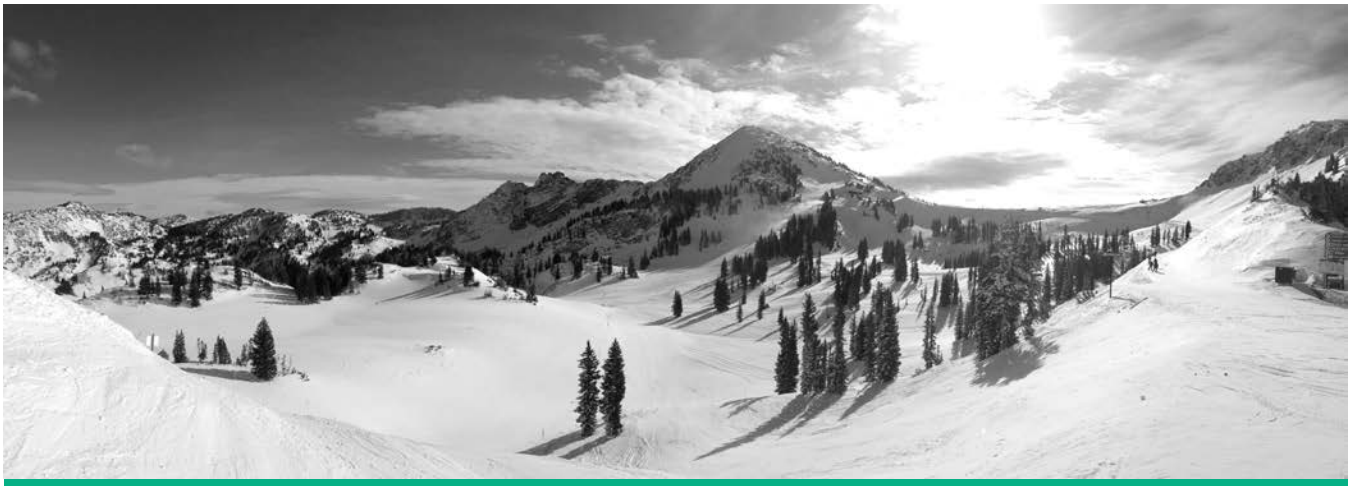
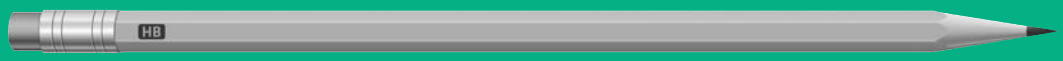
Colorado Measures of Academic Success



Grade 8 Science



Paper Practice Resource for Students

Paper Practice Resource for Students

The Colorado Measures of Academic Success (CMAS) is Colorado's standards-based assessment program designed to measure the Colorado Academic Standards (CAS) in the content areas of science, social studies, English language arts, and mathematics. The sample items included in this resource provide students with an opportunity to become familiar with the format of test items that appear in the paper-based test books.

While the use of the sample items is not required, it is strongly encouraged to help ensure students are familiar with the types of items they may encounter while taking the paper-based test.

The sample item sets in the CMAS Practice Resources are not intended to be representative of a complete unit or test, nor are they intended to cover all assessed content or item types. To view assessment frameworks, high level blueprints, scoring rubrics, evidence statements and standards for the CMAS assessments, visit: https://www.cde.state.co.us/assessment/cmas_testdesign.

Item Types:

Selected Response Items

Selected response items are multiple choice questions. To respond, the student indicates their response by filling in the circle(s) next to their answer choice.

Correct Mark:

Incorrect Marks:

Constructed Response Items

Constructed response items are questions or prompts that require an independent, written response. To respond, the student writes his or her answer in the response box in the test book.

Converted Online Technology-Enhanced Item Types

Online technology-enhanced items converted to the paper testing format may ask students to:

- Circle the correct answer
- Complete a table with checkmarks, Xs, or letters from a list of answer choices
- Fill in the blank
- Draw lines from boxes to correct answers
- Complete a bar graph or histogram

Clusters

Clusters include groups of items that relate to a scientific topic. The information needed to respond appears before the associated items.

ITEM SET 1

1. Curtains in theaters prevent sound waves from being reflected as echoes. Which model best explains why curtains prevent echoes?

Ⓐ A ball thrown toward a surface will come in contact faster with a soft surface than with a hard surface.

Ⓑ A ball thrown at a surface will hit with a greater force on a soft surface than on a hard surface.

Ⓒ A ball rolled across a surface will roll more quickly on a hard surface than on a soft surface.

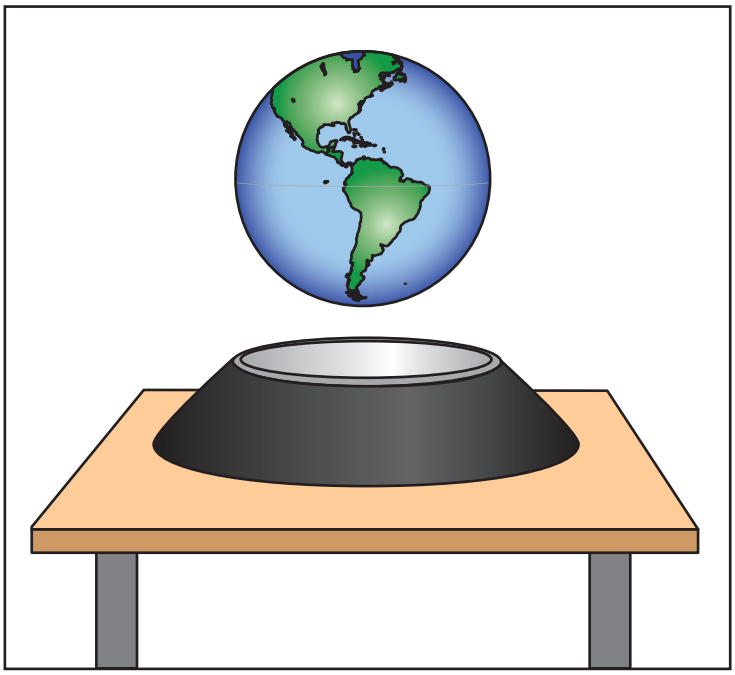
Ⓓ A ball dropped on a surface will bounce more on a hard surface than on a soft surface.

