



## 2022-2023 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. [Sunspots](#) are darker areas on the surface of the Sun that indicate strong magnetic fields.
2. The [ozone layer](#) acts as a barrier, protecting life on Earth from the Sun's ultraviolet rays.
3. [Jupiter](#), the fifth planet from the Sun, is the largest in the solar system.
4. [Fusion](#) powers stars by combining different atomic nuclei in a process also called nucleosynthesis.
5. The [International Space Station](#) is a modular laboratory orbiting the lower regions of Earth's atmosphere.
6. [Voyager](#) was a NASA mission that sent two probes to the edge of the solar system.
7. The [expansion of the universe](#) is a process that involves an increase in distance between different points in the universe.
8. The [Big Dipper](#) is located in the constellation Ursa Major.
9. [Stephen Hawking](#) was an American astronomer who named a type of radiation that is emitted from black holes.
10. [Sirius](#) is the brightest star in the night sky.

### Biology

1. [Pollination](#) is the process of transferring pollen from the anther of a plant to the stigma of another plant.
2. [Fish](#) are a group of common, aquatic animals, many of whom belong to the vertebrate class Osteichthyes.
3. The cell's [nucleus](#) houses its genetic material and is the site of DNA replication and transcription.
4. [Fat tissue](#), also known as adipose, is a type of tissue that stores energy and accumulates in obesity.
5. The [ribosome](#) is an organelle that is the site of protein synthesis within a cell.
6. [Flowers](#) are the reproductive components of angiosperms, plants that contain seed-producing fruits.
7. [Cortisol](#) is a steroid hormone that is produced by the adrenal glands. Cortisol regulates the body's blood sugar, though it is most associated with the stress response.
8. In a [food chain](#), the first trophic level consists of autotrophs, which produce their own food.
9. The [heart](#) consists of four chambers, with the top two chambers called the right and left atria and the lower two chambers called the right and left ventricles.

10. [Neanderthals](#) are an early hominid species that lived in Asia and Europe until 40,000 years ago.
11. Animals that lived in the [Cretaceous period](#) include the Triceratops and the Tyrannosaurus Rex.
12. The [femur](#) is the longest bone in the human body.
13. The [brain](#) is the primary organ of the human body's central nervous system, which processes sensory input. The brain is a complex organ that consists of four lobes that each play a different role in information processing.
14. The [plasma membrane](#) is a double-bilayer structure that controls the movement of materials in and out of the cell.

## Chemistry

1. [Aluminum](#) is one-third the density of steel and has the atomic number 27.
2. [Bleaching](#) is the chemical process of removing natural colors from a product.
3. [Corrosion](#) is the process by which metals deteriorate into an oxidized state, as seen in rust.
4. [Sodium](#) is an alkali metal with the atomic number of 11. The chemical formula for salt is NaCl, meaning it forms by a 1:1 ratio of sodium and chloride ions.
5. [Absolute zero](#) is the lowest possible temperature where atoms of a substance are motionless. It is measured at 0 degrees Kelvin, or -273.15 degrees Celsius or -459.67 degrees Fahrenheit.
6. [Uranium](#) is a silvery-white heavy metal with the atomic number 92.
7. The dots of a [Lewis structure](#) represent the valence electrons of a molecule.
8. The [pH](#) of a substance indicates how acidic or basic it is based on its hydrogen ion concentration.

## Computer Science

1. [Bytes](#) are a unit of memory involved in computing. Bytes can be prefaced with kilo-, mega-, giga-, and others depending on their number.
2. [Cloud storage](#) allows users to store their data on off-site locations.

## Earth Science

1. [Tsunamis](#) are a type of large, destructive wave that can be caused by seismic events.
2. [Quartz](#) is the natural form of silicon dioxide.
3. Silicate rock is the primary component of the [Earth's mantle](#), a region whose upper ductile portion is known as the asthenosphere.
4. [Clouds](#) come in different varieties, including the thin and wispy cirrus clouds and the tall and towering cumulonimbus.
5. The layers of a [rainforest](#) include the emergent, canopy, and understory. Temperate and tropical are two different varieties of rainforest.
6. [Coral reefs](#) are a type of aquatic habitat home to numerous organisms. The largest of these systems is the Great Barrier Reef off the coast of Australia.
7. [Tectonic plates](#) are structures of the Earth, whose movement can cause continental drift.
8. [Iron pyrite](#) is an iron sulfide mineral that is also known as fool's gold due to its lustrous colors.

## Math

1. [Pascal's Triangle](#) is a diagram constructed by its namesake French mathematician in which each number is equal to the sum of the two numbers above.

2. [Independence](#) is a statistical property that describes the condition in which the outcome of one event has no relevance or effect on the outcome of another event.
3. The [sphere](#) is a round three-dimensional shape with no edges.
4. Numbers are said to be [imaginary](#) when the product of their squares is negative.

## Physics

1. [Antimatter](#) is a type of matter whose properties are opposite of the properties of normal atoms.
2. The [atomic number](#) represents the number of protons that an atom contains in its nucleus.
3. [Plasma](#) is a state of matter that consists of a high concentration of charged particles.
4. The [speed of sound](#), also known as Mach-1, is a sonic barrier that creates a sonic boom when crossed.
5. [Friction](#) is a force that opposes motion between two surfaces.
6. [Electrons](#) are particles with a negative charge that orbit the nucleus.
7. [Entropy](#) is the measure of a system's disorder. All systems tend toward entropy, according to the Second Law of Thermodynamics.
8. [Kinetic energy](#) is a type of energy that an object possesses due to its motion. It is usually contrasted with potential energy.