

ROUND 11

TOSS-UP

1) LIFE SCIENCE *Multiple Choice* Which of the following is NOT true of earthworms reproduction:

- W) earthworms are hermaphrodites
- X) earthworms cross-fertilize
- Y) the clitellum secretes a cocoon that picks up eggs and stored sperm
- Z) earthworm embryos develop inside the nephrostome (read as: neff-ro-stome) of the male

ANSWER: Z) EARTHWORM EMBRYOS DEVELOP INSIDE THE NEPHROSTOME OF THE MALE

BONUS

1) LIFE SCIENCE *Multiple Choice* If a pea plant with white flowers is crossed with a pea plant with red flowers and all 100 seedlings from this cross are white, then which of the following statements is most likely true:

- W) white is dominant to red
- X) white is recessive to red
- Y) white flowers are dominant in all flowering plants
- Z) red flowers are recessive in all flowering plants

ANSWER: W) WHITE IS DOMINANT TO RED

TOSS-UP

2) PHYSICAL SCIENCE *Multiple Choice* Which of the following do ideal machines MOST directly assume:

- W) work input equals work output
- X) efficiency is over 100%
- Y) power is independent of efficiency
- Z) energy input is less than energy output

ANSWER: W) WORK INPUT EQUALS WORK OUTPUT

BONUS

2) PHYSICAL SCIENCE *Short Answer* Which one of the following 5 elements is the LEAST likely to react with any other element: neon; fluorine; iron; oxygen; sodium

ANSWER: NEON

TOSS-UP

3) EARTH SCIENCE *Multiple Choice* Which of the following will typically be BEST preserved as a fossil:

- W) mountain or forest organisms
- X) animals with light, thin bones
- Y) desert or marine organisms
- Z) soft-shelled organisms

ANSWER: Y) DESERT OR MARINE ORGANISMS

BONUS

3) EARTH SCIENCE *Multiple Choice* Which of the following is considered a living fossil because, although fossils of it have been dated to 360 million years ago, these arthropods are still alive today:

- W) trilobite
- X) horseshoe crab
- Y) ammonite
- Z) lobster

ANSWER: X) HORSESHOE CRAB

TOSS-UP

4) MATH *Short Answer* When 2 fair dice are rolled simultaneously and the face values added, which of the following five numbers is the most common roll: 5, 6, 7, 9, 11

ANSWER: 7

BONUS

4) MATH *Short Answer* Solve the following equation for x : $\frac{(x + 4)}{(x - 2)} = \frac{10}{6}$

ANSWER: 11

TOSS-UP

5) GENERAL SCIENCE *Multiple Choice* Which of the following types of scientists would most likely use a Secchi (read as: sek-key) disk in their experiments:

- W) geneticist
- X) astronomer
- Y) physicist
- Z) fresh water biologist

ANSWER: Z) FRESH WATER BIOLOGIST

BONUS

5) GENERAL SCIENCE *Multiple Choice* Doppler radar is BEST used in which of the following applications:

- W) forecasting weather
- X) searching for extraterrestrial life
- Y) mapping the ocean floor
- Z) tracking marine life

ANSWER: W) FORECASTING WEATHER

TOSS-UP

6) LIFE SCIENCE *Short Answer* What are the letter abbreviations for the four base nucleotides found in mRNA?

ANSWER: A, U, C, G (any order)

BONUS

6) LIFE SCIENCE *Short Answer* What gland of the human body located in the throat is responsible for regulating metabolic rate and requires a halogen for normal function?

ANSWER: THYROID

TOSS-UP

7) PHYSICAL SCIENCE *Multiple Choice* Which of the following is TRUE about chemical elements:

- W) fluorine is a very reactive element
- X) rare earth metals are also known as alkaline earth metals
- Y) catalysts are typically consumed in chemical reactions
- Z) metalloids are some of the best-known conductors of heat and electricity

ANSWER: W) FLUORINE IS A VERY REACTIVE ELEMENT

BONUS

7) PHYSICAL SCIENCE *Short Answer* What 2 general products are formed by the reaction of hydrochloric acid and sodium hydroxide?

ANSWER: SALT AND WATER (ACCEPT: NaCl AND H₂O or SODIUM CHLORIDE AND WATER)

TOSS-UP

8) EARTH SCIENCE *Multiple Choice* Which of the following is the most common term for the small particles of salt, dust or smoke from which cloud formation begins:

- W) precipitation nuclei
- X) condensation nuclei
- Y) maturation nuclei
- Z) saturation nuclei

ANSWER: X) CONDENSATION NUCLEI

BONUS

8) EARTH SCIENCE *Multiple Choice* Which of the following is a location of typically calm and cloudy weather and where daily rains are very common:

- W) Hawaii
- X) the Sub-Saharan desert
- Y) the Pacific northwest
- Z) the intertropical convergence zone

ANSWER: Z) THE INTERTROPICAL CONVERGENCE ZONE

TOSS-UP

9) MATH *Short Answer* Give the slope of the following: $3x - 4y = 12$

ANSWER: $\frac{3}{4}$

BONUS

9) MATH *Short Answer* What is the slope of a line passing through the points (16, -10) and (11, 0)?