Directions: Use the information to answer questions 2 through 6.

Part 1

A student is curious about a toy in the classroom. The toy is a small globe that floats in place over a special base. The globe does not rise, fall, or move from side to side. The student wonders what forces are needed to cause this effect.

Figure 1: Toy Globe



Part 2

The student investigates the forces that make the toy globe float. The student uses ring magnets and places a wooden rod through the hole in the magnets. The student drops different numbers of ring magnets down the rod from different heights, in centimeters (cm). The magnets fall close to another set of magnets at the bottom of the rod. Then the bottom magnets push the falling magnets back up.

Figure 2: Ring Magnets and Wooden Rod

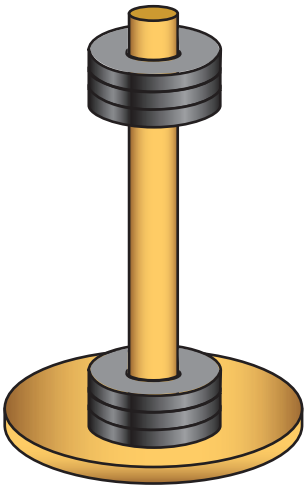
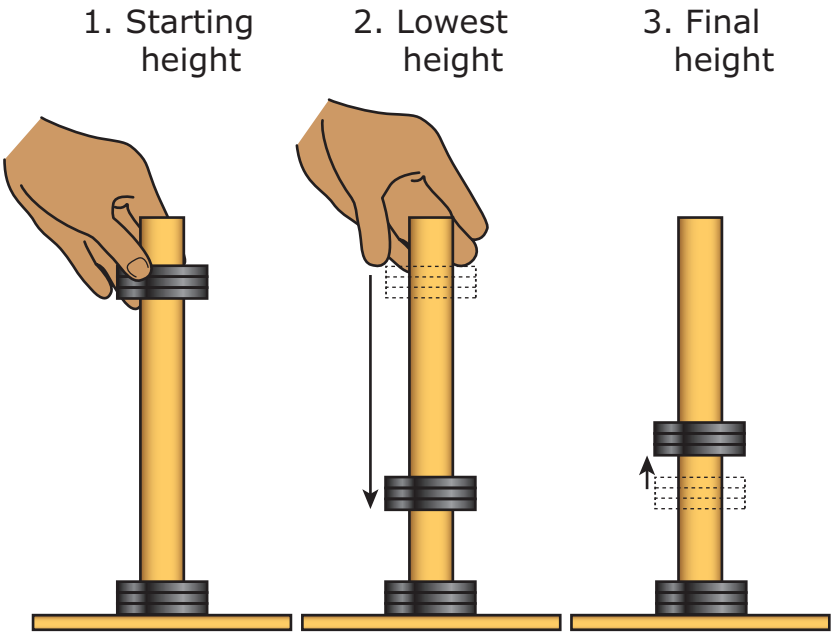


Figure 3: Movement of Dropped Magnets



The table shows the data the student collects.

Trial	Magnets Dropped	Height (cm)		
		Start	Lowest	Final
1	1	14.0	4.4	6.6
2	1	11.9	4.9	6.2
3	1	9.8	5.5	6.5
4	2	13.9	3.8	6.1
5	2	11.0	4.6	6.1
6	2	10.0	4.7	6.4
7	3	13.8	3.5	5.9
8	3	12.1	3.9	5.9
9	3	10.1	4.6	5.9

2. In the scenario described in Part 1, the student pushes down on the globe and lets it go. Then the globe returns to its original stable position.

Circle one correct response in each box to complete the sentence.

After the globe is let go, it will return to a stable position when the _____ force equals the _____ force.

frictional	electrical
magnetic	gravitational

3. The student completed the ring magnet investigation to help explain the interaction between the two sets of magnets described in Part 2.

Circle one correct response in each box to complete the sentences.

The investigation was designed to show that _____ exist

electrical currents
magnetic fields

between the upper and lower sets of magnets. The results provide evidence that the magnets exert forces on each other because the upper magnet set _____ the lower set when it is dropped.

does not touch
collides with

4. The data from the investigation in Part 2 show that the final height of three magnets dropped is lower than when one magnet or two magnets are dropped.

Circle one correct response from each box to complete the sentences.

The purpose of the investigation is to show that even when downward force is increased, the magnets continue to _____.

pull each other together
push each other away

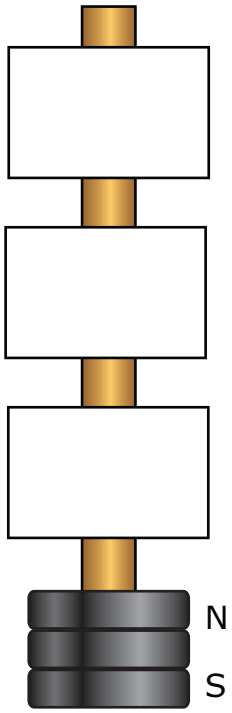
This shows that there is a field coming from _____.

the bottom set of magnets
the top set of magnets
both sets of magnets

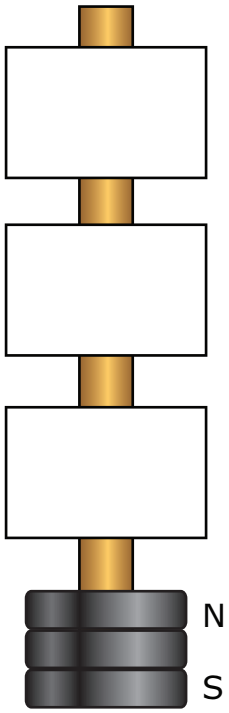
5. The sets of magnets described in the investigation in Part 2 demonstrate two kinds of potential energy, magnetic and gravitational. Based on the investigation, show where each kind of potential energy is greatest. The north (N) pole and south (S) pole of each magnet set are specified.

