

FORMULA CHART

for Middle School—Grade 8 Science Assessment

Work = force \times distance

$$W = Fd$$

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

$$s = \frac{d}{t}$$

Force = mass \times acceleration

$$F = ma$$

Weight = mass \times acceleration due to gravity

$$\text{Weight} = mg$$

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$D = \frac{m}{v}$$

Constants/Conversions

$$g = \text{acceleration due to gravity} = 9.8 \frac{\text{m}}{\text{s}^2}$$

$$\text{speed of light} = 3 \times 10^8 \frac{\text{m}}{\text{s}}$$

$$\text{speed of sound} = 343 \frac{\text{m}}{\text{s}} \text{ at sea level and } 20^\circ\text{C}$$

$$1 \text{ cm}^3 = 1 \text{ mL}$$

Centimeters

0
1
2
3
4
5
6
7
8
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10
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12
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14
15
16
17
18
19
20

Periodic Table of the Elements

Atomic number — 14
 Symbol — **Si**
 Atomic mass — 28.086
 Silicon — Name

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	H 1.008 Hydrogen																	He 4.0026 Helium
2	Li 6.941 Lithium	Be 9.012 Beryllium											B 10.81 Boron	C 12.011 Carbon	N 14.007 Nitrogen	O 15.999 Oxygen	F 18.998 Fluorine	Ne 20.179 Neon
3	Na 22.990 Sodium	Mg 24.305 Magnesium											Al 26.982 Aluminum	Si 28.086 Silicon	P 30.974 Phosphorus	S 32.066 Sulfur	Cl 35.453 Chlorine	Ar 39.948 Argon
4	K 39.098 Potassium	Ca 40.08 Calcium	Sc 44.956 Scandium	Ti 47.88 Titanium	V 50.942 Vanadium	Cr 51.996 Chromium	Mn 54.938 Manganese	Fe 55.847 Iron	Co 58.933 Cobalt	Ni 58.69 Nickel	Cu 63.546 Copper	Zn 65.39 Zinc	Ga 69.72 Gallium	Ge 72.61 Germanium	As 74.922 Arsenic	Se 78.96 Selenium	Br 79.904 Bromine	Kr 83.80 Krypton
5	Rb 85.468 Rubidium	Sr 87.62 Strontium	Y 88.906 Yttrium	Zr 91.224 Zirconium	Nb 92.906 Niobium	Mo 95.94 Molybdenum	Tc (98) Technetium	Ru 101.07 Ruthenium	Rh 102.906 Rhodium	Pd 106.42 Palladium	Ag 107.868 Silver	Cd 112.41 Cadmium	In 114.82 Indium	Sn 118.71 Tin	Sb 121.763 Antimony	Te 127.60 Tellurium	I 126.904 Iodine	Xe 131.29 Xenon
6	Cs 132.905 Cesium	Ba 137.33 Barium	La 138.906 Lanthanum	Hf 178.49 Hafnium	Ta 180.948 Tantalum	W 183.84 Tungsten	Re 186.207 Rhenium	Os 190.23 Osmium	Ir 192.22 Iridium	Pt 195.08 Platinum	Au 196.967 Gold	Hg 200.59 Mercury	Tl 204.383 Thallium	Pb 207.2 Lead	Bi 208.980 Bismuth	Po (209) Polonium	At (210) Astatine	Rn (222) Radon
7	Fr (223) Francium	Ra 226.025 Radium	Ac 227.028 Actinium	Rf (261) Rutherfordium	Db (262) Dubnium	Sg (263) Seaborgium	Bh (262) Bohrium	Hs (265) Hassium	Mt (266) Meitnerium	Pt 195.08 Platinum	Au 196.967 Gold	Hg 200.59 Mercury	Tl 204.383 Thallium	Pb 207.2 Lead	Bi 208.980 Bismuth	Po (209) Polonium	At (210) Astatine	Rn (222) Radon

Mass numbers in parentheses are those of the most stable or most common isotope.

58	Ce 140.12 Cerium	59	Pr 140.908 Praseodymium	60	Nd 144.24 Neodymium	61	Pm (145) Promethium	62	Sm 150.36 Samarium	63	Eu 151.97 Europium	64	Gd 157.25 Gadolinium	65	Tb 158.925 Terbium	66	Dy 162.50 Dysprosium	67	Ho 164.930 Holmium	68	Er 167.26 Erbium	69	Tm 168.934 Thulium	70	Yb 173.04 Ytterbium	71	Lu 174.967 Lutetium
90	Th 232.038 Thorium	91	Pa 231.036 Protactinium	92	U 238.029 Uranium	93	Np 237.048 Neptunium	94	Pu (244) Plutonium	95	Am (243) Americium	96	Cm (247) Curium	97	Bk (247) Berkelium	98	Cf (251) Californium	99	Es (252) Einsteinium	100	Fm (257) Fermium	101	Md (258) Mendelevium	102	No (259) Nobelium	103	Lr (262) Lawrencium

