Framework: 8 - Recognize that gravity is a force that pulls all things on and near the earth toward the center of the earth. Gravity plays a major role in the formation of the planets, stars, and solar system and in determining their motions.

2009, Science and Technology/Engineering - Grade 8
Question 9: Open-Response

The planets in our solar system were formed mainly by one force. That same force affects the motion of the planets in our solar system.

1. Identify the force that is responsible for the formation of the planets in our solar system.
2. Describe how the force you identified in part (a) formed the planets in our solar system.
3. Describe two other examples of the effects this force has in our solar system.

2008, Science and Technology/Engineering - Grade 8
Question 1: Multiple-Choice

Which of the following causes a ship's iron anchor to sink to the ocean floor when it is released overboard?

A. chemical forces
B. gravity
C. magnetism
D. nuclear forces

2007, Science and Technology/Engineering - Grade 8
Question 1: Multiple-Choice

Which of the following keeps the planets in our solar system in orbit around the Sun?

A. atmospheric pressure
B. gravitational force
C. electromagnetic energy
D. thermal energy

2006, Science and Technology/Engineering - Grade 8
Question 35: Multiple-Choice

The Moon orbits Earth at a speed of approximately one kilometer per second. The Moon is kept in orbit by which of the following?

A. gravity
B. lunar phases
C. magnetism
D. ocean tides

Framework: 9 - Describe lunar and solar eclipses, the observed moon phases, and tides. Relate them to the relative positions of the earth, moon, and sun.

2008, Science and Technology/Engineering - Grade 8
Question 11: Multiple-Choice

Which of the following pictures shows the appearance of the Moon when a solar eclipse occurs?

A.

Waning Moon

B.

Quarter Moon

C.

Full Moon

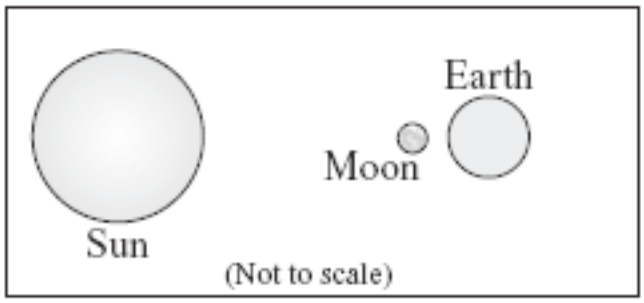
D.

New Moon

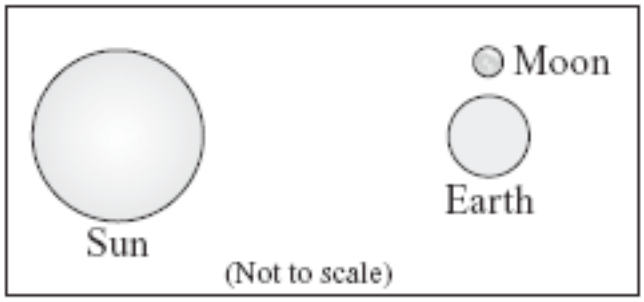
2007, Science and Technology/Engineering - Grade 8
Question 25: Multiple-Choice

Which of the following diagrams best shows the relative positions of Earth, the Moon, and the Sun during a lunar eclipse?

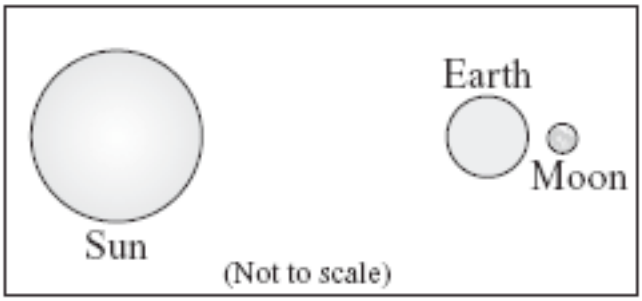
A.



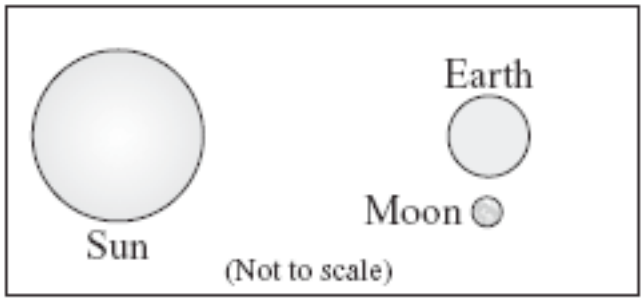
B.



C.

