

ASTRONOMY

1) GENERAL SCIENCE *Short Answer* An observer from mid-southern latitudes sees a first quarter Moon. In what phase would the Moon be in the same NORTHERN latitude?

ANSWER: FIRST QUARTER (ACCEPT: SAME)

2) Repeat in B GENERAL SCIENCE *Short Answer* If the Moon appears full in Vienna Switzerland at midnight local time, in what phase will the Moon appear to an observer on the opposite latitude of the Earth on the same day and local time?

ANSWER: FULL (ACCEPT: SAME)

3) GENERAL SCIENCE *Short Answer* Johannes Kepler, used data from what other astronomer of his time to establish his laws of planetary motion?

ANSWER: TYCHO BRAHE

4) GENERAL SCIENCE *Short Answer* During what season of the northern hemisphere does the Earth move the FASTEST in its orbit about the Sun?

ANSWER: WINTER

5) GENERAL SCIENCE *Short Answer* Choosing from first quarter, second quarter, third quarter, or new Moon. In what phase will the Moon be on May 6th 2010 at 4:15 PM?

ANSWER: THIRD QUARTER

6) GENERAL SCIENCE *Short Answer* How many degrees are there between the north and south celestial poles?

ANSWER: 180

7) GENERAL SCIENCE *Short Answer* By words or number, name all of the following 3 choices that were reasons for the New Horizons spacecraft to fly so close to Jupiter:

1) use gravity assist to speed up the spacecraft

2) study the moons of Jupiter

3) study Jupiter's magnetosphere

ANSWER: ALL

8) GENERAL SCIENCE *Multiple Choice* If the Moon has an angular diameter of about one-half of a degree, which of the following is CLOSEST to the angular diameter of the Sun:

W) 0.01 degrees

X) 0.05 degrees

Y) 0.5 degrees

Z) 5.0 degrees

ANSWER: Y) 0.5 DEGREES

9) GENERAL SCIENCE *Multiple Choice* Which of the following is 2010 considered regarding sunspot activity:

W) a sunspot maximum

X) a sunspot minimum

Y) a year or so on its way to a sunspot maximum

Z) a year or so past a sunspot maximum

ANSWER: Y) A YEAR OR SO ON ITS WAY TO A SUNSPOT MAXIMUM

10) GENERAL SCIENCE *Multiple Choice* Which of the following do scientists most often use to predict the magnitude of an upcoming sunspot cycle:

W) changes in Earth's magnetic field

X) an increase in the number of comets

Y) a change in the intrinsic brightness of the Sun

Z) a slight increase in the distance of an astronomical unit

ANSWER: W) CHANGES IN EARTH'S MAGNETIC FIELD

11) GENERAL SCIENCE *Multiple Choice* If a stargazer observing from mid-northern latitudes sees the Moon rising at 6:00 PM, at which of the following times will the Moon most likely rise the next day:

W) 6:20 PM

X) 6:50 PM

Y) 7:40 PM

Z) 8:30 PM

ANSWER: X) 6:50 PM

(Solution: with some variation, on average the Moon rises about 50 minutes later each night)

11b) GENERAL SCIENCE *Multiple Choice*
Which of the following is least likely to occur for a stargazer located at mid-northern latitudes:

- W) Mars as the brightest object in the night sky
- X) Venus within 10 degrees of the Moon
- Y) Mercury in the southern sky at midnight
- Z) Jupiter low in the southwest at twilight

ANSWER: Y) MERCURY IN THE SOUTHERN SKY AT MIDNIGHT

Solution: Mercury being so close to the Sun is never seen far from it

13) GENERAL SCIENCE *Short Answer* What is the common name for what streams off the Sun and causes a comet's tail to point away from the Sun?

ANSWER: SOLAR WIND

14) GENERAL SCIENCE *Short Answer* What commonly used astronomical distance measurement is equal to about 3.26 light years?

ANSWER: PARSEC

15) GENERAL SCIENCE *Multiple Choice*
Which of the following best describes the location of our solar system in the Milky Way galaxy:

- W) at its center
- X) just outside the center
- Y) in one of its spiral arms
- Z) in its halo

ANSWER: Y) IN ONE OF ITS SPIRAL ARMS

16) GENERAL SCIENCE *Short Answer* What star has the greatest angular diameter?

ANSWER: SUN

16b) GENERAL SCIENCE *Multiple Choice*
Which of the following is closest to the time when our Sun will first leave the main sequence:

- W) 40 million years
- X) 400 million years
- Y) 5 billion years
- Z) 50 billion years

ANSWER: Y) 5 BILLION YEARS

17a) GENERAL SCIENCE *Multiple Choice*
Which of the following stages will our Sun enter when it firsts leaves the main sequence:

- W) T-Tauri
- X) blue giant
- Y) red giant
- Z) whit dwarf

ANSWER: Y) RED GIANT

17b) GENERAL SCIENCE *Multiple Choice*
Which of the following is closest to the surface temperature of our Sun when it enters the red giant phase:

- W) 30,000 kelvin
- X) 15,000 kelvin
- Y) 6,000 kelvin
- Z) 3,000 kelvin

ANSWER: Z) 3,000 KELVIN

18) GENERAL SCIENCE *Short Answer*
Through which of the following constellations does the ecliptic pass: Leo; Taurus; Cassiopeia; Aquarius

ANSWER: LEO; TAURUS; AQUARIUS
(Solution: all the signs of the zodiac are on the ecliptic)

19) GENERAL SCIENCE *Short Answer* What is the typical numerical range for albedo values in astronomy?

ANSWER: 0 TO 1

19b) GENERAL SCIENCE *Short Answer*
Which one of the terrestrial planets has the highest albedo?