Lanthanide Series

Actinide Series

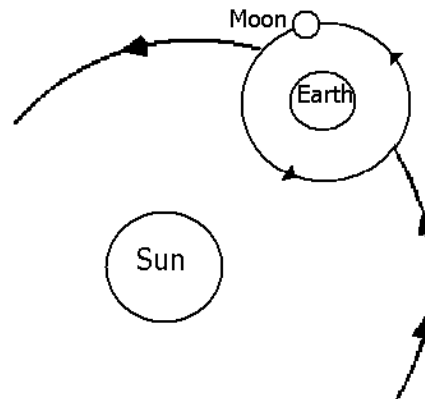
1. Which of these is an example of an unsafe practice in a lab or classroom?
 - (A) Testing a substance by tasting it
 - (B) Watering a plant without wearing gloves
 - (C) Using a glass rod to stir liquid in a glass beaker
 - (D) Detecting an odor by moving air toward you with your hand

2. What causes day and night on Earth?
 - (A) Earth's rotation on its axis.
 - (B) the Sun's revolution around Earth.
 - (C) Earth's revolution around the Sun.
 - (D) the Sun's rotation on its axis.

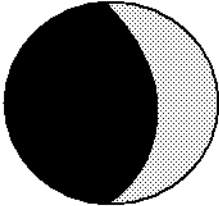
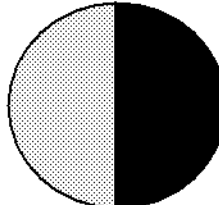
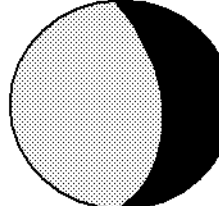
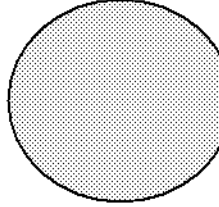
3. Cooler weather and fewer hours of daylight signal the approach of fall. Which feature of Earth is MOST responsible for these changes?
 - (A) The tilt of Earth's axis
 - (B) The strength of Earth's gravity
 - (C) The distance of Earth from the sun
 - (D) The direction in which Earth rotates

4. At noon one day, a student noticed the position of the sun in the sky. At noon two weeks later, the student discovered that the sun had moved to a point directly overhead. Why did the sun seem to change its position?
 - (A) The seasons were changing from summer to fall.
 - (B) The seasons were changing from fall to winter.
 - (C) The seasons were changing from winter to spring.
 - (D) The seasons were changing from spring to summer.

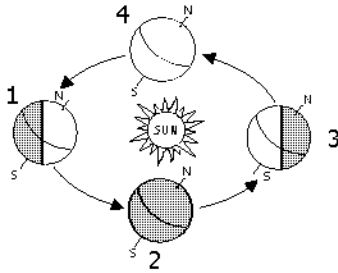
5.



Which of the following shows how the moon appears to be by an observer on Earth, when it is in the position shown in the diagram above?

- (A) 
- (B) 
- (C) 
- (D) 

6.



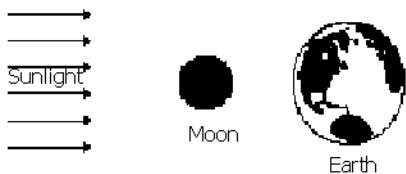
According to the diagram above, which is the order of seasons for the Northern Hemisphere, starting at number 1?

- (A) Summer, spring, winter, fall
- (B) Winter, spring, summer, fall
- (C) Winter, fall, spring, summer
- (D) Summer, fall, winter, spring

7. Mars has seasonal cycles like Earth's. This is primarily because ____.

- (A) Mars' orbit is fairly elliptical, so its distance from the sun varies.
- (B) the tilt of Mars' rotational axis is similar to the tilt of Earth's axis.
- (C) the distance from Mars to the sun is similar to the Earth's.
- (D) the Martian atmosphere has a composition similar to Earth's.

8.



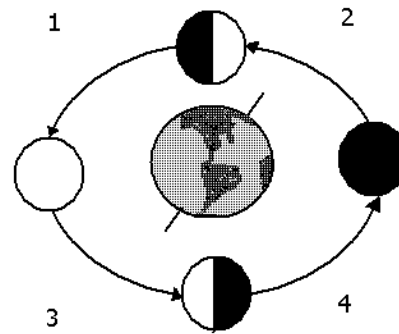
The diagram shows the conditions for which phase of the Moon?

- (A) full
- (B) crescent
- (C) quarter
- (D) new

9. If a new moon occurred on June 2, when will the next new moon occur?

- (A) June 30
- (B) June 28
- (C) June 23
- (D) June 15

10.



At which position on the diagram above does the waning gibbous phase of the moon occur?

- (A) 1
- (B) 2
- (C) 3
- (D) 4

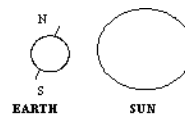
11. A solar eclipse occurs when ____.

- (A) the Moon blocks the Earth from the Sun.
- (B) the first four planets in the solar system are aligned.
- (C) Earth blocks the Moon from the Sun.
- (D) Earth's shadow falls on the Sun.

