



NATIONAL Science Bee

The National Science Bee – Varsity/Junior Varsity Division 2019-2020 National Qualifying Exam – B Set Version

NAME: _____ GRADE: _____ (e.g. 8th, 9th, 10th, etc.)

SCHOOL / HOMESCHOOL AFFILIATION: _____

* = Students in 6th- 8th grades are eligible to compete in both JV and Middle School Divisions. Students in 5th grade and younger are eligible to compete in both the JV and Elementary School Divisions. If you are in 8th grade or younger and you qualify for JV Nationals off this Exam, then you are also eligible to compete at Middle School or Elementary School Nationals (depending on your grade) without needing to take another Exam.

Email to report score to: _____ (print neatly!)

Instructions: Print the Correct Answer in the space provided or leave it blank. Write Neatly!!! Correct answers are worth 2 points. Incorrect answers are -1 point. Questions left blank are worth 0 points.

You have 20 minutes to complete this Exam. If you are also taking any other exam(s), you have 40 minutes in which to complete them, and you may do them simultaneously or one after the other.

- _____ 1) A compound that can accept an electron pair from a donor compound is known as what?
A) Lewis acid B) Lewis base C) Brønsted-Lowry acid D) Brønsted-Lowry base
- _____ 2) If a child has parents with type A and type AB blood, which of the following could not be the child's blood type?
A) type A B) type B C) type AB D) type O
- _____ 3) σ -bonds and π -bonds are types of what form of chemical bond?
A) covalent bonds B) metallic bonds C) hydrogen bonds D) ionic bonds
- _____ 4) Which of the following is not considered a simple machine?
A) propeller B) inclined plane C) wedge D) screw
- _____ 5) Cryochemistry is defined as the study of chemical reactions under what conditions?
A) involving elemental metals B) in aqueous solutions
C) in living solutions D) at extreme cold temperatures
- _____ 6) Protons and neutrons are both examples of which subatomic class?
A) quarks B) mesons C) leptons D) baryons
- _____ 7) An icosahedron is a Platonic solid with how many sides?
A) six B) twenty C) twelve D) ten
- _____ 8) Johannes Kepler made significant contributions to what branch of scientific study?
A) calculus B) stoichiometry C) astronomy D) genetics

- _____ 9) Which of the following is an example of an igneous rock?
A) gneiss B) obsidian C) feldspar D) halite
- _____ 10) What piece of laboratory equipment is commonly used in acid-base titrations?
A) burette B) Bunsen burner C) Buchner funnel D) eudiometer
- _____ 11) Antoine Lavoisier is known as the “father of” what modern branch of science?
A) physics B) chemistry C) biology D) astronomy
- _____ 12) Which of the following structures cannot be found in a plant cell?
A) cell wall B) mitochondrion C) lysosome D) nucleus
- _____ 13) Tim Berners-Lee is best known for his creation of what technology?
A) World Wide Web B) Dropbox C) DNS D) Flash animation
- _____ 14) Which bones cannot be found in the human leg?
A) fibia B) tibula C) radius D) femur
- _____ 15) Which of the following chemical elements was discovered in the modern era and has one of the highest resistances to corrosion of any metal?
A) copper B) mercury C) titanium D) arsenic
- _____ 16) Which of the following traits cannot be determined using a Punnett square diagram?
A) blood type B) genetic sex C) hair color D) intelligence
- _____ 17) Which of the following functions is positive in quadrants I and II on a Cartesian graph?
A) cosine B) sine C) tangent D) cotangent
- _____ 18) Which reddish-brown halogen exists as a liquid under standard conditions?
A) fluorine B) chlorine C) bromine D) iodine
- _____ 19) The Mohorovičić discontinuity is the boundary separating the earth’s crust from which of the following?
A) the atmosphere B) the mantle C) the core D) the mesosphere
- _____ 20) Nazca, Scotia, and Sandwich are examples of which of the following?
A) sedimentary rocks B) geologic epochs C) weather systems D) tectonic plates
- _____ 21) The theory that matter could behave like waves was proposed by what physicist?
A) J.J. Thompson B) Louis de Broglie C) Henri Becquerel D) Marie Curie
- _____ 22) Lactose, glucose, and cellulose are all examples of what class of molecule?
A) nucleotides B) carbohydrates C) proteins D) amino acids
- _____ 23) What astronomer is known for describing the rings of Saturn in 1655?
A) William Herschel B) Maria Mitchell C) Christiaan Huygens D) Pierre-Simon Laplace
- _____ 24) The atomic number is equal to the number of what subatomic particles in the atom?
A) protons B) neutrons C) electrons D) photons