ANSWER: VENUS

20) GENERAL SCIENCE *Short Answer* Order the following 4 stages from the EARLIEST to the LATEST in the evolution of a star of one solar mass units: red giant; T-tauri; main sequence; white dwarf

ANSWER: T-TAURI; MAIN SEQUENCE; RED GIANT; WHITE DWARF

21) GENERAL SCIENCE *Multiple Choice*
Which of the following is CLOSEST to the surface temperature of the Sun, in kelvin:

- W) 3,000
- X) 4,750
- Y) 5,780
- Z) 7,540

ANSWER: Y) 5,780

22) GENERAL SCIENCE *Multiple Choice*
Most of the stars in our galaxy are:

- W) main sequence stars
- X) white dwarfs
- Y) red dwarfs
- Z) red giants

ANSWER: Y) RED DWARFS

23a) GENERAL SCIENCE *Short Answer*
What is the most common element in the photosphere of the Sun?

ANSWER: HYDROGEN

23b) GENERAL SCIENCE *Short Answer*
What is believed to be the most common element in the core of the Sun?

ANSWER: HELIUM

23) GENERAL SCIENCE *Short Answer* Order the following 3 layers of the Sun from the MOST dense to the LEAST dense: radiative zone; photosphere; core

ANSWER: CORE; RADIATIVE ZONE; PHOTOSPHERE

24a) GENERAL SCIENCE *Multiple Choice*
Which of the following best describes an astronomical unit:

- W) the average distance between the Sun and the Earth
- X) the average distance the Earth travels in one lunar month
- Y) how far the Sun travels in a solar year
- Z) how far light travels in a vacuum in one second

ANSWER: W) THE AVERAGE DISTANCE BETWEEN THE SUN AND THE EARTH

24b) GENERAL SCIENCE *Multiple Choice* If Jupiter is about 5 astronomical units from the Sun and Saturn is about 9 astronomical units from the Sun, about how many astronomical units from the Sun is Neptune:

- W) 15
- X) 20
- Y) 25
- Z) 30

ANSWER: Z) 30

25) GENERAL SCIENCE *Short Answer*
Which one of the solar system's terrestrial planets has the lowest density?

ANSWER: MARS

26) GENERAL SCIENCE *Short Answer* What is the most common name for the largest mirror in a typical Newtonian reflector telescope?

ANSWER: PRIMARY

27) GENERAL SCIENCE *Multiple Choice*
Which of the following telescopes typically has the lowest resolving power:

- W) radio
- X) reflector
- Y) refractor
- Z) x-ray

ANSWER: W) RADIO

28) GENERAL SCIENCE *Short Answer* Name all of the following 3 choices that are radio telescope facilities: The Very Large Array; The Arecibo Observatory; The Keck Observatory

ANSWER: THE VERY LARGE ARRAY; THE ARECIBO OBSERVATORY

29a) GENERAL SCIENCE *Multiple Choice*
Which of the following is closest to the meaning of retrograde as in "retrograde motion of Mars":

- W) faster
- X) slower
- Y) older
- Z) backwards

ANSWER: Z) backwards

29b) GENERAL SCIENCE *Multiple Choice*
Which of the following is the most direct cause of the relatively poor resolution of a radio telescope:

- W) the size of the dish is too difficult to make precisely
- X) the long wavelengths in which they operate
- Y) the interference with the Earth's atmosphere
- Z) interference by the solar wind

ANSWER: X) THE LONG WAVELENGTHS IN WHICH THEY OPERATE

30) GENERAL SCIENCE *Short Answer* What terrestrial planet has the densest atmosphere?

ANSWER: VENUS

31) GENERAL SCIENCE *Short Answer* What was to The lunar Crater Observation and Sensing Satellite mission to the Moon late in 2009 primarily designed to detect?

ANSWER: WATER

32) GENERAL SCIENCE *Multiple Choice*
Which of the following instruments aboard The lunar Crater Observation and Sensing Satellite provided the most definitive evidence for water on the Moon:

- W) spectrometer
- X) photometer
- Y) hydrometer
- Z) gravitometer

ANSWER: W) SPECTROMETER

MEASUREMENTS/STATS/SCIENCE PROCESS

33a) GENERAL SCIENCE *Multiple Choice*
Which of the following is the most common term scientists use for a subset or a part of a population:

- W) sample
- X) variable
- Y) constant
- Z) mode

ANSWER: W) SAMPLE

33b) GENERAL SCIENCE *Multiple Choice*
Which of the following terms best describes the reproducibility of measurements:

- W) accuracy
- X) precision
- Y) quantitative
- Z) qualitative

ANSWER: X) PRECISION

34) GENERAL SCIENCE *Multiple Choice*
Which of the following best describes the location of the mean on a line graph with a bell shaped curve:

- W) the last value on the right side of the bell curve
- X) the lowest value on the left side of the bell curve
- Y) the most common value which is not on any particular spot of the bell curve
- Z) the middle value at the top of the bell curve

ANSWER: Z) THE MIDDLE VALUE AT THE TOP OF THE BELL CURVE

35) GENERAL SCIENCE *Multiple Choice*
Which of the following would be considered a variable in statistics:

- W) the number of days in the week
- X) the number children in a city
- Y) the number of primes between 0 and 100
- Z) the number of protons in a given element

ANSWER: X) THE NUMBER CHILDREN IN A CITY

36) GENERAL SCIENCE *Multiple Choice*
Which of the following is closest to the meaning of inference in statistical inference:

- W) the best guess
- X) to make a conclusion based on evidence
- Y) a random error
- Z) an unproven theory

ANSWER: X) TO MAKE A CONCLUSION BASED ON EVIDENCE

37) GENERAL SCIENCE *Multiple Choice*
Random sampling of a population in a scientific experiment will most directly ensure that the experiment is not subject to:

- W) unexpected outcomes in data
- X) random experimental error
- Y) a non-representative sample population
- Z) misinterpretation

