

Science Olympiad: Division C Events Listed by QCC

QCC Content Standard

Physical Science

9.1.0 Uses science process skills in laboratory or field investigations including observation, classification, communication, metric measurement, prediction, inference, collecting and analyzing data.

Bottle Rocket

Experimental Design

Mission Possible

Storm The Castle

Tower Building

Wright Stuff

9.1.1 Designs and conducts a scientific experiment that identifies the problem, distinguishes manipulated, responding and controlled variables, collects, analyzes and communicates data, and makes valid inferences and conclusions.

Bottle Rocket

Experimental Design

Mission Possible

Wright Stuff

9.1.2 Evaluates procedures, data and conclusions to determine scientific validity of research.

Bottle Rocket

Experimental Design

9.2.0 Uses traditional reference materials to explore background and historical information regarding a scientific concept.

Bottle Rocket

Mission Possible

Wright Stuff

9.2.1 Uses current technologies such as CD-ROM, Internet and on-line data search to explore current research related to a science concept.

Bottle Rocket

Wright Stuff

9.3.0 Learns and uses on a regular basic standard safety practices for laboratory or field investigations.

Bottle Rocket

Experimental Design

Mission Possible

Storm The Castle

Tower Building

9.3.1 Learns and uses safety procedures specific to an investigation or research activity.

Bottle Rocket

Experimental Design

Mission Possible

Storm The Castle

Tower Building

9.6.0 Identifies chemical or physical changes conceptually in a laboratory setting.

Qualitative Analysis

9.6.1 Differentiates chemical from physical changes in the following laboratory investigations: combustion, fermentation, melting, dissolving, metabolism, boiling, and electrolysis.

Qualitative Analysis

9.10.0 Classifies common chemical reaction types as syntheses, decomposition, or single or double displacement.

Qualitative Analysis

9.10.1 Distinguishes chemical reactions as endothermic and exothermic.

Qualitative Analysis

9.10.2 Writes balanced chemical equations giving names of reactants.

Qualitative Analysis

9.11.1 Describes the importance of organic and biochemical compounds in everyday life.

Polymer Detectives

9.12.0 Analyze different types of energy in terms of sources, limits and uses, and environmental impact.

Mission Possible

9.12.1 Describes some sources and uses of energy such as chemical, thermonuclear, photoelectric, and electromagnetic. etc.

Mission Possible

9.12.2 Describes the law of conservation of energy.

Mission Possible

9.12.4 Identifies and analyzes the nature of heat transfer in the learner's environment and describes and classifies heat transfer as conduction, convection and radiation.

Mission Possible

9.13.0 Identifies gravity as a force that is dependent upon mass and the distance between objects.

Bottle Rocket

Mission Possible

9.13.1 Distinguishes among mechanical, atomic, gravitational, and electromagnetic forces.

Mission Possible

9.13.2 Identifies and measures everyday forces such as gravity, rolling and sliding frictions, and other mechanical forces using common laboratory devices.

Bottle Rocket

Mission Possible

Wright Stuff

9.14.0 Measures and compares relationships among speed, velocity and acceleration.

Bottle Rocket

Mission Possible

Wright Stuff

9.14.1 Describes experimentally the effect of unbalanced forces in overcoming inertia, including the effect of sliding, static and rolling friction.

Bottle Rocket

Mission Possible

Wright Stuff

9.15.1 Calculates the work done by simple machines and compares the force or direction of the force applied.

Wright Stuff

9.16.0 Relates frequency and energy of the electromagnetic spectrum.

Mission Possible

9.16.1 Uses wave and particle theory to describe transmission, absorption, reflection, and refraction of the light in the visible spectrum.

Mission Possible

9.16.2 Experimentally develops how light interacts with lenses, mirrors, prisms, lasers and optical fibers.

Mission Possible

Physics Lab

9.16.3 Relates color to frequency of light.

Mission Possible

9.16.4 Relates frequencies of the electromagnetic spectrum outside the visible range to technological advances (e.g. microwave, radiowave).