ANSWER: -2

(Solution: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 + 10}{11 - 16} = -2$)

TOSS-UP

10) GENERAL SCIENCE *Multiple Choice* Which of the following is the BEST example of a turbine:

- W) solar panel
- X) wind mill
- Y) fuel cell
- Z) diesel generator

ANSWER: X) WIND MILL

BONUS

10) GENERAL SCIENCE *Multiple Choice* An ecosystem is BEST classified by which of the following parameters:

- W) its predominant vegetation, soil, and living organisms
- X) its food web
- Y) its living organisms and how they interact with their nonliving environment
- Z) its species that live in the biome

ANSWER: Y) ITS LIVING ORGANISMS AND HOW THEY INTERACT WITH THEIR NONLIVING ENVIRONMENT

TOSS-UP

11) LIFE SCIENCE *Multiple Choice* Which of the following is the primary function of vascular tissue in plants:

- W) transport of fluids
- X) storage of solids
- Y) photosynthesis
- Z) carbon dioxide absorption

ANSWER: W) TRANSPORT OF FLUIDS

BONUS

11) LIFE SCIENCE *Multiple Choice* Which of the following is the plant hormone MOST directly responsible for plants growing towards a light source:

- W) photozyme
- X) lipin
- Y) gibberellin (read as: jib-er-ELL-in)
- Z) auxin

ANSWER: Z) AUXIN

TOSS-UP

12) PHYSICAL SCIENCE *Multiple Choice* Which of the following statements regarding electricity is LEAST accurate:

- W) resistance generally increases with increasing temperatures
- X) superconductors have essentially no resistance to current
- Y) resistance is often likened to electrical friction
- Z) the heater wires in an electric heater or toaster are designed to have very low resistance

ANSWER: Z) THE HEATER WIRES IN AN ELECTRIC HEATER OR TOASTER ARE DESIGNED TO HAVE VERY LOW RESISTANCE

BONUS

12) PHYSICAL SCIENCE *Short Answer* If a flask contains 500 milliliters of a 2 molar NaCl solution, how many moles of salt are in the beaker?

ANSWER: 1

(Solution: moles = (2 moles/L)(0.5L) = 1.0 mole)

TOSS-UP

13) EARTH SCIENCE *Multiple Choice* Which of the following is a mudflow that moves rapidly down the side of a volcano because of the rapid mixing of melted snow and pyroclastic material:

- W) avalanche
- X) lahar (read as: lah-HAR)
- Y) pahoehoe (read as: pa-HO-ee-ho-ee) lava
- Z) dike lava

ANSWER: X) LAHAR

BONUS

13) EARTH SCIENCE *Short Answer* Of the 3 basic types of volcanoes, what type is large, broad with a low slope, and formed by relatively quiet eruptions, an example of which is Mount Kilauea in Hawaii?

ANSWER: SHIELD

TOSS-UP

14) MATH *Short Answer* What is the total number of unique subsets of a set with 5 elements?

ANSWER: 32

(Solution: $2^5 = 32$)

BONUS

14) MATH *Short Answer* Rounded to the nearest whole number, find the distance between two points whose coordinates are (7, 5) and (9, 15)?

ANSWER: 10

TOSS-UP

15) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT true:

- W) a robotic spacecraft recently landed on the surface of a near-Earth asteroid
- X) a team of researchers plan to build a neutrino observatory at the bottom of the Mediterranean Sea
- Y) skin cancer is becoming more common and appearing at younger ages
- Z) solar activity is currently at an 11-year cyclical high point

ANSWER: Z) SOLAR ACTIVITY IS CURRENTLY AT AN 11-YEAR CYCLICAL HIGH POINT

BONUS

15) GENERAL SCIENCE *Multiple Choice* If 2 identical latex balloons are filled to the same size, one with air and the other with helium and left for 2 days, why would the helium balloon most likely decrease in size at a faster rate than the air balloon:

- W) helium molecules are smaller than air molecules and they leak through the balloon faster
- X) helium is always warmer when first introduced into a balloon
- Y) helium is lighter than air and moves faster
- Z) helium reacts with water inside the balloon and condenses

ANSWER: W) HELIUM MOLECULES ARE SMALLER THAN AIR MOLECULES AND THEY LEAK THROUGH THE BALLOON FASTER

TOSS-UP

16) LIFE SCIENCE *Short Answer* Of the 4 general types of biological molecules, proteins, carbohydrates, lipids and nucleic acids, which one is MOST directly effected by mutations?

