

ROUND 6A

TOSS-UP

1) Life Science – *Short Answer* What vasculature [**VASS-kyu-lah-chur**] in the human circulatory system relies on valves?

ANSWER: VEINS

BONUS

1) Life Science – *Multiple Choice* Which of the following pairs of structures can be considered homologous [**hoe-MAWL-uh-gus**]?

- W) Human hand and cat paw
- X) Butterfly wings and bat wings
- Y) Whale flipper and spider leg
- Z) Grasshopper leg and dog leg

ANSWER: W) HUMAN HAND AND CAT PAW

TOSS-UP

2) Energy – *Multiple Choice* Which of the following types of fossil fuels is created primarily from the remains of vegetation?

- W) Oil
- X) Coal
- Y) Natural Gas
- Z) Heavy Oil

ANSWER: X) COAL

BONUS

2) Energy – *Short Answer* Identify all of the following four units that are commonly used for energy: 1) Kilowatt-hour; 2) British thermal unit; 3) Joule [**jool**]; 4) Horsepower.

ANSWER: 1, 2, 3

TOSS-UP

3) Earth and Space – *Multiple Choice* In August 2012, NASA's Curiosity rover landed on what surface feature of Mars?

- W) Olympus Mons
- X) Northern Ice Cap
- Y) Southern Ice Cap
- Z) Gale Crater

ANSWER: Z) GALE CRATER

BONUS

3) Earth and Space – *Multiple Choice* Which of the following is a widespread and long-lived, violent convectively-induced straight-line windstorm that is associated with a fast-moving band of severe thunderstorms usually taking the form of a bow echo?

- W) Polar front
- X) Derecho
- Y) Haboob
- Z) Line echo wave pattern

ANSWER: X) DERECHO

TOSS-UP

4) Math – *Multiple Choice* A right triangle has one angle that measures 52 degrees. In degrees, what is the measure of the third angle of this triangle?

- W) 38
- X) 48
- Y) 128
- Z) 142

ANSWER: W) 38

BONUS

4) Math – *Short Answer* The base-six numeral four-four-three is equivalent to what in base 10?

ANSWER: 171

TOSS-UP

5) Physical Science – *Multiple Choice* A colleague explaining the results of an experiment tells you that a plot of position as a function of time is a straight line. Which of the following can you deduce from this information?

- W) Acceleration was decreasing
- X) Velocity was increasing
- Y) Acceleration was zero
- Z) Velocity was zero

ANSWER: Y) ACCELERATION WAS ZERO

BONUS

5) Physical Science – *Multiple Choice* A 2-pound ball traveling to the right collides elastically [*ee-LASS-tik-lee*] with a stationary 1-pound ball. Which of the following is most likely to occur as a result of the collision?

- W) The 2-pound ball will travel to the left while the 1-pound ball will travel to the right
- X) The 1-pound ball and the 2-pound ball will move to the right at the same speed
- Y) The 1-pound ball and the 2-pound ball will move to the right at different speeds
- Z) The 1-pound ball will move to the right while the 2-pound ball remains stationary

ANSWER: Y) THE 1-POUND BALL AND THE 2-POUND BALL WILL MOVE TO THE RIGHT AT DIFFERENT SPEEDS

TOSS-UP

6) Life Science – *Multiple Choice* Which of the following is found in both prokaryotic [*PRO-care-ee-AW-tic*] and eukaryotic [*YOU-care-ee-AW-tic*] cells?

- W) Ribosomes [*RYE-beh-sohms*]
- X) Golgi [*GOAL-jee*] apparatus
- Y) Mitochondria [*my-tow-KON-dree-ah*]
- Z) Endoplasmic [*EN-doh-PLAZ-mik*] reticulum [*reh-TIK-yoo-lum*]

ANSWER: W) RIBOSOMES

BONUS

6) Life Science – *Short Answer* When blood sugar levels rise, the pancreas releases what compound into the blood as a signal to the body's cells to absorb the sugar?