Mission Possible

9.17.0 Generates an imbalance of electrical charge and experiment with attraction and repulsion of objects.

Mission Possible

9.17.2 Demonstrates production of electrical charge in a chemical reaction (e.g. simple cell).

Mission Possible

9.17.3 Evaluates different methods of generating electricity such as electric induction or a simple, piezoelectric, thermoelectric or photoelectric cell.

Mission Possible

9.17.4 Builds series and parallel circuits to perform specific tasks.

Mission Possible

9.17.7 Describes the interplay of electric forces as the basis for electric motors, generators, radio, television, computers, and other modern technologies.

Mission Possible

Biology

10.1.0 Uses terms and processes employed in scientific research.

Disease Detectives

Experimental Design

10.1.1 Demonstrate proficiency in the use of science process skills in laboratory and/or field activities involving observation, classification, communication, metric measurement,

prediction, inference, identifying variables, formulating hypotheses, controlling variables, making operational definitions, designing investigations, experimenting, collecting qualitative and/or quantitative data, constructing a data table, graphing, analyzing, and interpreting data and/or drawing conclusions

Designer Genes.

Disease Detectives

Experimental Design

10.1.2 Produces written reports of laboratory and/or field activities in accepted formats and use precise language for presentations of procedure, tables of data, graphs, analytical methods, results, and analyses of error.

Designer Genes

Disease Detectives

Experimental Design

Write It Do It

10.1.3 Uses laboratory equipment to conduct safe and accurate laboratory work.

Designer Genes

Experimental Design

10.2.0 Demonstrates appropriate use of reference sources to access, analyze, evaluate, and present information related to research problems.

Designer Genes

Disease Detectives

10.2.1 Uses media resources such as print, audiovisual, and online services to find information.

Disease Detective

Forestry

Fossils

10.3.0 Explains the significance of biology (e.g., impact on daily life).

Disease Detectives

10.3.1 Defines biology and major divisions (e.g., botany and genetics).

Disease Detectives

10.3.2 Explains the use of biology in daily life.

Disease Detectives

10.4.0 Explains the cellular basis of life.

Cell Biology

10.4.1 Distinguishes between living and nonliving things (e.g., characteristics of living things).

Cell Biology

10.4.2 States the cell theory.

Cell Biology

10.4.3 Differentiates between prokaryotes and eukaryotes.

Cell Biology

10.4.4 Identifies common cell organelles and describe the function of each (e.g. diagrams and microscope examinations).

Cell Biology

10.4.5 Distinguishes between unicellular and multicellular organisms.

Cell Biology

10.5.0 Explains homeostasis and describes the transport of materials through cell membranes.

Cell Biology

10.5.1 Explains the role of homeostasis in maintaining life.

Cell Biology

10.5.2 Cites examples of homeostatic mechanisms in unicellular and multicellular organisms.

Cell Biology

10.5.3 Describes processes whereby substances enter and leave the cell (passive and active transport mechanisms).

Cell Biology

10.5.4 Compare the reaction of plant and animal cells in solutions of different solute concentrations, (e.g., isotonic, hypotonic, and hypertonic solutions).

