



2023-2024 Regional Finals Study Guide – Blue Question Set

Instructions: This study guide should be your first resource in preparing for the National Science Bee Regional Finals on the Blue Question Set. Most of the facts below are found at some point in the 120 questions that compose the Blue Question Set. Thus we have selected these facts for this study guide to help make your preparation easier and more efficient. Remember that the questions are all short paragraphs on a particular topic, so if a topic is referenced below, then it is a good idea to learn a bit more about it on your own than what is listed here (since additional facts about a topic will also be referenced in the question). It is also helpful to read the introduction of a Wikipedia page on a topic to gain additional historical context about why it is significant. Please also use our past question sets (especially National Science Bee Regional Finals questions from past years) which are found [here](#). Many of the topics that are found in past years' questions will again be found in the questions at this year's Regional Finals, and at the National Championships too. Good luck!

Astronomy

1. [Luminosity](#) is the total amount of light energy that is radiated by a star from its surface.
2. The moon's [Sea of Tranquility](#) was where the astronauts of Apollo 11 landed.
3. Jupiter's innermost moon, [Io](#), is said to be the most volcanically active body in the Solar System, with roughly 400 active volcanoes.
4. When a massive star runs out of nuclear fuel and collapses, and forms a black hole, it emits an explosion called [gamma-ray bursts](#).
5. [Dark energy](#) is an unknown form of energy that is said to account for roughly 70% of the universe's total matter. [Not to be mistaken for dark matter](#), which tends to drive the universe together, dark energy tends to drive the universe apart by speeding up its expansion.
6. Mars has two moons: [Phobos](#) and [Deimos](#).
7. [Asteroids](#) are tiny, rocky objects that orbit the Sun.
8. [Escape velocity](#) is the speed that an object needs to be traveling in order to leave the gravitational field of a celestial body.
9. Our Solar System is located in the [Milky Way](#) galaxy.

Biology

1. [Stem cells](#) are cells that are able to self-renew and develop into different types of cells within the body.
2. [Polymerase chain reaction](#) is a technique used to make rapid copies of DNA segments.
3. [Tuberculosis](#) is an infectious lung disease caused by the bacterium *Mycobacterium tuberculosis*.
4. [Malaria](#) is a disease caused by the *Plasmodium* protozoa, which is transmitted to humans via mosquitos.
5. [Pheromones](#) are a series of chemicals that are used for communication between members of the same species.
6. Kangaroos, opossums, and wombats belong to a group of mammals called [marsupials](#).
7. [Mitosis](#) is a form of cellular division that yields two identical daughter cells.
8. Blood cells are produced by the [bone marrow](#), which is a spongy tissue located in the center of the bone cavity.
9. "[Cold-blooded](#)" animals are animals whose body temperatures are dependent on their external environments, as they cannot generate internal body heat on their own.
10. [Taxonomy](#) is the biological study that deals with the defining and classification of organisms.
11. [Australopithecus](#) is a genus of early hominins that lived during the Pliocene and Early Pleistocene; they are the closest known relatives of the *Homo* genus.
12. Unlike eukaryotes, [prokaryotes](#) lack a nucleus and other membrane-bound organelles.

Chemistry

1. [Calcium](#) is an alkaline Earth metal and an essential mineral needed by the body to maintain strong bones and teeth.

2. [Carbon dioxide](#) is a greenhouse gas that is a natural waste product of human and animal exhalation.
3. [Ozone](#), or trioxygen, is a molecule that is formed naturally in the stratosphere through the interaction of ultraviolet sunlight and molecular oxygen. [Ground-level ozone](#) is an air pollutant that is formed by volatile organic compounds and nitrogen oxides.
4. [Lithium](#) is the lightest solid and metal on the periodic table.
5. A [mixture](#) is the physical combination of two or more pure substances. Air and seawater are examples of mixtures.
6. [Electrons](#) are negatively-charged subatomic particles that are found in the outer shells of the atom.
7. The two major elements that make up the atmosphere are [nitrogen](#) (78%) and [oxygen](#) (21%).

Computer Science

1. The [traveling salesman problem](#) is an algorithmic problem tasked with finding the shortest route between a set of points and locations that must be visited.

Earth Science

1. Seismologists measure the magnitude of an earthquake by using the [Richter scale](#).
2. The process of [upwelling](#) occurs when winds push surface water away from the shore, resulting in deep water being brought to the surface of the ocean.
3. The [polar vortex](#) is an area of cold, low pressure air that encircles both the Earth's polar regions.
4. The last period of the [Cenozoic](#) Era, the [Quaternary](#), spans from 2.58 million years ago to the present.
5. [Lake-effect snow](#) forms when cold air passes over a lake's warmer waters, resulting in the rising of warm air and the formation of clouds and snow.

Math

1. [Factoring](#) is the expression of a number or polynomials into simpler terms.
2. [Probability](#) is a branch of mathematics concerned with the likeliness of an event happening.
3. The [Fibonacci Sequence](#) is a series of numbers formed by adding the two preceding numbers. The sequence begins: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34.

Physics

1. The SI unit of [power](#) is the watt.
2. A seesaw is an example of a [lever](#), which is a simple machine that consists of a beam and fulcrum.
3. [Thermal radiation](#) is one of the fundamental methods of heat transfer in matter. It occurs when the energy from the motion of charged particles like electrons and protons is converted to radiation in the electromagnetic spectrum.
4. [Inertia](#) is the property of an object to resist change in its motion.
5. [Gravity](#) is the "downward" force that pulls objects toward the center of the Earth.

History of Science

1. [Johannes Kepler](#) (1571-1630) published *The Rudolphine Tables*, which was a star catalog based on observational data by [Tycho Brahe](#) (1546-1601).
2. [George Washington Carver](#) (1864-1943) was an agricultural scientist who developed the 300 uses for peanuts.
3. [Rosalind Franklin](#) (1920-1958) was a chemist and X-ray crystallographer who made significant contributions to the understanding of DNA structure.
4. Nicolaus Copernicus' publication of *On the Revolutions of the Heavenly Spheres* is believed to be the catalyst of the [Science Revolution](#).