ANSWER: INSULIN

TOSS-UP

7) Energy – *Multiple Choice* Which technology is the largest source of carbon-free renewable electricity in the United States?

- W) Hydroelectric
- X) Photovoltaics [*photo-vawl-TAY-iks*]
- Y) Wind turbines
- Z) Geothermal

ANSWER: W) HYDROELECTRIC

BONUS

7) Energy – *Short Answer* What unit of heat energy equals 100,000 BTUs?

ANSWER: THERM

TOSS-UP

8) Math – *Short Answer* What is the value of x when $x/3 + 5 = 18$?

ANSWER: 39

BONUS

8) Math – *Multiple Choice* In the Cartesian coordinate system, which of the following points is closest to the origin?

- W) $(-8, 11)$
- X) $(-4, 13)$
- Y) $(10, -9)$
- Z) $(12, -7)$

ANSWER: Y) $(10, -9)$

TOSS-UP

9) Life Science – *Multiple Choice* What is the connective tissue that protects the ends of the bones and allows them to move more easily?

- W) Cartilage
- X) Tendons
- Y) Ligaments
- Z) Muscles

ANSWER: W) CARTILAGE

BONUS

9) Life Science – *Short Answer* What kingdom primarily contains organisms that possess a cell wall but no chlorophyll [*KLOR-oh-fil*]?

ANSWER: FUNGI

TOSS-UP

10) Earth and Space – *Multiple Choice* What is the largest known natural satellite in the solar system?

- W) Ganymede
- X) Io
- Y) Callisto
- Z) Europa

ANSWER: W) GANYMEDE

BONUS

10) Earth and Space – *Short Answer* What American astronomer first proved the existence of other galaxies?

ANSWER: EDWIN HUBBLE

TOSS-UP

11) Physical Science – *Short Answer* What type of radiation is associated with the release of very high energy photons?

ANSWER: GAMMA

BONUS

11) Physical Science – *Short Answer* Identify all of the following three actions that can cause a physical change:

- 1) Boiling water; 2) Frying an egg; 3) Cutting a banana.

ANSWER: 1 AND 3

TOSS-UP

12) Math – *Short Answer* Rounded to the nearest 100, what is 415 times 7?

ANSWER: 2900

BONUS

12) Math – *Short Answer* What is the volume of a rectangular pyramid with base dimensions 15 and 12 and height 13?

ANSWER: 780

TOSS-UP

13) Earth and Space – *Short Answer* Atolls are rings of coral reefs surrounding what bodies of water?

ANSWER: LAGOON

BONUS

13) Earth and Space – *Short Answer* What is the name given to a body in orbit about a star, in the process of accumulating mass and destined to become a planet?

ANSWER: PROTOPLANET

TOSS-UP

14) Energy – *Multiple Choice* Which of the following is closest to the percentage of the energy used in the United States that comes from non-renewable sources?

- W) 60
- X) 70
- Y) 80
- Z) 90

ANSWER: Z) 90

BONUS

14) Energy – *Multiple Choice* Which of the following types of energy is associated with the reservoir behind a dam?

- W) Kinetic
- X) Chemical
- Y) Electrical
- Z) Potential

ANSWER: Z) POTENTIAL

TOSS-UP

15) Life Science – *Multiple Choice* Some bacteriophages [**bak-TEER-ee-oh-fay-jez**] do not immediately kill the bacteria that they infect; rather, they incorporate themselves into the host genome [**JEE-nome**]. What is the term for the incorporated virus?

- W) Lysogen [**LYE-soh-jen**]
- X) Temperate
- Y) Prophage [**pro-fayj**]
- Z) Lytic [**LIH-tik**] phage [**fayj**]

ANSWER: Y) PROPHAGE

BONUS

15) Life Science – *Multiple Choice* Chemoreceptors [**KEE-mo-receptors**] would likely be involved in sensing which of the following?