ANSWER: Y) A NON-REPRESENTATIVE SAMPLE POPULATION

38) GENERAL SCIENCE *Multiple Choice*
Which of the following is a double-blind study most often designed to avoid:

- W) random errors
- X) bias
- Y) the need for positive control groups
- Z) the need for large sample populations

ANSWER: X) BIAS

38) GENERAL SCIENCE *Multiple Choice* Ed is tested for a *Staphylococcus* infection and is told there is a 5 % chance of a false negative in the test. This generally means that there is a:

- W) 5% chance he will not become sick
- X) 5% chance that the test will not detect the *Staphylococcus*
- Y) 5% chance that even if he has a *Staphylococcus* infection it will not be detected
- Z) 5% chance that even if he does not have the *Staphylococcus infection* the test will indicate he does

ANSWER: Y) 5% CHANCE THAT EVEN IF HE HAS A *STAPHYLOCOCCUS* INFECTION IT WILL NOT BE DETECTED

39) GENERAL SCIENCE *Multiple Choice*
Which of the following in statistics is the term given to a symmetrical distribution of data around a mean:

- W) normal
- X) single
- Y) skewed
- Z) average

ANSWER: W) NORMAL

40) GENERAL SCIENCE *Short Answer*
Name all of the following 3 choices that will affect the height of a line graph with a normal distribution: range; standard deviation; mean

ANSWER: MEAN

41) GENERAL SCIENCE *Multiple Choice* A scientist collects data on a thousand house cats and finds that every house cat in the study was found to sleep. She concludes that all house cats sleep. This form of logic is best known as:

- W) inductive reasoning
- X) deductive reasoning
- Y) responsive reasoning
- Z) reasoning by reduction

ANSWER: W) INDUCTIVE REASONING

42) GENERAL SCIENCE *Multiple Choice* An internet article has the title “New Experiment Proves Prions Cause Mad Cow Disease”. Which of the following best explains why this statement would not be acceptable to most scientists.

- W) prions have not been shown to cause Mad Cow disease
- X) science is generally unable to prove a hypothesis or inference to be true in all cases
- Y) using the term disease implies prions are organisms
- Z) more than a few studies are needed to prove anything

ANSWER: X) SCIENCE IS GENERALLY UNABLE TO PROVE A HYPOTHESIS OR INFERENCE TO BE TRUE IN ALL CASES

43) GENERAL SCIENCE *Multiple Choice*
Which of the following is per capita data adjusted for:

- W) random errors
- X) population size
- Y) any variation in range of variables
- Z) the unevenness of the shape of the graph

ANSWER: X) POPULATION SIZE

TERMINOLOGY

44) GENERAL SCIENCE *Short Answer* Name all of the following 4 substances that are considered volatile: milk; ether; olive oil; gasoline

ANSWER: ETHER; GASOLINE

29) GENERAL SCIENCE *Multiple Choice* An FM radio has the number 89.5 on its digital readout. This number represents:

- W) millihertz
- X) hertz
- Y) kilohertz
- Z) megahertz

ANSWER: Z) MEGAHERTZ

45) GENERAL SCIENCE *Multiple Choice* Which of the following is closest to the meaning of anthropogenic:

- W) evolution of humans
- X) study of human ancestors
- Y) produced by humans
- Z) toxic to humans

ANSWER: Y) PRODUCED BY HUMANS

46) GENERAL SCIENCE *Short Answer* Name all of the following 4 choices that are considered persistent organic pollutants because they are not readily degraded in nature and often remain in food webs for years: biotin; DDT; dioxin

ANSWER: DDT; DIOXIN

47) GENERAL SCIENCE *Multiple Choice* Which of the following is CLOSEST to the meaning of flux, as in heat flux:

- W) flow
- X) obstruct
- Y) increased
- Z) change

ANSWER: W) FLOW

48) GENERAL SCIENCE *Short Answer* What is the most common translation of the two Greek roots "din" and "saur" in the word dinosaur?

ANSWER: TERRIBLE; LIZARD

49) GENERAL SCIENCE *Short Answer* Sigmund Freud divided the subconscious into what 3 parts?

ANSWER: ID, EGO, SUPEREGO (in any order)

50) GENERAL SCIENCE *Multiple Choice* The circadian rhythm of animals is typically about how many hours:

- W) 1
- X) 12
- Y) 24
- Z) 48

ANSWER: Y) 24

51) GENERAL SCIENCE *Short Answer* What is the common name for the most well-known member of the genus *Allium* cultivated for its widespread and historical use for both culinary and medicinal purposes?

ANSWER: GARLIC

52) GENERAL SCIENCE *Multiple Choice* Which of the following best explains estivation:

- W) predation of a species until extinction
- X) hibernation of animals in the summer to avoid the heat
- Y) removal of harmful wastes
- Z) adoption of a bird of one species by another

ANSWER: X) HIBERNATION OF ANIMALS IN THE SUMMER TO AVOID THE HEAT

53) GENERAL SCIENCE *Multiple Choice* For a large culture and social system to develop, anthropologists generally believe that there must also be:

- W) an advanced medical system based on scientific reasoning
- X) a system of agriculture
- Y) a banking system with a printed form of money
- Z) an organized school system with trained teachers

ANSWER: X) A SYSTEM OF AGRICULTURE

54) GENERAL SCIENCE *Short Answer* What is the most common term for the size of the opening in a camera lens or the size of the primary mirror of a telescope?

ANSWER: APERTURE

55) GENERAL SCIENCE *Short Answer* What is the most common term scientists use for hominids that walked upright on their legs?