Draw an X in the box that shows the location of the greatest amount of each kind of potential energy. Draw only one X in the location for the greatest amount of magnetic potential energy, and draw another X in the location for the greatest amount of gravitational potential energy. Only one X should be drawn for each type of potential energy.

Greatest Magnetic Potential Energy



Greatest Gravitational Potential Energy



6. In the scenario described in Part 1, the student plans to change the setup by adding mass to make the globe heavier. Explain what effect the additional mass will have on the globe. Your response should include:

- an explanation of the changed position of the heavier globe
- a description of two different forces acting on the heavier globe

Directions: Use the information to answer questions 7 through 12.

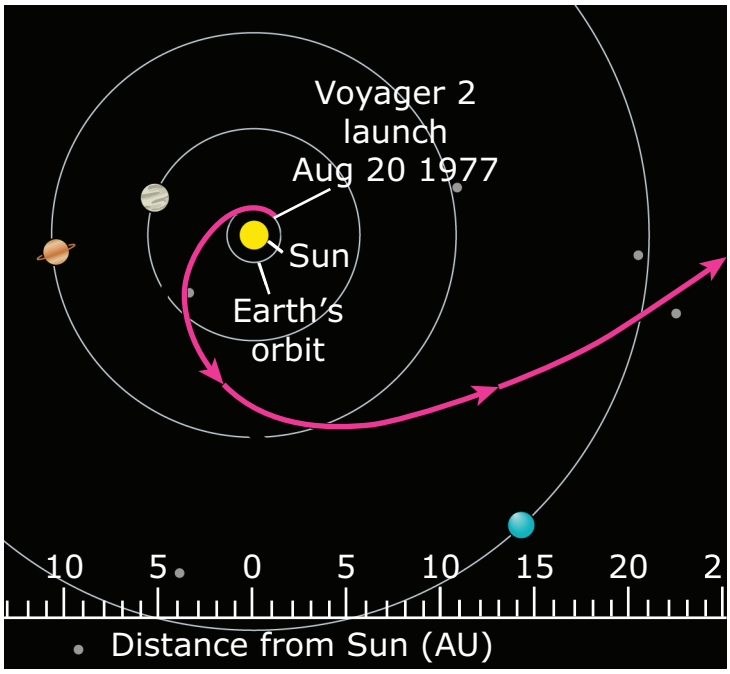
In 1977, NASA launched a robotic spacecraft from Earth called Voyager 2. This spacecraft was sent to gather data on Jupiter, Saturn, Uranus, and Neptune, and those planets' moons. Voyager 2's trip was timed to take place when Jupiter, Saturn, Uranus, and Neptune were positioned near each other in their orbits, an arrangement that only occurs every 176 years.

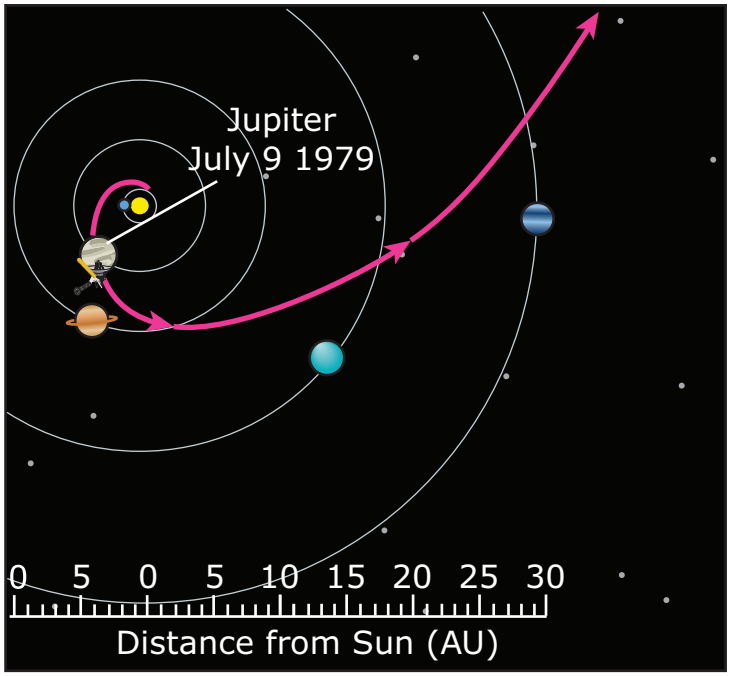
Solar system distances are measured in astronomical units (AU). One AU is the average distance between Earth and the Sun, about 150 million kilometers.

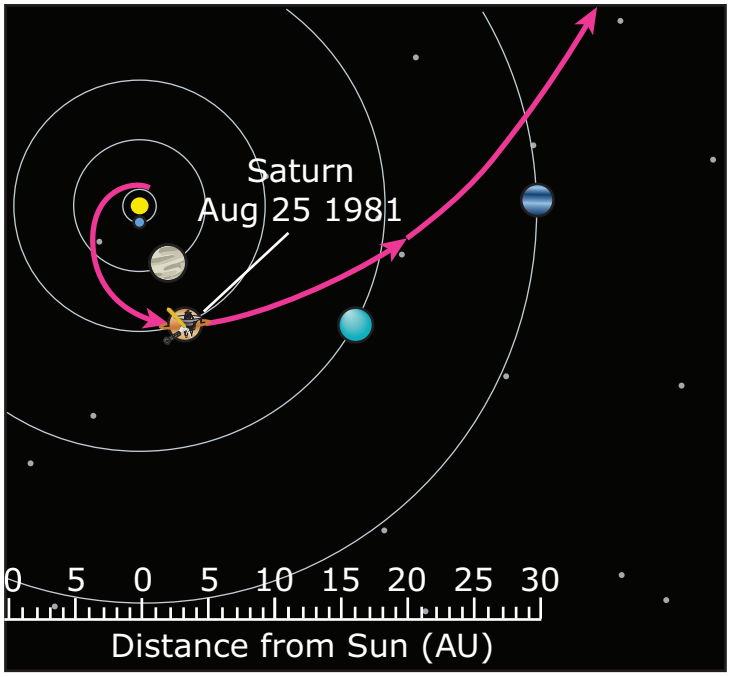
The planets Mercury, Venus, and Mars are not included in the drawings of this model.