Cell Biology

10.7.0 Explains the processes of photosynthesis and respiration.

Cell Biology

10.7.1 Diagrams and explains ATP-ADP cycle.

Cell Biology

10.7.2 Lists the reactants, products, and other requirements of photosynthesis.

Cell Biology

10.7.3 Lists the reactants, products, and other requirements of respiration.

Cell Biology

10.8.0 Explains the structure of DNA and RNA and their role in protein synthesis.

Cell Biology

Designer Genes

10.8.1 Describes the double-helix model.

Cell Biology

10.8.2 Summarizes the processes of replication, transcription, and translations.

Cell Biology

10.9.0 Describes the process of cell division.

Cell Biology

10.9.1 Identifies the phases of mitosis.

Cell Biology

10.9.2 Describes the process of cytokinesis.

Cell Biology

10.9.3 States the significance of mitosis to unicellular and multicellular organisms.

Cell Biology

10.9.4 Compares meiosis in sperm and egg formation, (e.g., cell number, cell size, and chromosome number).

Cell Biology

Designer Genes

10.10.0 Explains and uses the basic Mendelian genetic principles.

Designer Genes

10.10.1 Defines important genetic terms.

Designer Genes

10.10.2 Given parental genotypes, predicts the phenotypic, and genotype probabilities of subsequent generations.

Designer Genes

10.11.0 Describes patterns of inheritance and genetic engineering.

Designer Genes

10.11.1 Relates normal patterns of genetic inheritance to genetic variation (e.g., crossing over).

Designer Genes

10.11.2 Relates abnormal patterns of genetic inheritance to genetic disorders and disease (e.g., nondisjunction).

Designer Genes

10.11.3 Lists significant contributions of genetic engineering to agricultural and medical practices.

Designer Genes

10.13.0 Discriminates relationships when using a classification model to group living things.

Forestry

10.13.1 Recognizes and uses the Linnean system of nomenclature as an accepted system of classification.

Forestry

10.13.2 Uses a dichotomous key to classify a variety of living things based on structural similarities and differences in a laboratory setting.

Forestry

10.14.0 Explains the structure and function of viruses.

Cell Biology

10.14.1 Describes the structure of viruses and the manner in which they infect living cells.

Cell Biology

10.14.2 Describes transmission, treatment, and possible prevention so specific viral diseases.

Disease Detectives

10.15.2 Describes common diseases caused by bacteria and their treatments (e.g., streptococcal, infections, pneumonia).

Disease Detectives

10.16.3 Describes the beneficial and harmful effects of protozoa and algae.

Disease Detectives

10.17.2 Explains the beneficial and harmful effects of fungi.

Disease Detectives

10.19.2 Describes the structure and function of roots, stems, leaves, and flowers.

Forestry

10.19.3 Explains the process of sexual and asexual plant reproduction (e.g., pollination, fertilization, germination).

Forestry

10.19.4 Describes the importance of seed plants for food, medicine, and other products

Forestry

10.21.3 Describes the life processes of common organisms in each class of vertebrates (reproduction, response, nutrition, and behavior).

Designer Genes

10.22.0 Analyzes the overall organization of the human body.

Science of Fitness

10.22.1 Describes the basic function of each body system.

Science of Fitness

10.22.2 Explains how the organ systems interact to maintain homeostasis.

Science of Fitness

10.23.0 Describes the anatomy of each system.

Science of Fitness

10.23.1 Identifies the organs and structural parts present in each system (e.g., circulatory: heart, arteries, veins, and capillaries).

Science of Fitness

10.24.0 Describes the physiology of each system.

Science of Fitness

10.24.1 Identifies the function of each structural part in the human body system.

Science of Fitness

10.24.2 Explains how the parts interrelate in a functioning system.

Science of Fitness

Chemistry

11.1.0 Uses science process skills in laboratory or field investigations, including observation, classification, communication, metric measurement, prediction, inference, collecting and analyzing data.

Chemistry Lab

Experimental Design

Mission Possible

Qualitative Analysis

Practical Data Gathering

11.1.1 Designs and conducts a scientific experiment that identifies the problem, distinguishes manipulated, responding, and controlled variables, collects, analyzes and communicates data, and makes valid inferences and conclusions.

Chemistry Lab

Experimental Design

Mission Possible

Practical Data Gathering

11.1.2 Evaluates procedures, data and conclusions to determine the scientific validity of research.

Chemistry Lab

Experimental Design

Practical Data Gathering

Qualitative Analysis

11.2.0 Uses traditional reference materials to explore background and historical information regarding a scientific concept.

Mission Possible

11.2.1 Uses current technologies such as CD-ROM, Internet and online data searches to explore current research related to a science concept.