ANSWER: NUCLEIC ACIDS

BONUS

16) LIFE SCIENCE *Short Answer* Of the 4 general types of biological molecules, proteins, carbohydrates, lipids and nucleic acids, which one will typically release the MOST energy per gram when metabolized by a normal healthy human?

ANSWER: LIPIDS

TOSS-UP

17) PHYSICAL SCIENCE *Short Answer* If the knob of a door knob is 8 centimeters in diameter and the rod that the door knob turns to allow the door to be opened is 2 centimeters in diameter, what is the ideal mechanical advantage of this simple machine?

ANSWER: 4

BONUS

17) PHYSICAL SCIENCE *Short Answer* Giving your answer in numeral form, how many complete vibrations per second are in an 890 kilohertz radio broadcast?

ANSWER: 890,000

TOSS-UP

18) EARTH SCIENCE *Multiple Choice* Erratics are rocks or boulders that were moved to their current location by:

- W) rivers
- X) tides
- Y) glaciers
- Z) volcanoes

ANSWER: Y) GLACIERS

BONUS

18) EARTH SCIENCE *Short Answer* Of the following 4 layers of the Earth, name the one which is LEAST dense and the one that is MOST dense, respectively: oceanic crust; continental crust; inner core; mantle

ANSWER: LEAST = CONTINENTAL CRUST; MOST = INNER CORE

TOSS-UP

19) MATH *Short Answer* In how many different ways can 5 different puppets be ordered across a shelf?

ANSWER: 120

(Solution: $5! = 120$)

BONUS

19) MATH *Short Answer* Expand the following expression, giving your answer in standard binomial form: $(5x - 25)^2$

ANSWER: $25x^2 - 250x + 625$

TOSS-UP

20) GENERAL SCIENCE *Multiple Choice* Although lichens can be found in many locations, in which of the following biomes will lichens grow and thrive the best:

- W) coniferous forest
- X) tundra
- Y) grassland
- Z) rain forest

ANSWER: X) TUNDRA

BONUS

20) GENERAL SCIENCE *Multiple Choice* A parsec is equal to about:

- W) 5 Astronomical Units
- X) 1 million kilometers
- Y) 3 and $\frac{1}{4}$ light years
- Z) 158,000 clicks

ANSWER: Y) 3 AND $\frac{1}{4}$ LIGHT YEARS

TOSS-UP

21) LIFE SCIENCE *Short Answer* In what specific tissue of the common adult house cat are red blood cells primarily produced?

ANSWER: BONE MARROW (ACCEPT: RED MARROW)

BONUS

21) LIFE SCIENCE *Short Answer* What element is most directly involved with the binding of oxygen in the hemoglobin molecule?

ANSWER: IRON

TOSS-UP

22) PHYSICAL SCIENCE *Multiple Choice* Which of the following does water possess that most directly allows it to absorb large amounts of energy with a relatively small change in temperature:

- W) high thermal expansion
- X) high specific heat
- Y) high heat of vaporization
- Z) high latency

ANSWER: X) HIGH SPECIFIC HEAT

BONUS

22) PHYSICAL SCIENCE *Short Answer* Consider a jet engine that is 10,000-times as loud as a certain locomotive. If the jet engine is operating at 100 decibels, how loud is the locomotive, in decibels?

ANSWER: 60

TOSS-UP

23) EARTH SCIENCE *Short Answer* What is the name for the era of the geological time scale that occurs after the Mesozoic and continues to present day?

ANSWER: CENOZOIC

BONUS

23) EARTH SCIENCE *Short Answer* What era of the geological time scale ended with the largest extinction event in Earth's history?

ANSWER: PALEOZOIC

TOSS-UP

24) MATH *Short Answer* Solve the following logarithmic equation for x : $\log 2^{(x+1)} = \log 8$

ANSWER: 2

BONUS

24) MATH *Short Answer* Give the following sum as a single logarithm: $\log_3 10 + \log_3 3$

ANSWER: $\log_3 30$

TOSS-UP

25) GENERAL SCIENCE *Short Answer* Of the following 4 choices, name all that are vitamins:
lysine; lactose; cholesterol; riboflavin

ANSWER: RIBOFLAVIN

BONUS

25) GENERAL SCIENCE *Short Answer* What is the specific name for the type of solar eclipse of the Sun in which the Moon is positioned to block nearly all of the Sun, causing a symmetrical ring of sunlight at maximum eclipse?

ANSWER: ANNULAR