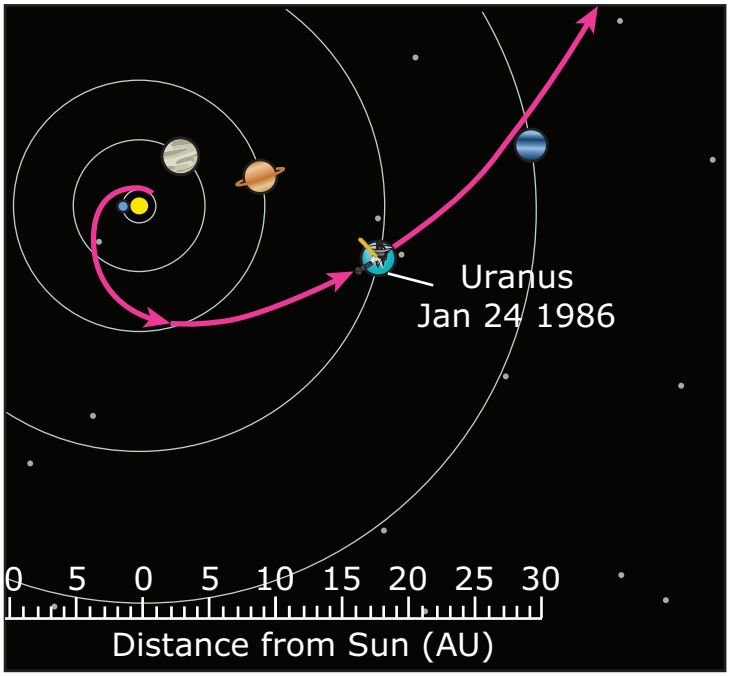
Part 1

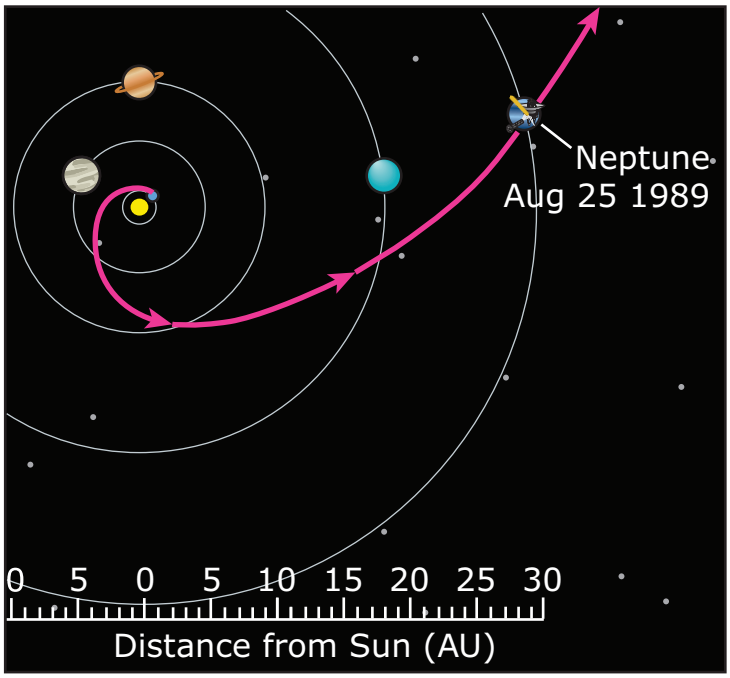
These drawings show the path that Voyager 2 took through the solar system and the movements of the planets as the spacecraft traveled around the Sun.




Jupiter
July 9 1979
0 5 0 5 10 15 20 25 30
Distance from Sun (AU)


Saturn
Aug 25 1981
0 5 0 5 10 15 20 25 30
Distance from Sun (AU)


Uranus
Jan 24 1986
0 5 0 5 10 15 20 25 30
Distance from Sun (AU)


Neptune
Aug 25 1989
0 5 0 5 10 15 20 25 30
Distance from Sun (AU)

Part 2

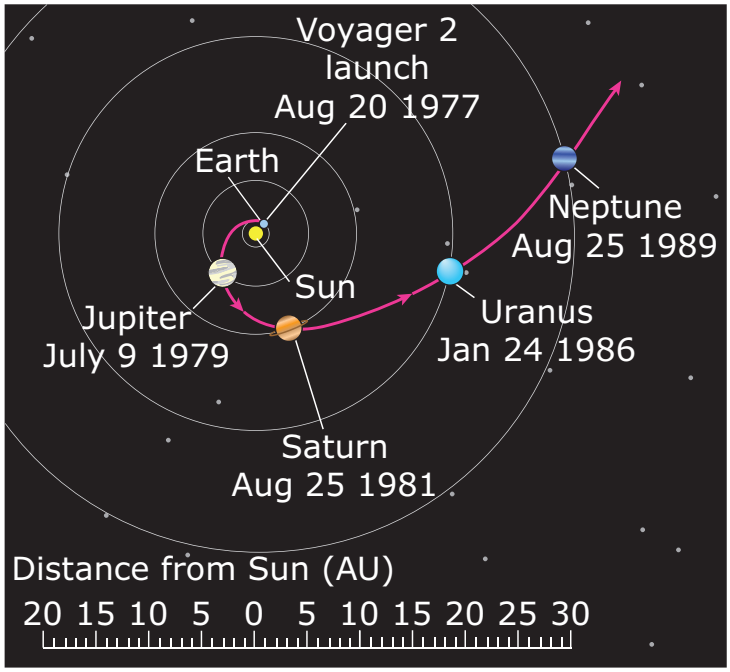
Observe the number of revolutions around the Sun each planet made during the time Voyager 2 traveled through our solar system. The planets closer to Earth orbit more quickly around the Sun than the planets farther away do.