Mission Possible

11.3.0 Learns and uses on a regular basis standard safety practices for laboratory or field investigations.

Chemistry Lab

Experimental Design

Mission Possible

Polymer Detectives

11.3.1 Learns and uses safety procedures specific to an investigation or research activity.

Chemistry Lab

Experimental Design

Mission Possible

Polymer Detectives

11.8.0 Writes formulas for and names a variety of compounds.

Polymer Detectives

Qualitative Analysis

11.9.0 Classifies four types of chemical reactions.

Chemistry Lab

Qualitative Analysis

11.9.1 Uses the law of conservation of matter and provides standard rules for writing and balancing equations.

Chemistry Lab

Qualitative Analysis

11.9.2 Predicts products of replacement reactions based on relative reactivity of reactants in terms of ionization energy, electronegativity and location in the periodic table.

Chemistry Lab

11.9.3 Classifies products of a reaction as heterogeneous or homogeneous and demonstrates how they may be separated.

Chemistry Lab

11.9.4 Defines the term mole and uses this concept to determine relative amounts of reactants and products in a given equation.

Chemistry Lab

11.9.5 Determines empirical formula of a compound from experimental data.

Chemistry Lab

11.9.6 Provides evidence from an experiment that a chemical reaction has occurred.

Chemistry Lab

Qualitative Analysis

11.9.7 Determines experimentally the percentage by weight or volume of a compound.

Chemistry Lab

11.11.0 Writes formulas for and names a variety of acids, bases and salts.

Qualitative Analysis

11.11.3 Uses experimentally determined pH to calculate hydrogen ion concentrations in solutions.

Qualitative Analysis

11.11.4 Explains the roles of indicators in determining relative pH of a substance.

Qualitative Analysis

11.12.0 Graphically illustrates activation energy, activated complex, reactant, product and reaction rates by means of a potential energy diagram.

Chemistry Lab

11.12.1 Describes the rate and spontaneity of a reaction in terms of free energy, entropy, and enthalpy.

Chemistry Lab

11.12.2 Uses potential energy diagram to predict the rate and extent of a reaction.

Chemistry Lab

11.12.3 Explains the effect of concentration, temperature, pressure, surface area and catalysts on the rate of a reaction.

Chemistry Lab

11.13.0 Defines oxidation and reduction and describes common reactions of each.

Chemistry Lab

11.13.1 Describes compounds as oxidizing or reducing agents.

Chemistry Lab

Mission Possible

11.17.0 Uses the structure of methane as a model structure to draw configurations of and name, representative classes of organic compounds. Discusses the solubility properties of such compounds.

Polymer Detectives

11.17.1 Describes the applications of organic compounds to modern industry, such as pharmaceuticals and plastics industries.

Polymer Detectives

Physics

12.1.0 Demonstrates proficiency in use of science process skills in laboratory and/or field activities that involve observation, classification, communication, metric measurement, prediction, inference, identifying variables, formulating hypotheses, controlling variables, making operational definitions, designing investigations, experimenting, collecting qualitative and quantitative data, constructing data tables, graphing, analyzing and interpreting data and/or drawing conclusions.

Bottle Rocket

Experimental Design

Mission Possible

Physics Lab

Wright Stuff

12.1.1 Produces written reports of laboratory and/or field activities in accepted formats and uses precise language for presentations of procedure, tables of data, graphs, analytical methods, results and analyses or error.

Bottle Rocket

Experimental Design

Physics Lab

Practical Data Gathering

Write It Do It

12.1.2 Conducts safe and accurate laboratory work.

Bottle Rocket

Experimental Design

Mission Possible

Storm The Castle

Tower Building

Wright Stuff

12.1.3 Demonstrates proficiency in the proper use of laboratory equipment.

Bottle Rocket

Experimental Design

Physics Lab

12.1.4 Identifies safety equipment and demonstrates its proper use.

Bottle Rocket

Experimental Design

Mission Possible

Physics Lab

12.2.0 Collects time and distance data on objects in motion such as toy cars, air track, ball rolling down an incline, etc.

Bottle Rocket

Practical Data Gathering

Wright Stuff

12.2.2 Investigates experimentally and solves problems that relate to time, distance, displacement, speed, velocity, and acceleration.

