



## 2022-2023 Regional Finals Study Guide – Red Question Set

**Instructions:** This study guide should be your first resource in preparing for the National Science Bee Regional Finals on the Red Question Set. Most of the facts below are found at some point in the 120 questions that compose the Red 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 at: [www.nationalsciencebee.com/practice-resources/](http://www.nationalsciencebee.com/practice-resources/) 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. The gravity of [black holes](#) is so strong that even light can't escape. A black hole is found at the center of the Milky Way galaxy.
2. [Challenger](#) was a NASA space shuttle which exploded during its launch in 1986.
3. The German astrophysicist Johannes Kepler formulated three laws for planetary motion.
4. [Neptune](#) is the eighth and farthest planet from the sun. Its largest moon is Triton.
5. [Pulsars](#) are rapidly rotating neutron stars, whose magnetic poles emit electromagnetic radiation.
6. [Sally Ride](#) was the first American woman to go to space as an astronaut.
7. A [supernova](#) is powerful explosion of a star that gives off an enormous amount of light.
8. [Neil deGrasse Tyson](#) is an American astrophysicist who has been the director the Hayden Planetarium in New York since 1996.
9. [Venus](#), which has a runaway greenhouse effect, is the hottest planet and the second from the Sun.

### Biology

1. Dysentery can be cause by amoebas (pr. uh-MEE-bahs), which are a type of protozoan.
2. Nearly all insects have [antennae](#), which serve as sensors for touch and smell.
3. Cancer is a disease which is characterized by the uncontrollable division of cells.
4. All organisms have a scientific name, which consists of the genus name, followed by the species name. For humans, the scientific name is *Homo sapiens*.
5. Fruit flies (scientific name *Drosophila melanogaster*) are an organism commonly studied by biologists.
6. [Neanderthals](#) (scientific name *Homo neanderthalensis*) are an extinct species which are our closest ancient human relative.
7. [Photosynthesis](#) is the process that happens when plants use energy from sunlight to create food.

## Biology (continued)

8. Parasitism is a symbiotic relationship that occurs between two organisms where one benefits (i.e. the parasite) at the expense of another (i.e. the host).
9. [Proteins](#) are molecules which are composed of amino acids.
10. Protozoans are a loose grouping of single-celled organisms which have a nucleus.
11. [Taiga](#), also known as boreal forests, are subarctic biomes characterized by thick coniferous forests.
12. [Tundra](#) are cold, treeless biomes found mostly north of the taiga, and also on some mountain peaks

## Chemistry

1. [Brass](#) is an alloy formed by copper and zinc, which has high malleability.
2. [Marie Curie](#) is the only person to have won the Nobel Prize in both physics and chemistry.
3. Evaporation is a phase transition in which a liquid turns into a gas.
4. Half-life is the time it takes for fifty percent of a radioactive isotope to decay.
5. Methane, which is an odorless greenhouse gas, is the simplest alkane with chemical formula  $\text{CH}_4$ .
6. The process of Pasteurization, developed by the French biochemist [Louis Pasteur](#), extends the shelf life of dairy products.
7. Tin is a malleable metal and its atomic symbol is Sn.
8. [Zinc](#), whose chemical formula is Zn, forms over 95% of the mass of a US penny coin. Copper provides the rest.

## Computer Science

1. Alan Turing is the namesake of a test used to determine whether an Artificial Intelligence can pass as human.

## Earth Science

1. Acid rain, which is a type of pollution, is a form of precipitation with very low pH levels. It can kill trees.
2. [Geysers](#) are hot springs which eject streams of water above ground.
3. The ocean current known as the [Gulf Stream](#) is largely responsible for the relatively warm temperatures of Western Europe considering its otherwise high latitude.
4. [Magma](#) is molten rock stored underground until it erupts from volcanoes and becomes known as lava.
5. Stalagmites and stalactites are rock formations that are found in caves and are typically made of limestone.

## Math

1. [Archimedes](#) was a Greek mathematician who devised namesake type of "Screw" used to lift water
2. Four is the next highest perfect square number after one, as it is the product of 2 times 2.
3. Quadrilaterals, also known as tetragons, have four sides and have interior angles that sum to 360 degrees.

## Physics

1. The Celsius scale is used to measure temperature in science and is in common usage outside the United States.
2. Current, which is measured in amperes, quantifies the flow of electrical charge through a point.
3. Density is a property of a substance that can be measured by dividing its mass by its volume.
4. [Protons](#) are subatomic particles with a positive charge. Protons and [neutrons](#), which have a neutral charge, are found in the nucleus of an atom. [Electrons](#) have a negative charge and are found in orbitals beyond the nucleus.
5. Quarks are elementary particles that combine to form protons and neutrons.
6. [Refraction](#) is the process in which the direction of a wave changes when entering another medium.
7. Ultraviolet radiation has wavelengths longer than x-rays and shorter than visible light.