ANSWER: BIPEDALISM

56) GENERAL SCIENCE *Multiple Choice* Which of the following is closest to the beginning of the Neolithic age:

- W) 25,500 BC
- X) 19,000 BC
- Y) 9,500 BC
- Z) 2,000 BC

ANSWER: Y) 9,500 BC

57) GENERAL SCIENCE *Multiple Choice* Genetics is a Greek term for:

- W) related to birth
- X) because of parents
- Y) coming from the family
- Z) from life

ANSWER: W) RELATED TO BIRTH

58) GENERAL SCIENCE *Multiple Choice* Which of the following is closest to the meaning of the term prehensile as in "prehensile tail":

- W) fury
- X) primitive
- Y) grasping
- Z) long

ANSWER: Y) GRASPING

59) GENERAL SCIENCE *Multiple Choice* Which of the following does the word labile mean as in the term heat labile:

- W) easily made
- X) easily broken down
- Y) resistant to
- Z) unalterable

ANSWER: X) EASILY BROKEN DOWN

60) GENERAL SCIENCE *Multiple Choice* *Thermus aquaticus* is a famous bacterium from which a widely used heat stable DNA polymerase is derived. *Thermus aquaticus* was first discovered in:

- W) ice cores from Greenland
- X) hospitals as a mutant strain causing skin diseases in
- Y) the geyser basin of Yellowstone National Park
- Z) the Amazon rain forest

ANSWER: Y) THE GEYSER BASIN OF YELLOWSTONE NATIONAL PARK

61) GENERAL SCIENCE *Multiple Choice* Which of the following best describes a fumarole:

- W) a small boulder that has been rolled over great distances by water
- X) a steam vent
- Y) the outside of a nebula
- Z) the first stage in the refinement of crude oil

ANSWER: X) A STEAM VENT

62) GENERAL SCIENCE *Short Answer* What compound is most often noted as the cause of the rotten egg smell at mudpots and hot springs?

ANSWER: HYDROGEN SULFIDE
(ACCEPT: H₂S)

UNITS/CONVERSIONS

63) GENERAL SCIENCE *Short Answer* Order the following 3 units of volume from the SMALLEST to the LARGEST: 3 cc's; 20 micro-liters; 2 milliliters

ANSWER: 20 MICRO-LITERS; 2 MILLILITERS; 3 CC'S

64) GENERAL SCIENCE *Short Answer* Name all of the following 3 choices that are units of measure for magnetic field strength or magnetic flux: tesla; farad; weber

ANSWER: TESLA; WEBER

65) GENERAL SCIENCE *Short Answer* Name the 3 SI base units for length, mass, and time, respectively:

ANSWER: METER; KILOGRAM; SECOND

66) MATH *Short Answer* A string that is 40-feet long is folded in half three times. How many inches long in the folded string?

ANSWER: 60

67) GENERAL SCIENCE *Short Answer* 1×10^8 micrograms equals how many grams?

ANSWER: 100

68) GENERAL SCIENCE *Multiple Choice* Which of the following is CLOSEST to the number of grams in 2 ounces:

- W) 25
- X) 57
- Y) 76
- Z) 91

ANSWER: X) 57

69) GENERAL SCIENCE *Multiple Choice* A nautical mile is approximately equal to how many miles:

- W) 1.15
- X) 1.00
- Y) 0.85
- Z) a nautical mile varies depending on the latitude

ANSWER: X) 1.15

70) GENERAL SCIENCE *Short Answer* What are the boiling points of pure water on the Celsius and kelvin scales respectively, rounded to the nearest whole number?

ANSWER: 100; 373

71) GENERAL SCIENCE *Short Answer* What are the freezing points of pure water on the Fahrenheit and kelvin scales respectively, rounded to the nearest whole number?

ANSWER: 32; 273

72) GENERAL SCIENCE *Short Answer* How many of the following four numbers have 3 significant figures: 6.78; 0.678; 0.0678; 0.00678

ANSWER: 4 (ACCEPT: ALL)

73) GENERAL SCIENCE *Short Answer* Add the following 3 values and give your answer with the correct number of significant figures: $2.30 + 1.231 + 0.018$

ANSWER: 3.55

(Solution: 2.30 has the least number of decimal places)

74) GENERAL SCIENCE *Short Answer* To the nearest whole number, what is the change in degrees going from absolute zero to the absolute temperature at 0°C ?

ANSWER: 273

75) GENERAL SCIENCE *Multiple Choice* A land owner has a surveying map that reads 10 rods along one border of his land. What is this length in feet?

- W) 66
- X) 77
- Y) 120
- Z) 165

ANSWER: Z) 165

76) GENERAL SCIENCE *Short Answer* What is the SI unit for electrical current?

ANSWER: AMPERE (ACCEPT: AMP)

77) GENERAL SCIENCE *Multiple Choice* Which of the following is the name of a SI unit that is defined in absolute terms and not based on another unit:

- W) derived
- X) ultimate
- Y) base
- Z) universal

ANSWER: Y) BASE

78) GENERAL SCIENCE *Short Answer* Name all of the following 4 units that are base SI units; candela; kelvin; ampere; joule

ANSWER: CANDELA; KELVIN; AMPERE

79) GENERAL SCIENCE *Short Answer* What is the SI unit for mass?

ANSWER: KILOGRAM

80) GENERAL SCIENCE *Multiple Choice* Which of the following is how the SI unit of mass is defined:

W) the mass of a platinum-iridium bar located at the International Bureau of weights and measures

X) the mass of 6.23×10^{23} protons

Y) the mass of 6.23×10^{56} hydrogen-1 atoms

Z) the mass of 168 cubic kilometers of interstellar space

ANSWER: W) THE MASS OF A PLATINUM-IRIDIUM BAR LOCATED AT THE INTERNATIONAL BUREAU OF WEIGHTS AND MEASURES

81) GENERAL SCIENCE *Multiple Choice* AM radio stations are typically reported as being broadcast in signal frequencies of:

W) megacycles

X) microhertz

Y) kilohertz

Z) kilovolts

ANSWER: Y) KILOHERTZ

82) GENERAL SCIENCE *Multiple Choice* In navigation, an azimuth of 270° corresponds to which of the following directions:

W) west

X) west-northwest

Y) west-southwest

Z) north-northwest

ANSWER: W) WEST

) GENERAL SCIENCE *Short Answer* How many pounds are in 1 short ton?