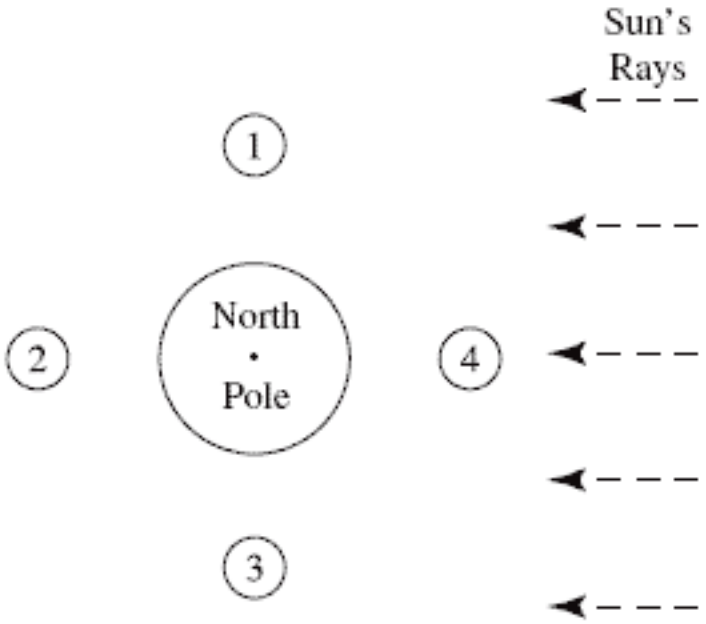


D.



2005, Science and Technology/Engineering - Grade 8
Question 10: Multiple-Choice

The diagram below shows a polar projection of Earth and four positions of the Moon.



The highest high tides and lowest low tides are called spring tides. Which positions of the Moon produce spring tides in Earth's oceans?

A. 1 and 2
B. 2 and 4
C. 1 and 3
D. 3 and 4

Framework: 10 - Compare and contrast properties and conditions of objects in the solar system (i.e., sun, planets, and moons) to those on Earth (i.e., gravitational force, distance from the sun, speed, movement, temperature, and atmospheric conditions).

2008, Science and Technology/Engineering - Grade 8
Question 22: Multiple-Choice

Which of the following statements best describes one way that the Moon is different from Earth?

A. The Moon is not solid.
B. The Moon has no gravity.
C. The Moon has almost no atmosphere.
D. The Moon receives almost no solar light.

2007, Science and Technology/Engineering - Grade 8
Question 18: Open-Response

The table and descriptions below show some of the characteristics of the planets in our solar system.

Planetary Data*

Planet	Mass (10^{24} kg)	Diameter (km)	Density (kg/m^3)	Length of Day[1] (hours)	Distance from Sun (10^6 km)	Orbital Period[2] (days)	Orbital Velocity[3] (km/s)
Mercury	0.330	4879	5427	4222.6	57.9	88.0	47.9
Venus	4.87	12,104	5243	2802.0	108.2	224.7	35.0
Earth	5.97	12,756	5515	24.0	149.6	365.2	29.8
Mars	0.642	6794	3933	24.7	227.9	687.0	24.1
Jupiter	1899	142,984	1326	9.9	778.6	4331	13.1
Saturn	568	120,536	687	10.7	1433.5	10,747	9.7
Uranus	86.8	51,118	1270	17.2	2872.5	30,589	6.8
Neptune	102	49,528	1638	16.1	4495.1	59,800	5.4
Pluto (dwarf)	0.0125	2390	1750	153.3	5870.0	90,588	4.7

* Numerical data based on NASA information.

[1]**Length of Day (hours)** – This is the average time in hours that it takes for the Sun to move from the noon position in the sky at a point on the equator back to the same position.
[2]**Orbital Period (days)** – This is the time in Earth days that it takes for the planet to orbit the Sun.
[3]**Orbital Velocity (km/s)** – This is the average velocity, or speed, of the planet in kilometers per second as it orbits the Sun.

a. Identify the planet that has the greatest density. Include data from the table to support your answer.
b. Describe the relationship between a planet's distance from the Sun and its orbital period. Include data from the table for at least two planets to support your answer.
c. Identify the planet that rotates the fastest on its axis. Include data from the table to support your answer.

2005, Science and Technology/Engineering - Grade 8
Question 5: Multiple-Choice

Mercury, the planet nearest to the Sun, has extreme surface temperatures, ranging from 465°C in sunlight to −180°C in darkness.

Why is there such a large range of temperatures on Mercury?

A. The planet is too small to hold heat.
B. The planet is heated on only one side.
C. The planet reflects heat from its dark side.
D. The planet lacks an atmosphere to hold heat.

2005, Science and Technology/Engineering - Grade 8
Question 12: Multiple-Choice

Which of the following describes a feature that is shared by Earth and the Moon?

A. They have nearly the same atmosphere.
B. They have almost the same gravitational pull.
C. They have a rocky crust that includes mountains.
D. They have areas that show considerable water erosion.

Framework: 11 - Explain how the tilt of the earth and its revolution around the sun result in an uneven heating of the earth, which in turn causes the seasons.

2009, Science and Technology/Engineering - Grade 8
Question 3: Multiple-Choice

Which of the following statements best explains why it is warmer at the equator than at the North Pole?

A. The equator has a larger area than the North Pole.
B. The equator is closer to the Sun than the North Pole.
C. The equator receives more direct sunlight than the North Pole.
D. The equator has more hours of daylight per year than the North Pole.