Planetary Revolutions: 1977–1989

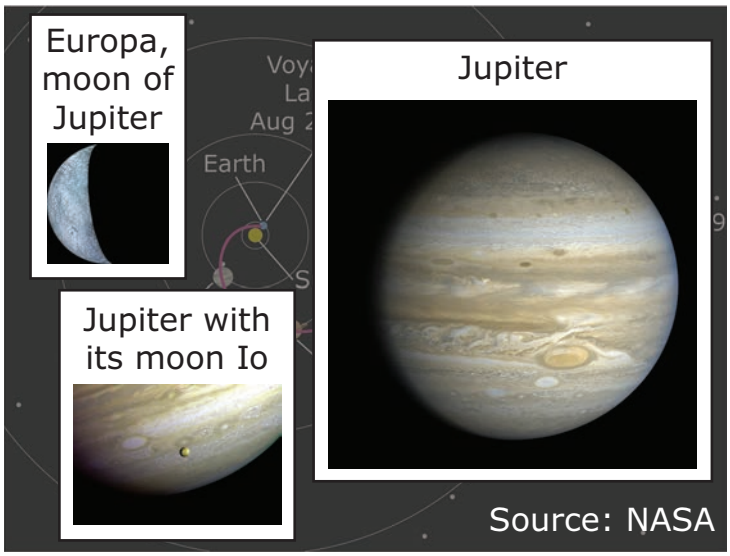
Planet	Number of Revolutions around the Sun
Earth	12
Jupiter	1
Saturn	$\frac{1}{2}$
Uranus	$\frac{1}{7}$
Neptune	$\frac{1}{13}$

Part 3

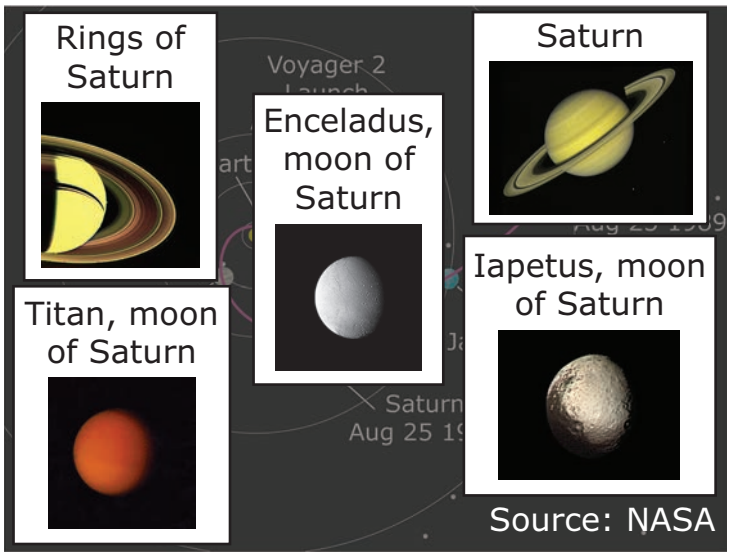
This drawing shows the path Voyager 2 took through the solar system.

