

## 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:  $6.74 \times 10^4$

**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