ANSWER: 2,000

) GENERAL SCIENCE *Short Answer* How many pounds are in 1 long ton?

ANSWER: 2,240

HEALTH

) GENERAL SCIENCE *Short Answer* From what product produced by flowers is honey primarily made?

ANSWER: NECTAR

) GENERAL SCIENCE *Short Answer* What are the two main monosaccharide in honey?

ANSWER: FRUCTOSE; GLUCOSE

29) GENERAL SCIENCE *Multiple Choice* Which of the following foods when eaten alone will contribute to the largest release of insulin in humans:

W) fried lean beef

X) baked fatty pork

Y) raw celery

Z) boiled white rice

ANSWER: Z) BOILED WHITE RICE

13) GENERAL SCIENCE *Multiple Choice* Which of the following metals would be the most appropriate in which to mount a compass for a ship or boat:

W) stainless steel

X) iron

Y) bronze

Z) chromed steel

ANSWER: Y) BRONZE

11) GENERAL SCIENCE *Multiple Choice* Which of the following was one of the main points of the book *Silent Spring*:

W) climate change and its effect on the world

X) radioactivity and its effects on animals

Y) the life of a deaf person

Z) harmful effects of insecticides on animals and ecosystems

ANSWER: Z) HARMFUL EFFECTS OF INSECTICIDES ON ANIMALS AND ECOSYSTEMS

5) GENERAL SCIENCE *Multiple Choice*
Which of the following vitamins is most likely to cause serious side effects when taken in excessive amounts over a short period:

- W) vitamin A
- X) riboflavin
- Y) vitamin K
- Z) thiamin

ANSWER: W) VITAMIN A

340) GENERAL SCIENCE *Multiple Choice*
Which of the following is a viral infection transmitted by mosquitoes and first detected in the U.S. in 1999:

- W) equine encephalitis
- X) rocky mountain spotted fever
- Y) H1N1
- Z) West Nile virus

ANSWER: Z) WEST NILE VIRUS

386) GENERAL SCIENCE *Short Answer* In humans, what vitamin is most directly involved with the synthesis of the pigment rhodopsin?

ANSWER: VITAMIN A (ACCEPT: A)

) GENERAL SCIENCE *Multiple Choice* Trans fats, which increase the risk of coronary heart disease in humans, are most directly associated with which of the following food additives or food processes:

- W) hydrogenation of oils
- X) rapid freezing
- Y) poor storage
- Z) contamination by fungi

ANSWER: W) HYDROGENATION OF OILS

) GENERAL SCIENCE *Multiple Choice*
Which of the following, until the late twentieth century was largely produced by hydrogenation of corn oil:

- W) polycarbonate plastic
- X) margarine
- Y) artificial sweetener
- Z) no calorie artificial oils

ANSWER: X) MARGARINE

) GENERAL SCIENCE *Short Answer* The bone developmental disease called rickets is caused by a deficiency in what vitamin?

ANSWER: C

) GENERAL SCIENCE *Short Answer* The disease called rickets which was exemplified by poor bone development in humans is most directly related to a deficiency in what vitamin?

ANSWER: D (accept: D-3)

29) GENERAL SCIENCE *Multiple Choice*
Which of the following is the common term for a measure of how quickly different foods cause a rise in blood sugar levels:

- W) SL table
- X) glycemic index
- Y) basal metabolic listing
- Z) BMI

ANSWER: X) GLYCEMIC INDEX

) GENERAL SCIENCE *Short Answer* What is the common name for the substance that corn flower lacks that gives it poor rising capacity that wheat flours have?

ANSWER: GLUTEN

) GENERAL SCIENCE *Multiple Choice*
Which of the following food sources accounts for the majority of calories consumed by humans worldwide:

- W) fats
- X) protein
- Y) carbohydrates
- Z) refined sugars

ANSWER: Y) CARBOHYDRATES

) GENERAL SCIENCE *Short Answer* What is the most common name for the substance from which bees obtain most of their dietary protein?

ANSWER: POLLEN

) GENERAL SCIENCE *Short Answer* What is the most common name for the substance from which bees obtain most of their dietary energy?

ANSWER: NECTAR

29) GENERAL SCIENCE *Multiple Choice*

Which of the following vitamins will be degraded or inactivated the most by boiling in water:

- W) A
- X) C
- Y) E
- Z) Niacin

ANSWER: X) C

) GENERAL SCIENCE *Short Answer* Name all of the following 3 vitamins that are soluble in water: C; E; A

ANSWER: C

) GENERAL SCIENCE *Short Answer* Name all of the following 3 vitamins that are often stored in the human body for days to weeks: C; E; D

ANSWER: E; D

) GENERAL SCIENCE *Short Answer* Name all of the following 3 choices for which sulfur dioxide is commonly used: food preservative; disinfectant; eye drops

ANSWER: FOOD PRESERVATIVE;
DISINFECTANT

TECHNIQUES/INSTRUMENTS

29) GENERAL SCIENCE *Multiple Choice*
The various colors and luster of different metals is most directly caused by differences in:

- W) electron makeup of atoms of the metal
- X) density of the metals
- Y) isotopic makeup of the metals
- Z) speed of incident light

ANSWER: W) ELECTRON MAKEUP OF ATOMS OF THE METAL

15) GENERAL SCIENCE *Multiple Choice*
Which of the following would most commonly be used for accurately dispensing exactly 100 milliliter of water:

- W) a Pyrex 500 milliliter graduated cylinder
- X) a Pyrex 250 milliliter volumetric flask
- Y) a Pyrex 1 ml serological pipet
- Z) a Pyrex 100 milliliter Erlenmeyer flask

ANSWER: W) A PYREX 500 MILLILITER GRADUATED CYLINDER

29) GENERAL SCIENCE *Multiple Choice*

Which of the following was the main purpose for aerial spraying of DDT in U.S. cities in the mid 20th century:

- W) as a crop fertilizer
- X) to eradicate insect pests that fed on wheat
- Y) as a biocide against parasitic worms
- Z) to kill mosquitoes

ANSWER: Z) TO KILL MOSQUITOES

30) GENERAL SCIENCE *Short Answer* What is the common name for the process invented by Louise Pasteur that he used to save the wine crops of France by warming the wine to about 55° C for a few minutes?

ANSWER: PASTEURIZATION

15) GENERAL SCIENCE *Multiple Choice*
Which of the following is the best example of sound reasoning in science:

- W) only those theories that are proven beyond a doubt are scientific laws
- X) only hypotheses that can be proven are considered part of proven scientific theories
- Y) association of a certain event with another is reasonable proof of cause and effect
- Z) scientific theories must be subject to experimental verification

ANSWER: Z) SCIENTIFIC THEORIES MUST BE SUBJECT TO EXPERIMENTAL VERIFICATION

19) GENERAL SCIENCE *Multiple Choice*
Which of the following medical imaging techniques delivers the most ionizing radiation to a typical patient:

- W) MRI
- X) CAT
- Y) Ultrasound
- Z) NMR

ANSWER: X) CAT

20) GENERAL SCIENCE *Short Answer* What human organ is typically most directly examined with an EKG?

ANSWER: HEART

21) GENERAL SCIENCE *Short Answer* What human organ is typically most directly examined with an EEG?

ANSWER: BRAIN

29) GENERAL SCIENCE *Multiple Choice* Which of the following is the health condition called hypertension most directly related to:

- W) bone density
- X) blood pressure
- Y) blood sugar
- Z) dietary protein

ANSWER: X) BLOOD PRESSURE

) GENERAL SCIENCE *Multiple Choice* Which of the following was once named molecule of the year by the journal *Science* and is one of the most important molecules in genetics and molecular biology because of its central role in the Polymerase Chain Reaction:

- W) thermostable DNA polymerase
- X) reverse transcriptase
- Y) ribozyme
- Z) plasmids

ANSWER: W) THERMOSTABLE DNA POLYMERASE

) GENERAL SCIENCE *Short Answer* What is the most common name for the theoretical branch of physics often noted to have been founded by Max Planck that has been extremely successful at accurately predicting and describing the behavior of matter at an atomic and subatomic level?

ANSWER: QUANTUM MECHANICS
(ACCEPT: QUANTUM THEORY)

29) GENERAL SCIENCE *Multiple Choice* Which of the following is the Milankovitch theory most directly involved:

- W) artificial intelligence
- X) climate change
- Y) origin of life

Z) string theory

ANSWER: X) CLIMATE CHANGE

) GENERAL SCIENCE *Short Answer* By words or numbers, name the 2 of the following 4 choices that are primary factors in the Milankovitch cycle:

- 1) Earth's precession
- 2) the solar cycle
- 3) variation in the inclination of the Earth over 41,000 years
- 4) nutation of the Moon

ANSWER: 1; 3

) GENERAL SCIENCE *Short Answer* What lens aberration is most commonly noted as the major drawback in refractor telescopes?

ANSWER: CHROMATIC ABERRATION

29) GENERAL SCIENCE *Multiple Choice* Which of the following is the optical term most commonly used to describe the ability of a telescope or microscope to discern two objects in its field of vision s distinctly separate:

- W) magnification
- X) focal plane
- Y) resolving power
- Z) interference

ANSWER: Y) RESOLVING POWER

) GENERAL SCIENCE *Short Answer* What gas in Earth's atmospheres is most effective at absorbing infrared radiation?

ANSWER: WATER VAPOR (accept: water or H₂O)

) GENERAL SCIENCE *Short Answer* By words or numbers, name all of the following 4 choices that describe approaches used by scientists to employ infrared devices to observe objects in outer space that emit radiation in the infrared:

- 1) high altitude balloons
- 2) high flying jets
- 3) ground based observatories with interferometers
- 4) outer space-based observatories

ANSWER: 1; 2; 4

MATERIALS

) GENERAL SCIENCE *Short Answer* Name all of the following materials that would be considered as made up primarily of long chain hydrocarbons of at least 14 carbons long: bees wax; diamond; lard

ANSWER: BEES WAX; LARD

a) GENERAL SCIENCE *Multiple Choice* Which of the following would steel, and bronze typically be considered:

- W) alloys
- X) elements
- Y) ceramics
- Z) super-cooled liquids

ANSWER: W) ALLOYS

b) GENERAL SCIENCE *Short Answer* Steel is an alloy composed mostly of what two elements?

ANSWER: IRON AND CARBON

) GENERAL SCIENCE *Short Answer* During the refinement of iron from iron ore, what element is functions during the process to remove the oxygen from the iron oxide?

ANSWER: CARBON

) GENERAL SCIENCE *Short Answer* The invention of what substance in the early 1700's that replaced charcoal by the end of the century has been partially credited with enabling the industrial revolution?