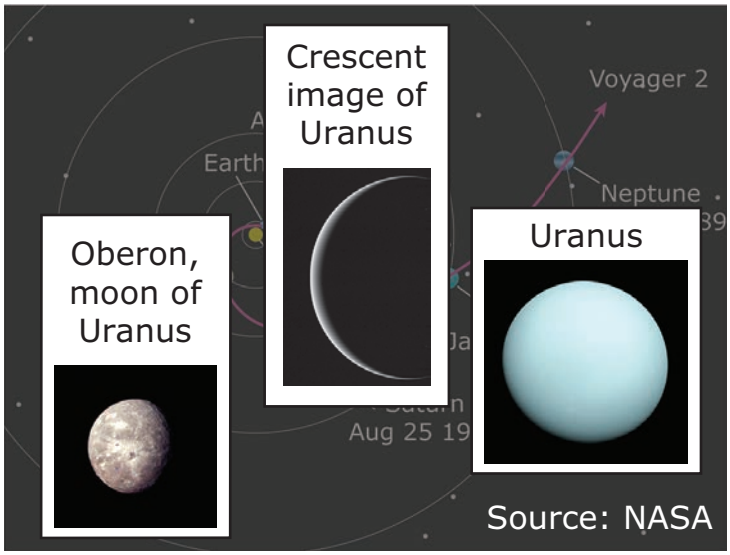


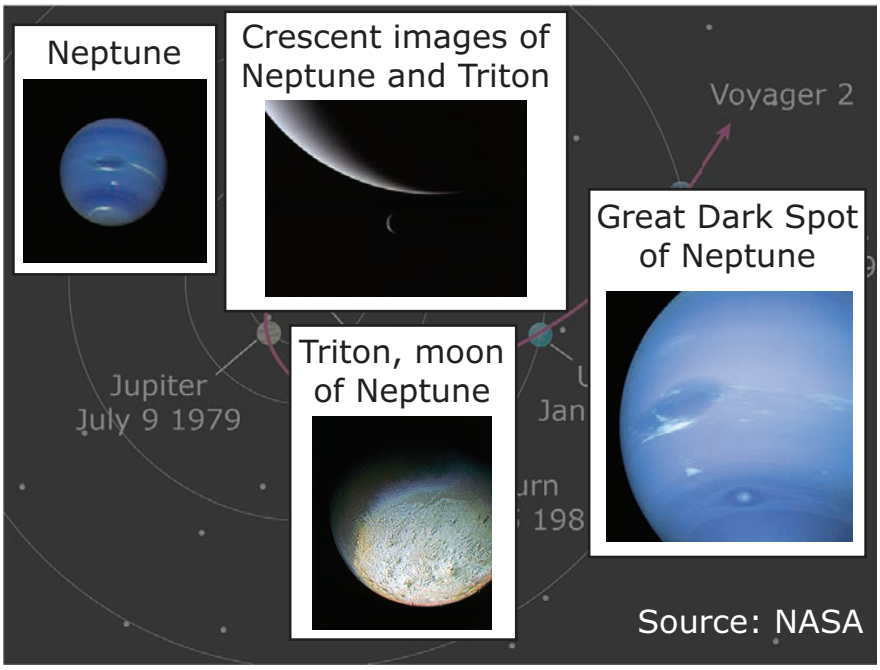
The images show information sent back to Earth by Voyager 2 as it encountered Jupiter.



The images show information sent back to Earth by Voyager 2 as it encountered Saturn, Uranus, and Neptune.

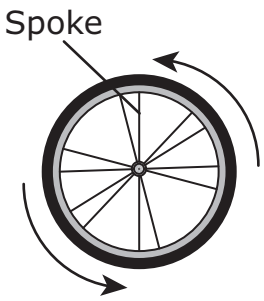




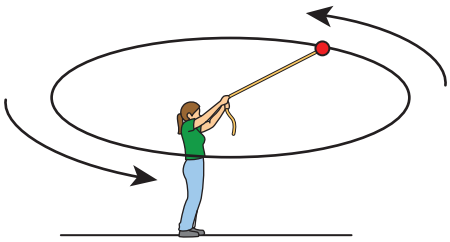

Neptune
Crescent images of Neptune and Triton
Voyager 2
Great Dark Spot of Neptune
Triton, moon of Neptune
Jupiter
July 9 1979
Source: NASA

7. A student wants to demonstrate the movement of the planets shown in Part 1.

The student will use one of two different models. On the wheel, the spokes are permanently attached to the center, and the wheel stays round. The person spinning the ball on the string has to continue applying force to the string and ball to keep the ball moving in a circular path.



Spinning wheel



Spinning a ball on a string

Circle one correct response in each box to complete the sentence.

A planet stays in orbit because the

Sun's _____ acts like a

gravitational force
rotational motion

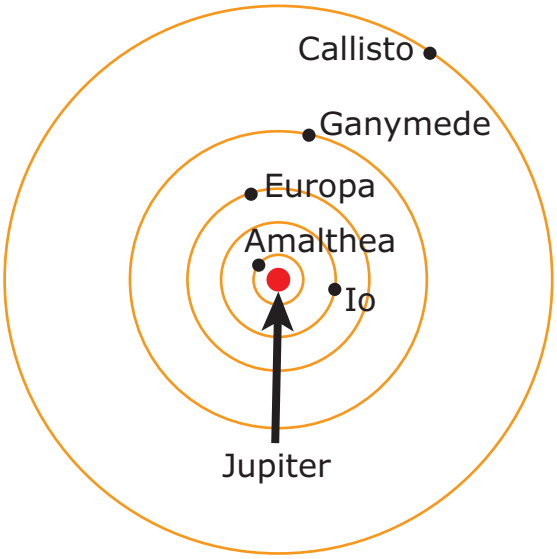
_____

spoke that is used to spin a wheel
string that is used to swing a ball

in a circle.

8. Use the planetary movement shown in Part 1, the table in Part 2, and the Moons of Jupiter diagram to answer this question.

Moons of Jupiter



Circle one correct response in each box to complete the sentence.

The moon Io travels _____ than

faster
slower

Europa because the gravitational force is stronger between Jupiter and moons that are _____ the planet.

farther away from
closer to

9. A student wants to compare the distance between orbital paths of each planet shown using the scale along the bottom in Part 3.

Circle one correct response in each box to complete the sentences.

The distance between the orbital paths of Earth and _____

Jupiter
Neptune
Saturn
Uranus

is almost the same as the distance between the

orbital paths of _____.

Uranus and Neptune
Saturn and Uranus
Jupiter and Saturn

This shows the orbital radius increases by a _____.

greater and greater
constant

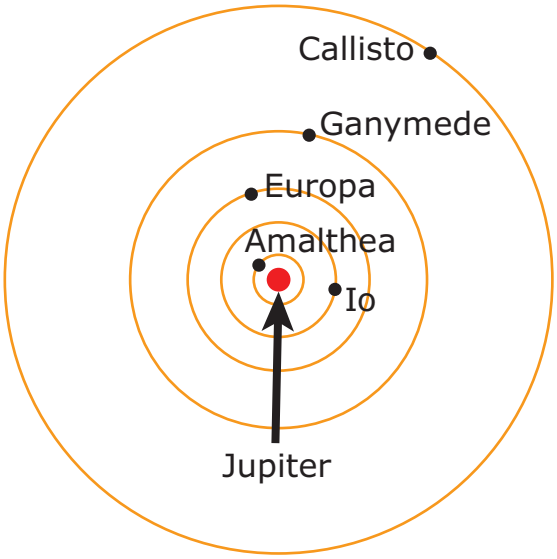
amount for each of the outer planets.