Bottle Rocket

Practical Data Gathering

Wright Stuff

12.2.4 Performs laboratory investigations of free-fall motion.

Bottle Rocket

12.2.6 Constructs and analyzes graphs of various types of motion.

Practical Data Gathering

12.3.0 Explains and apply Newton's three laws of motion.

Bottle Rocket

Mission Possible

Wright Stuff

12.3.1 States and demonstrates the relationship between unbalanced forces and acceleration.

Bottle Rocket

Mission Possible

Storm The Castle

Wright Stuff

12.3.2 Explains Newton's Law of Universal Gravitation.

Bottle Rocket

12.3.3 Investigates experimentally and solves problems that relate gravitational forces, mass, distance, the Universal Gravitation constant and acceleration due to gravity.

Bottle Rocket

12.4.1 Investigates experimentally and solves problems that involve friction forces and the coefficients of static sliding friction.

Mission Possible

12.4.2 Investigates experimentally and solves problems that involve a system of torque-producing forces acting on an object in equilibrium.

Mission Possible

Storm The Castle

12.5.1 Demonstrates the relationship among and solves problems that involve time, angular displacement, torque, rotational inertia, angular velocity, and angular acceleration for bodies in circular and rotary motion.

Mission Possible

12.5.2 Investigates experimentally and solves problems involving the motion of a simple pendulum.

Mission Possible

12.6.0 Investigates experimentally and solves problems relating to work, power, momentum, and impulse.

Mission Possible

12.6.3 Differentiates between potential and kinetic energy.

Mission Possible

12.7.0 Analyzes development of the science and technology of mechanics that affect the quality of life, such as weather satellites, the space program, robots, etc.

Robot Ramble

12.10.1 Distinguished between heat and temperature.

Mission Possible

12.10.2 Investigates experimentally and calculate the quantity of heat needed to produce a specified temperature change in a given substance.

Mission Possible

12.11.3 Relates potential and kinetic energy to their heat equivalents (measures the heat produced by an object falling a given distance).

Mission Possible

12.13.4 Demonstrates the descriptive terms that can be applied to sound waves on a musical instrument such as amplitude, loudness, and quality

Sounds of Music

12.13.6 Makes drawings to illustrate interference of sound waves to produce harmonics and resonance in various types of musical instruments (stringed, open and closed pipes and percussion). .

Sounds of Music

12.14.3 Investigates with laboratory activities and calculations the inverse square relationship between light intensity and distance from the light source.

Mission Possible

12.14.6 investigates reflection with plane and spherical (concave and convex) mirrors in the laboratory.

Physics Lab

12.14.7 Investigates refraction of light in relation to the speed of light in a medium, index of refraction, and angles of incidence and refraction (Snell's Law).

Mission Possible

Physics Lab

12.14.8 Constructs ray diagrams and makes calculations relating to focal length, image distance, object distance, and image magnification for curved mirrors and lenses.

Mission Possible

Physics Lab

12.14.9 Conducts laboratory investigations and calculations of the wavelength of light using a diffraction grating and light source.

Physics Lab

12.14.10 Investigates polarized light using various polarizing filters and substances.

Physics Lab

12.14.11 Demonstrates dispersion of white light into a color spectrum and the addition of primary colors to form white light.

Physics Lab

12.16.0 Investigates electrostatic attraction/repulsion and charge transfer in the laboratory.

Mission Possible

12.21.2 Calculates the relationship between frequency and energy of light waves.

Mission Possible

12.24.0 Analyzes a scientific question to determine specific topic, subtopics, and amount of information needed.

Bottle Rocket

Mission Possible

Practical Data Gathering

12.24.1 Formulates a precise problem.

Experimental Design

Mission Possible

12.24.2 Identifies criteria and alternative approaches to solving the problem.

Bottle Rocket

Experimental Design

12.24.3 Identifies multiples types of sources (e.g., scientific journals, newspapers, directories, audiovisuals, government publications and yearbooks, computer data bases, online resources, and other electronic media) for information on a specific topic.

Bottle Rocket

Experimental Design

12.24.4 Uses appropriate and available retrieval systems (e.g., periodical index, computer resources, glossary, appendix, bibliography, and graphic data) to locate sources.