ANSWER: COKE

) GENERAL SCIENCE *Short Answer* Order the following 3 lipids from the one with the lowest melting point to the highest: lard; olive oil; bees wax

ANSWER: olive oil; lard; bees wax

) GENERAL SCIENCE *Short Answer* Name all of the following 3 lipids that are made mostly of unsaturated fat: beef fat; corn oil, olive oil

ANSWER: CORN OIL, OLIVE OIL

29) GENERAL SCIENCE *Multiple Choice* Which of the following best describes why gold is more malleable than iron:

- W) gold has a higher atomic mass
- X) gold has more atoms per gram molecular weight than iron
- Y) the bonds among atoms in gold are bonded more weakly than iron atoms in iron
- Z) iron has a smaller electronegativity than gold

ANSWER: Y) THE BONDS AMONG ATOMS IN GOLD ARE BONDED MORE WEAKLY THAN IRON ATOMS IN IRON

) GENERAL SCIENCE *Multiple Choice* Which of the following is TRUE regarding denatured alcohol:

- W) it is another name for 100% methanol
- X) it is the primary component of rubbing alcohol
- Y) it is rendered unfit for human consumption by the addition of toxic substances
- Z) it is a common additive to antifreeze solutions

ANSWER: Y) IT IS RENDERED UNFIT FOR HUMAN CONSUMPTION BY THE ADDITION OF TOXIC SUBSTANCES

) GENERAL SCIENCE *Short Answer* Which two fo the following 4 elements are common constituents of halogen light bulbs: iodine; polonium; bromine; xenon

ANSWER: IODINE; BROMINE

29) GENERAL SCIENCE *Multiple Choice* Which of the following best describes why a common halogen light bulb lasts longer than a normal tungsten filament incandescent light bulb:

- W) halogens in halogen light bulbs help redeposit tungsten onto the filament
- X) the halogen in halogen light bulbs prevents oxidation of tungsten
- Y) halogen gases burn much hotter than tungsten
- Z) halogens in halogen light bulbs combine with oxygen preventing oxidation of the filament

ANSWER: W) HALOGENS IN HALOGEN LIGHT BULBS HELP REDEPOSIT TUNGSTEN ONTO THE FILAMENT

151) GENERAL SCIENCE *Short Answer*
Name all of the following 3 substances that are typically NOT ferromagnetic: brass; copper; cast iron

ANSWER: BRASS; COPPER

154) GENERAL SCIENCE *Multiple Choice*
Some scientists theorize that the bronze age gave way to the iron age because of the difficulties in obtaining what non-native metal:

- W) iron
- X) tin
- Y) copper
- Z) silver

ANSWER: X) TIN

(Solution: Cu is a native element and iron and silver are not typically components of ancient bronze)

164) GENERAL SCIENCE *Multiple Choice*
Which of the following is the primary function of carbon when added to iron in the making of steel:

- W) emulsifying agent
- X) hardening agent
- Y) anti-rusting agent
- Z) increased ductility

ANSWER: X) HARDENING AGENT

) GENERAL SCIENCE *Short Answer* Which one of the following 5 types of trees produces an aromatic wood valued for its use in discouraging moths and used to line blanket chests: long leaf yellow pine; bass wood; hickory; cedar; black walnut

ANSWER: CEDAR

) GENERAL SCIENCE *Short Answer* Name all of the following 4 fabrics that are directly derived from plants: wool; hemp; linen; silk

ANSWER: HEMP; LINEN

) GENERAL SCIENCE *Multiple Choice*
Which of the following is an artificial fiber typically synthesized from pure cellulose:

- W) rayon
- X) acrylic
- Y) polyester
- Z) ramie

ANSWER: W) RAYON

) GENERAL SCIENCE *Short Answer* Name all of the following 3 fibers that are derived from the stalks or stems of plants: linen; cotton; ramie

ANSWER: LINEN; RAMIE

) GENERAL SCIENCE *Short Answer* Name all of the following 4 fibers that are derived from animal sources: angora; jute; cashmere; nylon

ANSWER: ANGORA; CASHMERE

) GENERAL SCIENCE *Short Answer* Name all of the following 3 choices that are commonly used as bleaching agents: hydrogen peroxide; sodium hypochlorite; ammonia

ANSWER: HYDROGEN PEROXIDE; SODIUM HYPOCHLORITE

) GENERAL SCIENCE *Short Answer* What is the molecular formula for quicklime?

ANSWER: CaO

) GENERAL SCIENCE *Multiple Choice*
Refractory materials are:

- W) generally soluble in water room temperature
- X) common catalysts in the production of alloys
- Y) physically and chemically stable at high temperatures
- Z) highly susceptible to thermal shock

ANSWER: Z) HIGHLY SUSCEPTIBLE TO THERMAL SHOCK

ENERGY

29) GENERAL SCIENCE *Multiple Choice*
Which of the following is most of the coal in the USA used for:

- W) production of asphalt and building material
- X) smelting of iron ore and production of steel
- Y) electrical energy production
- Z) conversion into plastics

ANSWER: Y) ELECTRICAL ENERGY PRODUCTION

) GENERAL SCIENCE *Short Answer* What fossil energy accounts for most of the electrical energy produced in the USA?

ANSWER: COAL

) GENERAL SCIENCE *Short Answer* Most of the acid rain in Japan is caused by the burning of what fuel in what country?

ANSWER: COAL in CHINA

) GENERAL SCIENCE *Short Answer* Of the 4 major ranks of coal: anthracite lignite, sub-bituminous, and bituminous: which one has the highest and lowest carbon content by weight respectively?

ANSWER: ANTHRACITE; LIGNITE

) GENERAL SCIENCE *Short Answer* Of the following 4 forms of solid fossil fuels, which one is geologically the youngest: lignite coal; anthracite coal; peat; bituminous coal

ANSWER: PEAT

) GENERAL SCIENCE *Short Answer* What major energy source of fossil fuel burns with releasing the LEAST amount of carbon dioxide in the atmosphere?