2008, Science and Technology/Engineering - Grade 8
Question 9: Multiple-Choice

Which of the following statements best explains why the tilt of Earth on its axis causes summer to be warmer than winter in the Northern Hemisphere?

A. The warm ocean currents flow from the tropics to the Northern Hemisphere in the summer.
B. The rays of the Sun strike the Northern Hemisphere more directly in the summer.
C. The greenhouse effect increases in the Northern Hemisphere in the summer.
D. The Northern Hemisphere is closer to the Sun in the summer.

Framework: 12 - Recognize that the universe contains many billions of galaxies, and that each galaxy contains many billions of stars.

2008, Science and Technology/Engineering - Grade 8
Question 3: Multiple-Choice

Which of the following is the best estimate of the number of stars in a typical galaxy?

A. tens
B. hundreds
C. thousands
D. billions

2007, Science and Technology/Engineering - Grade 8
Question 21: Multiple-Choice

Which of the following lists is in order from smallest to largest?

A.
universe → solar system → galaxy

B.
galaxy → solar system → universe

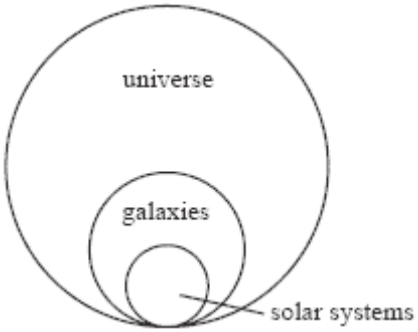
C.
solar system → universe → galaxy

D.
solar system → galaxy → universe

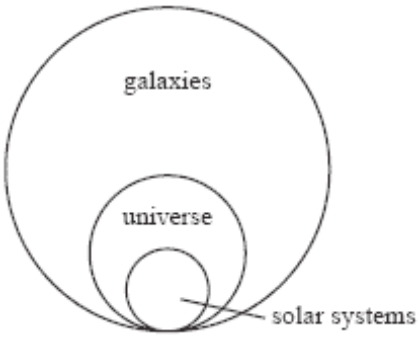
2006, Science and Technology/Engineering - Grade 8
Question 15: Multiple-Choice

Which of the following diagrams best represents the relationship between galaxies, the universe, and solar systems?

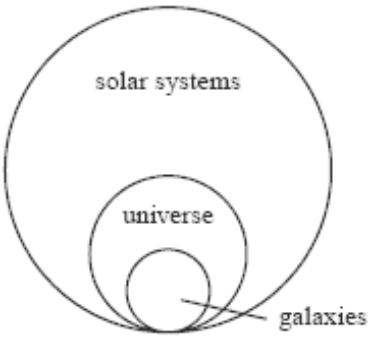
A.



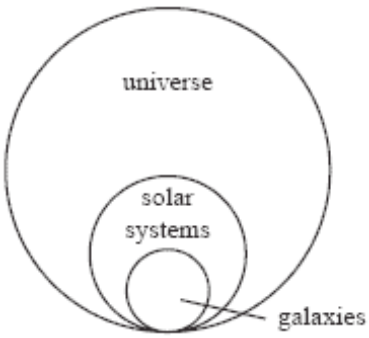
B.



C.



D.



PHYSICAL SCIENCE ***Framework: 1 - Differentiate between weight and mass, recognizing that weight is the amount of gravitational pull on an object.***

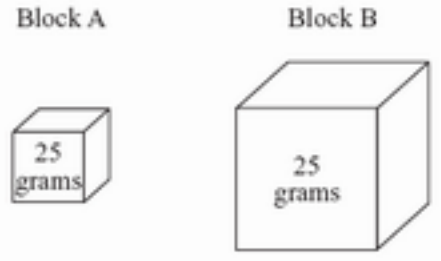
2009, Science and Technology/Engineering - Grade 8
Question 1: Multiple-Choice

If a solid object is taken from Earth far into space, which of the following measurements of the object will change most?

A. density
B. mass
C. volume
D. weight

2008, Science and Technology/Engineering - Grade 8
Question 14: Multiple-Choice

The diagrams below illustrate two blocks composed of different materials.



If Block A is located on the Moon and Block B is located on Earth, what property do these two blocks have in common?

A. They have the same mass.
B. They have the same weight.
C. They have the same volume.
D. They have the same surface area.

2005, Science and Technology/Engineering - Grade 8
Question 25: Multiple-Choice

On Earth, Johanna weighs 100 lbs. She calculated what her weight would be at several other locations in the solar system. The results are shown in the table below.

Location in Solar System	Weight (lbs.)
Venus	90
Earth	100
Moon	16
Mars	40
Jupiter	260

Which of the following statements is **best** supported by the information in the table?

A. Venus has more gravitational force than Earth.
B. Mars has less gravitational force than the Moon.
C. Earth has four times the gravitational force of Mars.
D. Jupiter has more than twice the gravitational force of Earth.