10. Explain how the planetary motion shown in the model in Part 1 and described in the table in Part 2 can be used to describe the effects of gravity on the motions of the solar system, and why designers had to consider the entire system of planets when planning Voyager 2's path. Your response should include explanations of:

- how the model demonstrates the effect of gravity on planetary motions over time given the planets' locations in the solar system
- why understanding planetary motion was needed to plan Voyager 2's path

11. Study the Moons of Jupiter diagram, which shows Jupiter and the orbital paths of its moons.

Moons of Jupiter



Compare the Sun and planets system in Part 3 with the Jupiter and moons system shown in the diagram. Your response should include:

- a comparison of how the two systems are similar
- an explanation of the role of gravity in both systems

12. Use the AU scale across the bottom of Part 3 to compare the relative distances of the different planets' orbits from one another. With this information, identify three planets where the distance between the orbits of the first two planets is almost the same distance between the orbits of the second and third planets. Your response should include:

- the distances between orbits of the **three** particular planets from Part 3
- an explanation of how evidence from Part 3 supports your selection of those planets

Directions: Use the information to answer questions 13 through 17.

Part 1

The ecosystems of western Canada include mountainous terrain covered in forests that usually receive snowfall five to eight months a year. Two animals that live in these forests are the Canada lynx and the snowshoe hare.

Information about Canada Lynx and Snowshoe Hares

Animal	Main Food Source	Other Food Sources	Adaptations for Cold Weather Conditions
Canada lynx	snowshoe hares	small mammals, birds, caribou	large, furry paws to walk on snow
snowshoe hare	plants with soft stems, grasses	tree seedlings, leaves from shrubs	fur turns white in winter

Part 2

Scientists gathered data about the populations of Canada lynx and snowshoe hares. These graphs show how populations of lynx and hares changed over time.

Figure 1: Lynx Population over Time

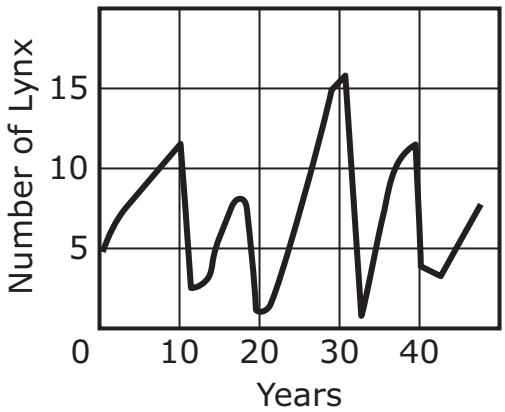


Figure 2: Hare Population over Time

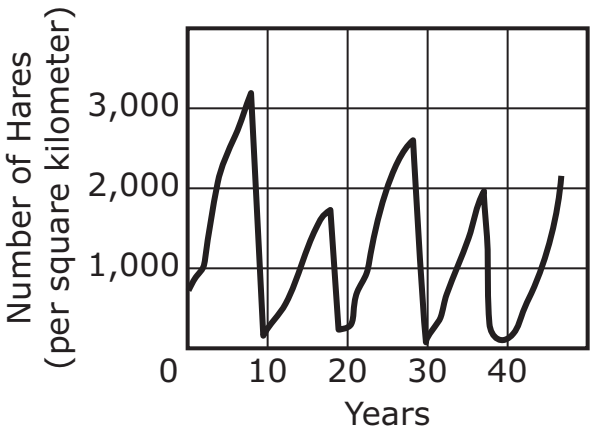
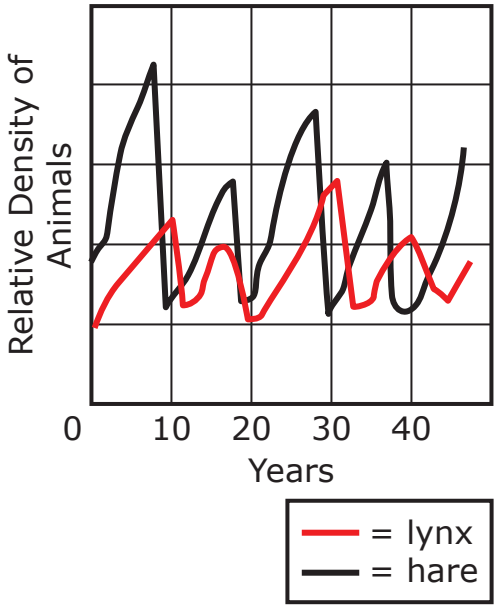


Figure 3: Lynx and Hare Populations over Time

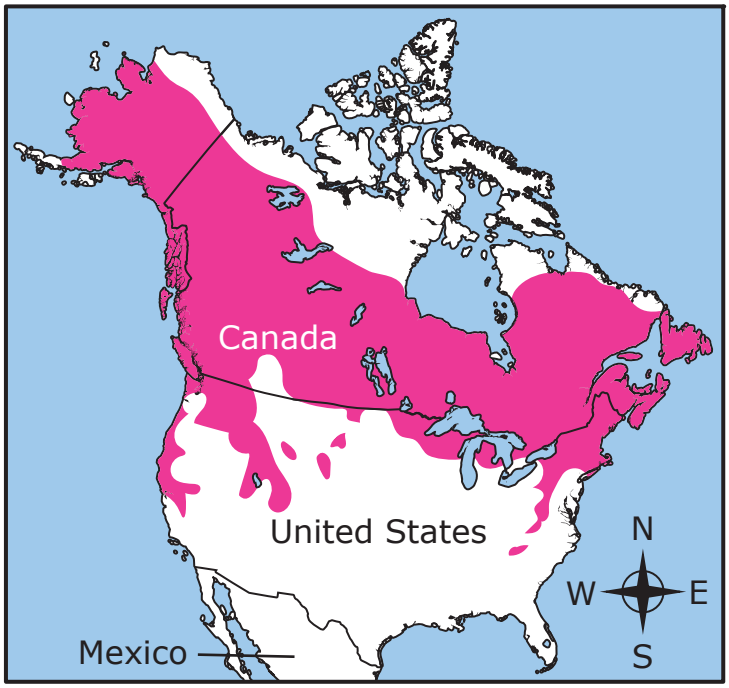


Part 3

These maps show the ranges of Canada lynx and snowshoe hares.