12. The phase of the moon you see depends on ____.

- (A) where you are on Earth's surface.
- (B) how much of the sunlit side of the moon faces Earth.
- (C) how much of the moon's surface is lit by the sun.
- (D) whether or not an eclipse is occurring

13.

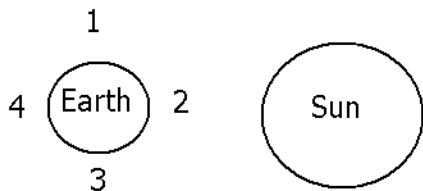


In the illustration above, what season is North America experiencing?

- (A) spring
- (B) summer
- (C) fall
- (D) winter

14. It is necessary to add a day to the calendar every four years because ____.
- (A) the axis of Earth is tilted.
 - (B) the gravitational pull of the Sun affects Earth's revolution.
 - (C) the revolution of Earth is not exactly 365 days.
 - (D) the Moon crosses the orbit of the Sun every 28 days.

15. A student is drawing a diagram to show the positions of Earth, the moon, and the sun during a full moon.



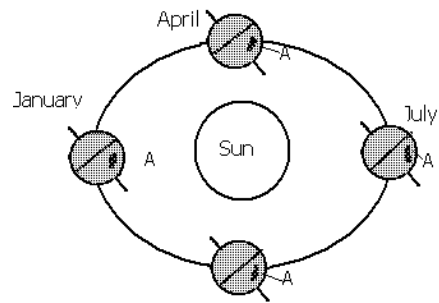
Where on the diagram should the student place the moon to accurately show its position relative to the Earth and the sun during a full moon?

- (A) 1
- (B) 2
- (C) 3
- (D) 4

16. In 1610, Galileo first observed what looked like three small stars near Jupiter. As Galileo continued to make observations, he saw that these "stars" seemed to follow Jupiter and change their positions around it. This led Galileo to conclude that Jupiter was orbited by moons that were like Earth's moon. Which of these BEST describes the impact of this research?

- (A) Proving that Earth and Jupiter are both orbiting the Sun
- (B) Showing that planets besides Earth and Jupiter must have moons
- (C) Proving that Jupiter was the largest planet in the solar system
- (D) Showing that Earth was not the center of motion in the universe

17.



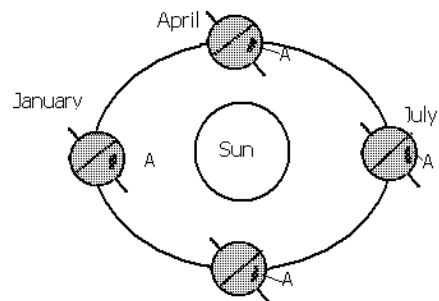
Which of the following BEST describes the length of days in location A when the Earth and sun are positioned as shown in January in the diagram above?

- (A) Long days
- (B) Continual daylight
- (C) Short days
- (D) Continual darkness

18. Which of the following is a necessary condition for a lunar eclipse to occur?

- (A) The Moon must be full.
- (B) The Moon must be waxing.
- (C) It must be the beginning of the month.
- (D) It must be winter in the Northern Hemisphere.

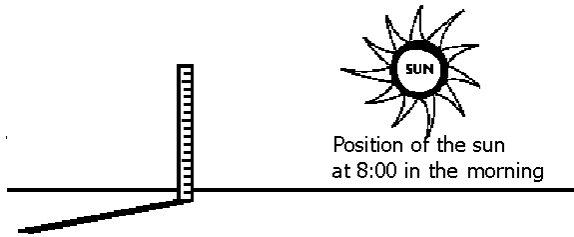
19.



According to the diagram above, during what months does location A have the MOST hours of daylight?

- (A) March-May
- (B) September-November
- (C) June-August
- (D) December-February

20.

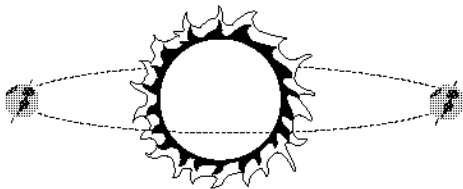


A student stuck a meter stick in the ground outside the school at 8:00 in the morning. How will the shadow of the stick at 2:00 in the afternoon compare to its shadow at 8:00 in the morning?

- Ⓐ There will be no shadow at 2:00 in the afternoon.
- Ⓑ The shadow will be longer and on the opposite side of the stick.
- Ⓒ The shadow will be longer and on the same side of the stick.
- Ⓓ The shadow will be shorter and on the opposite side of the stick.

Free Response

21. Explain two main causes of seasons on Earth. Look at the diagram below to help with your written explanation.



22. As you observe the Moon for one continuous month, you will always see the same side of the Moon while the Moon is revolving in its orbit about Earth.

1. Explain why you always see the same side of the moon.

2. Explain how the position of the moon affects the appearance of each of the following moon phases. (new moon, waxing crescent, waxing gibbous, and full moon)