- _____ 25) The coldest layer of the atmosphere is on the lower end of which section?
 A) thermosphere B) mesosphere C) troposphere D) stratosphere
- _____ 26) Louis Pasteur was involved in the development of all of the following except:
 A) rabies vaccine B) anthrax vaccine C) germ theory D) penicillin
- _____ 27) All electromagnetic waves in a vacuum have the same:
 A) speed B) wavelength C) frequency D) period
- _____ 28) The positional number system with digits ranging from 0 to 7 is known by what name?
 A) hexadecimal B) octal C) senary D) binary
- _____ 29) An isosceles right triangle with sides of length x have a hypotenuse of what length?
 A) $2x$ B) $x\sqrt{3}$ C) $x\sqrt{2}$ D) x
- _____ 30) A column of air that is in continuous contact with clouds and the ground is known as what?
 A) tornado B) hurricane C) thunderstorm D) meteor shower
- _____ 31) Which of the following properties is not shared by all alkaline earth metals?
 A) toxic to humans when consumed in elemental form
 B) shiny and silvery in appearance
 C) melting point above 500 °C
 D) two valence electrons in the outermost shell
- _____ 32) The amount of current in a circuit can be measured using what device?
 A) voltmeter B) accelerometer C) ohmmeter D) ammeter
- _____ 33) Oxytocin and progesterone are produced by which organ system?
 A) respiratory B) endocrine C) respiratory D) immune
- _____ 34) Which level of biological organization can contain multiple phyla?
 A) kingdom B) class C) order D) species
- _____ 35) Which of the following cannot be determined using a linear function?
 A) x-intercept B) y-intercept C) slope D) vertex
- _____ 36) An area of a circle bounded by two radii and the arc between the radii is known as what?
 A) semicircle B) secant C) segment D) sector
- _____ 37) What mathematical constant is equal to $6.67 \times 10^{-11} \frac{N \cdot m^2}{kg^2}$?
 A) mass of an electron (m_e) B) universal gravitational constant (G)
 C) mass of a proton (m_p) D) Planck's constant (h)
- _____ 38) The frequency of a wavelength is measured in what units?
 A) coulomb B) ampere C) hertz D) electronvolt
- _____ 39) All forms of which shape are geometrically similar?
 A) trapezoids B) ellipses C) triangles D) circles

- _____ 40) Which state of matter conforms to the shape of its container but does not expand to fill the volume of its container?
A) gases B) solids C) liquids D) plasmas
- _____ 41) Which early search engine was acquired by Yahoo! in 2003 and shut down in 2013?
A) AltaVista B) America Online C) Google D) Ask.com
- _____ 42) An angle that measures $3\pi/2$ radians is equal to an angle of how many degrees?
A) 45° B) 180° C) 270° D) 300°
- _____ 43) Which organ listed below does not play a role in the digestive system?
A) liver B) trachea C) pancreas D) esophagus
- _____ 44) Which of the following is an intramolecular interaction?
A) metallic bond B) van der Waals force C) salt bridges D) dihydrogen bond
- _____ 45) Which elementary particle has neither mass nor charge?
A) quarks B) leptons C) photons D) electrons
- _____ 46) The cellular structure responsible for molecular transport is known by what name?
A) vesicle B) centrosome C) cell wall D) nuclear membrane
- _____ 47) What cellular structure is responsible for protein synthesis and can be found on the rough endoplasmic reticulum?
A) ribosome B) cytoskeleton C) centromere D) Golgi body
- _____ 48) Ada Lovelace and Charles Babbage are best known for developing what early computer?
A) UNIVAC B) Harvard Mark I
C) Oslo Analyzer D) Analytical Engine
- _____ 49) Which of the following scientific advances occurred most recently?
A) Mendeleev's periodic table B) Millikan's oil drop experiment
C) Salk's polio vaccine D) Thompson's plum pudding model
- _____ 50) What pair of moons listed below orbit Mars?
A) Pluto and Charon B) Io and Europa
C) Ganymede and Callisto D) Phobos and Deimos