Figure 4: Range of Canada Lynx

Figure 5: Range of Snowshoe Hares

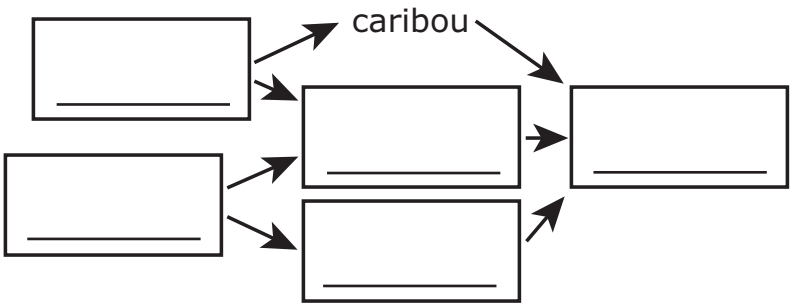


LEGEND
= areas with snowshoe hares

13. A student creates a food web for the organisms listed in the table from Part 1. The student learns that caribou eat shrubs, and birds eat grass seeds.

Based on this information, write the letters for the organisms in the boxes to create a model that shows how matter and energy move through this forest ecosystem. Each letter may be used once.

A.	birds	D.	shrubs
B.	Canada lynx	E.	snowshoe hare
C.	grasses		



14. Based on the information in Part 2, which year in the study was **most likely** associated with a decrease in available energy from plants?

Ⓐ Year 9

Ⓑ Year 15

Ⓒ Year 27

Ⓓ Year 45

15. Based on the information in Part 1 and Part 2, which statement **most likely** explains the conditions between Year 15 and Year 20?

Ⓐ A decrease in caribou population in Year 17 led to a decrease in the Canada lynx population and an increase in the snowshoe hare population in Year 20.

Ⓑ A disease slowed the population growth of Canada lynx in Year 17, but the disease did not affect the snowshoe hare population in that same year.

Ⓒ A new predator of snowshoe hares migrated to the area in Year 17, which led to an increase in the Canada lynx population in Year 20.

Ⓓ A severe drought in Year 17 caused a sharp reduction in both the Canada lynx population and the snowshoe hare population.

16. The maps in Part 3 show the ranges for the Canada lynx and the snowshoe hare. The scientists collected data on sightings of these animals during the study. They observed that the Canada lynx traveled outside their normal range at certain times.

Circle one correct response in each box to complete the sentence.

Based on the information in Part 1 and Part 2, the **most likely** year during the study when Canada lynx were observed outside their range is _____

Year 5
Year 15
Year 30
Year 35

because the main food source for the Canada lynx was _____ during this year.

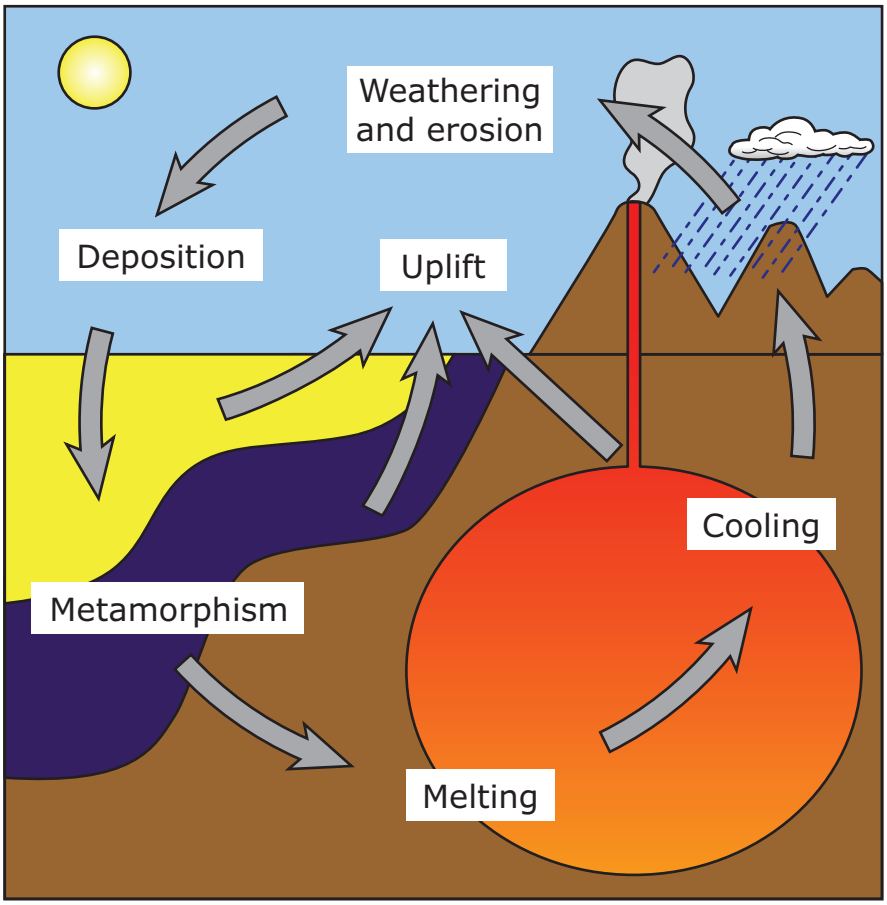
more abundant
less abundant
stable

17. A disease that affects snowshoe hares may also have an effect on the ecosystem. Based on the information in Part 1, explain how a disease affecting the snowshoe hare population would affect the overall ecosystem. Your response should include:

- how the disease would cause a decrease in population of some organisms in the ecosystem
- how the disease would cause an increase in population of other organisms in the ecosystem

18. This model shows interactions in one of Earth's systems.

The Rock Cycle



KEY
= sedimentary rock
= metamorphic rock
= igneous rock

How does energy from the Sun affect this cycle?

Ⓐ It causes heating of water that results in weathering and erosion.

Ⓑ It causes heating of rocks that results in metamorphism.

Ⓒ It causes heating of Earth that results in melting.

Ⓓ It causes heating of the air that results in uplift.

This is the end of Item Set 1.

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