- W) Pheromones [**FAIR-oh-moans**]
- X) Touch
- Y) Pain
- Z) Light

ANSWER: W) PHEROMONES

TOSS-UP

16) Physical Science – *Multiple Choice* If the radius of a wheel is 6 centimeters and the radius of the axle is 2 centimeters, what is the mechanical advantage?

- W) 3
- X) 4
- Y) 6
- Z) 12

ANSWER: W) 3

BONUS

16) Physical Science – *Short Answer* What type of frictional force only acts upon a body that isn't moving relative to the surface on which it sits?

ANSWER: STATIC FRICTION (ACCEPT: STATIC)

TOSS-UP

17) Math – *Short Answer* The point $(-4, -8)$ is reflected over the y -axis. In what quadrant does the reflected point lie?

ANSWER: 4 (ACCEPT: FOURTH)

BONUS

17) Math – *Short Answer* If f of x equals -2 times 8 to the x power, what is f of $2/3$?

ANSWER: -8

TOSS-UP

18) Physical Science – *Short Answer* You place a 10-pound weight on one end of a see-saw and find that it takes a 30-pound weight on the other end to exactly balance the see-saw. What is the mechanical advantage of the see-saw if used as a lever from the side with the 10-pound weight?

ANSWER: 3 (ACCEPT: 3 TO 1)

BONUS

18) Physical Science – *Short Answer* You throw a ball into the air. What type of energy is at a maximum when the ball reaches its highest point?

ANSWER: POTENTIAL (ACCEPT: GRAVITATIONAL POTENTIAL)

TOSS-UP

19) Earth and Space – *Multiple Choice* Which of the following rocks is composed of the smallest particles?

- W) Breccia
- X) Shale
- Y) Sandstone
- Z) Conglomerate

ANSWER: X) SHALE

BONUS

19) Earth and Space – *Multiple Choice* Which of the following could be a likely location for a salt mine?

- W) Playa
- X) Inselberg
- Y) Kame
- Z) Drumlin

ANSWER: W) PLAYA

TOSS-UP

20) Math – *Short Answer* Express the following number in scientific notation: 67,400

ANSWER: 6.74×10^4

BONUS

20) Math – *Short Answer* If angle ABC is inscribed in a circle and measures 35 degrees, what is the degree measure of arc ABC?

ANSWER: 290

TOSS-UP

21) Physical Science – *Short Answer* What type of chemical bond is found in table salt?

ANSWER: IONIC

BONUS

21) Physical Science – *Multiple Choice* What would be the effect on an x-ray passing through a region containing crossed electric and magnetic fields?

- W) The x-ray will be deflected by the electric field but not by the magnetic field
- X) The x-ray will be deflected by the magnetic field but not by the electric field
- Y) The x-ray will be unaffected by both the electric field and the magnetic field
- Z) The x-ray will be deflected by both the electric field and the magnetic field

ANSWER: Y) THE X-RAY WILL BE UNAFFECTED BY BOTH THE ELECTRIC FIELD AND THE MAGNETIC FIELD

TOSS-UP

22) Life Science – *Short Answer* A protein consists of a single polypeptide chain. How many levels of protein structure does it possess?

ANSWER: THREE

BONUS

22) Life Science – *Short Answer* Scientists believe that the chloroplast was once a bacterial cell that was engulfed by an ancestral eukaryotic [**YOU-care-ee-AW-tic**] cell. What other organelle [**organ-ELL**] did the ancestral eukaryotic cell engulf?

ANSWER: MITOCHONDRION

TOSS-UP

23) Earth and Space – *Short Answer* What type of nebula consists of ionized gas that emits light?

ANSWER: EMISSION NEBULA

BONUS

23) Earth and Space – *Short Answer* Identify all of the following three statements that are generally true of artesian wells: 1) They exist in areas where the water table has little to no incline; 2) They are sandwiched between aquitards; 3) They are characterized by groundwater rising to the surface.

ANSWER: 2 AND 3