. Were you able to guess what the picture was that was sent to you?

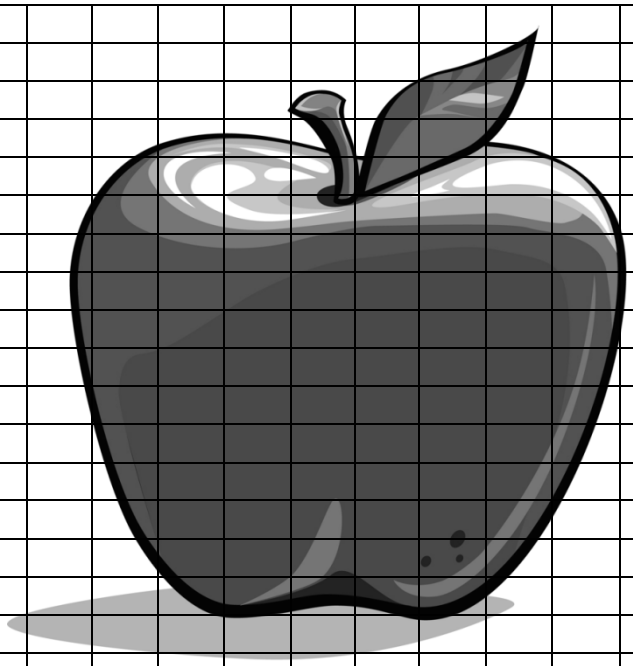
2. How was the translated picture different from the real one?

3. You sent the picture to your partner using what type of waves?

4. Are pictures sent through space on these same waves?

5. What would happen if you used a different size grid than the sender? (with more rows or columns?)

Apple



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Grade 6 **Standard 3** **Performance Test 2**

Staying in Orbit

Activity Description

In this activity students will model the forces that keep planets in orbit and discover relationships between mass, distance, and velocity.

Materials

1 meter (and a little more for tying the knots) of string per group (4 students) a meter stick, 4 large metal washers, clock with second hand or stopwatch, student sheet (see next page)

Time Needed

50 minutes

Teacher Background

Objects stay in stable orbits when the gravity between them and a larger body (like the sun) matches their own forward velocity. The distance a planet is from the sun affects the gravitational attraction. If preferred, this can be done as a demonstration with one student swing the "planet" and the class counting and timing the swings.

Procedure

1. Explain to students that they will be investigating the forces that keep planets in orbit and read the introduction and procedures to the activity.
2. Allow groups to gather their materials. Remind them to stay far enough apart that the swinging washers do not hit anyone.
3. Allow time for students to collect data.
4. As a class, discuss data and draw conclusions.
5. Allow students time to answer questions on student sheet.

Scoring Guide

1. Students make prediction …… 3pts.
2. Students design their own test ……. 10 pts.
3. Students collect and record data …….. 15 pts.
4. Students correctly answer questions …… 5 pts.

    Answers:

    1. Shortening the string increases the speed and shortens the revolution time.
    2. The inner planets have the shortest revolutions.
    3. Increasing the mass increases the speed needed and shortens revolution time.
    4. The larger objects require more speed in forward motion to keep from falling.
    5. Answers will vary.
5. Students write specific and pertinent conclusion ……. 3pts.

Student Sheet

Title: Staying in Orbit **Name** _____

Introduction: In this activity you will investigate the factors that affect the revolution of planets around the sun. We will use string for "gravity" and washers for "planets".

Materials
1 meter of string, a meter stick, 4 large metal washers, clock with second hand or stopwatch.

Procedure:
1. Tie two washers on the end of your string. Have a student hold the end of the string and swing it over their head. Swing it only fast enough to keep it in "orbit." Make sure you will not hit anyone with the washers.
2. Have one student count the number of revolutions the washers take in 10 seconds. One student needs to time while the other counts. Do this twice and average your results. Record your data on the data table.
3. Fold the string in two and hold it in the middle (at the 50 cm) mark. Repeat the counting for 10 seconds. Do this twice and average your results. Record your data on the data table.
4. Put two more washers on the string and repeat #2 and #3.
5. Think of another different test you can do concerning orbits with the string and washers. Write down here what you will do:
   a.

   b.

   Record this data also.
6. Answer the questions when you are done.

Prediction: (Which combination of string and washers will go fastest?)

Data

Experiment	First Test	Second Test	Average
100 cm, 2 washers			
50 cm, 2 washers			
100 cm, 4 washers			
50 cm, 4 washers			
Your experiment			

Questions:

1. What effect did making the orbit smaller (shortening the string) have on the speed of the washers and time it took to make an orbit (revolution)?

2. Which planets in the solar system have the shortest revolution time?

3. How does increasing the weight of the "planet" affect its revolution?

4. Why?

5. What did your experiment show?

Conclusion