ANSWER: NATURAL GAS (ACCEPT: METHANE)

29) GENERAL SCIENCE *Multiple Choice*
Which of the following renewable energy resources accounts for more than 80% of the world's renewable energy output and produces about 15-20% of global electricity:

- W) geothermal
- X) hydropower
- Y) photovoltaics
- Z) wind

ANSWER: X) HYDROPOWER

) GENERAL SCIENCE *Short Answer* Name all of the following 4 energy sources that are generally considered as ultimately derived from the Sun: geothermal; wind; photovoltaics; hydroelectricity:

ANSWER: WIND; PHOTOVOLTAICS; HYDROELECTRICITY

) GENERAL SCIENCE *Short Answer* Which 2 of the following 4 energy sources that are typically considered intermittent energy sources: photovoltaics; nuclear; wind; geothermal

ANSWER: PHOTOVOLTAICS; WIND

) GENERAL SCIENCE *Short Answer* If a biofuel is a liquid fuel derived from plant materials, what is the most common biofuel in the world?

ANSWER: ETHANOL

) GENERAL SCIENCE *Short Answer* What specific process is most commonly used to convert plant sugars into ethanol during the production of ethanol-based biofuel?

ANSWER: FERMENTATION

) GENERAL SCIENCE *Multiple Choice*
Which of the following produces the largest amount of renewable energy used in the U.S.:

- W) solar
- X) wind
- Y) biomass
- Z) geothermal

ANSWER: Y) BIOMASS

) GENERAL SCIENCE *Short Answer* What unit is the most common in the U.S. for comparing the energy content of different fuels?

ANSWER: BRITISH THERMAL UNIT (ACCEPT: BTU)

29) GENERAL SCIENCE *Multiple Choice*
Which of the following is the most confusing unit of measure since the volume or mass that it equals varies among what is contained in that unit:

- W) short ton
- X) barrel
- Y) imperial gallon
- Z) pound

ANSWER: X) BARREL

) GENERAL SCIENCE *Short Answer* Order the following 3 energy sources from the one the accounts for the most energy produced in the U.S. to the least: natural gas; coal; petroleum

ANSWER: COAL; NATURAL GAS; PETROLEUM

29) GENERAL SCIENCE *Multiple Choice*
Which of the following is the largest source of sulfur dioxide emissions in the U.S.:

- W) coal-fired electric power plants
- X) automobile emissions
- Y) smelting of metals
- Z) burning of biomass

ANSWER: W) COAL-FIRED ELECTRIC POWER PLANTS

AGRICULTURE

22) GENERAL SCIENCE *Multiple Choice*
Which of the following foods is most likely to contain small amounts of toxic mold product called aflatoxin:

- W) oysters
- X) peanuts
- Y) beef
- Z) pasteurized milk

ANSWER: X) PEANUTS

) GENERAL SCIENCE *Short Answer* Name all of the following 4 grains that do not contain gluten: wheat; buckwheat; rye; sorghum

ANSWER: BUCKWHEAT; SORGHUM

) GENERAL SCIENCE *Short Answer* What 3 grains by weight account for the large majority of cereal crops of the world?

ANSWER: CORN, RICE AND WHEAT
(accept maize for corn)

) GENERAL SCIENCE *Short Answer* Name all of the following 4 cereal crops that were not grown as food sources in Europe before the 15th century: maize; wheat; barley; rye

ANSWER: MAIZE

) GENERAL SCIENCE *Multiple Choice*
Which of the following accounts for the majority of nitrogen fixation on Earth:

- W) bacterial nitrogen fixation
- X) fungal nitrogen fixation
- Y) lightening
- Z) industrially

ANSWER: W) BACTERIAL NITROGEN FIXATION

) GENERAL SCIENCE *Multiple Choice*
Which of the following is the most commonly noted property of atmospheric nitrogen that makes it inert and difficult to fix into biologically accessible forms:

- W) it can easily form nitric acid when in the presence of water
- X) it has a triple bond
- Y) it is toxic to most organisms
- Z) it is lighter than air

ANSWER: X) IT HAS A TRIPLE BOND

) GENERAL SCIENCE *Short Answer* Name all of the following 4 crops that are often planted as green manures: maize; buckwheat; potatoes; winter rye

ANSWER: BUCKWHEAT; WINTER RYE

) GENERAL SCIENCE *Short Answer* Which two of the following 4 crops typically need the least nitrogen fertilizer: soybeans; maize; peas; wheat

ANSWER: SOYBEANS; PEAS

Solution: these are legumes that fix nitrogen

) GENERAL SCIENCE *Short Answer* A gardener buys a bag of fertilizer labeled 20-10-5. What are the percentages of potassium, nitrogen and phosphorus in the bag respectively?

ANSWER: 5% POTASSIUM; 20% NITROGEN; 10% PHOSPHORUS
SOLUTION: N-P-K label system

ARCHEOLOGY

) GENERAL SCIENCE *Multiple Choice*
Archaeopteryx is best known as:

- W) the first known dinosaur
- X) a primitive bird from the Jurassic period
- Y) a large herbivore that lived in the swamps of the Cretaceous period
- Z) the ancestor to all hominids

ANSWER: X) A PRIMITIVE BIRD FROM THE JURASSIC PERIOD

) GENERAL SCIENCE *Short Answer* What single physical characteristic was the most convincing evidence that Archaeopteryx was a bird?

ANSWER: FEATHERS

62) GENERAL SCIENCE *Short Answer* The oldest fossil remains of hominids have been found in what continent?

ANSWER: AFRICA

) GENERAL SCIENCE *Short Answer* What is the common name for what is now believed to be our closest primate relative?

ANSWER: CHIMPANZEE (ACCEPT: CHIMP)

) GENERAL SCIENCE *Short Answer* Traces of what element in Emeralds is most often the cause of their green color?

ANSWER: CHROMIUM