Bottle Rocket

Experimental Design

12.24.5 Distinguishes between essential and nonessential information on a topic.

Bottle Rocket

Experimental Design

Mission Possible

Practical Data Gathering

12.24.8 Determines the need for currency of data as a criteria in evaluating information.

Practical Data Gathering

12.24.10 Compares and synthesizes information obtained from multiple types of sources.

Bottle Rocket

Mission Possible

Earth Science

13.1.0 Uses science process skills in laboratory or field investigations, including observation, classification, communication, metric measurement, prediction, inference, collecting and analyzing data.

Dynamic Planet
Practical Data Gathering
Remote Sensing

13.1;1 Designs and conducts a scientific experiment that identifies the problem, distinguishes manipulated, responding and controlled variables, collects, analyzes and communicates data, and makes valid inferences and conclusions.

Dynamic Planet
Practical Data Gathering
Remote Sensing

13.1.2 Evaluates procedures, data and conclusions to determine the scientific validity of research.

Dynamic Planet
Practical Data Gathering
Remote Sensing

13.2.0 Uses traditional reference materials to explore background and historical information regarding a scientific concept.

Practical Data Gathering

13.2.1 Uses current technologies such as CD-ROM, Internet and on-line data search to explore current research related to a science concept.

Practical Data Gathering

13.5.1 Summarizes the type of information that can be obtained from a variety of maps.

Dynamic Planet

Remote Sensing

13.5.3 Demonstrates the use of models of the earth to locate points on the earth's surface.

Remote Sensing

13.5.4 Demonstrates the use of topographic maps to examine surface features.

Dynamic Planet

Remote Sensing

13.5.5 Describes how topographic maps are made from aerial and satellite photographs.

Remote Sensing

13.5.6 Identifies mean sea level as the point to which all topographic heights and oceanic depths are referenced.

Remote Sensing

13.5.7 Relates the importance of accurate, current, geological and topographical information to urban planning.

Remote Sensing

13.12.3 Distinguishes among the various types of precipitation with respect to both type and origin.

Dynamic Planet

13.13.3 Collects data related to weather forecasting.

Practical Data Gathering

13.13.4 Identifies and compares various methods of heat transfer.

Mission Possible

13.14.1 Analyzes the relationship between slope and velocity of runoff.

Dynamic Planet

13.14.4 Explains the cause of flooding.

Dynamic Planet

13.14.5 Evaluates the economic impact of flooding.

Dynamic Planet

13.14.6 Analyzes the impact people have on the existence of fresh water bodies.

Remote Sensing

13.16.5 Analyzes the relationship between erosion and gravity.

Dynamic Planet

13.16.6 Evaluates the effectiveness of each of the agents of erosion.

Dynamic Planet

13.16.7 Describes the appearance of topography influenced by each of the agents of erosion.

Dynamic Planet

13.16.8 Investigates the relationships among slope, velocity and load.

Dynamic Planet

13.16.9 Investigates stream development.

Dynamic Planet

13.16.10 Evaluates the economic impact of weathering and erosion.

Dynamic Planet

13.22.1 Analyzes the ways that fossils form.

Fossils

13.22.2 Models and interprets fossil casts.

Fossils

13.22.3 Explains how fossils are used to classify sedimentary rocks.

Fossils

13.22.4 Describes how rock strata are matched by fossil and rock types.

Fossils

13.22.5 Infers past conditions of an area by interpreting the fossil history of that area

Fossils

13.22.6 Observes species variation in fossil record as an explanation of the changes in organisms over time.

Fossils

13.22.7 Evaluates the economic impact of the technology of fossil correlation on the coal, petroleum and other mineral industries.

Fossils

13.25.2 Estimates the number of stars that can be seen by the unaided eye and identifies factors that affect this number.

Astronomy

13.25.4 Describes methods of measuring distance and obtaining information about the composition of stars.

Astronomy

13.25.5 Plots and interprets a Hertzsprung-Russell diagram.

Astronomy

13.26.2 Compares and contrasts the Milky Way to other galaxies.

Astronomy