

Course Syllabus

Science, Chemistry

Morgan County Curriculum 4.1 High School, Final
Morgan County School District

Students are assessed in Science through the Commonwealth Assessment Testing System (CATS).

The Kentucky Core Content Test (KCCT) in science is given in grade 11 and consists of 38 Multiple-Choice and five (5) Open Response items. The scientific content standards at the high school level are organized around seven "Big Ideas" that are important to the discipline of science. These big ideas are: Structure and Transformation of Matter, Motion and Forces, The Earth and the Universe, Unity and Diversity, Biological Change, Energy Transformations and Interdependence.

Eleventh grade students will also take the American College Test (ACT). The ACT assesses students' general educational development and their ability to complete college-level work. The Science section of the ACT contains 40 Multiple-Choice questions dealing with the following: The Science Reasoning section has seven passages, each of which is followed by five to seven questions. The passages cover material drawn from biology, chemistry, physics, and the physical sciences (including geology, astronomy, and meteorology). All of the passages fall within three basic formats: Data Representation (38%), Experimental Reasoning (45%), and Conflicting Viewpoints (17%). The questions test one's ability to interpret scientific data and fall into three categories: Understanding, Analysis, Generalization.

Tenth grade students will take the PLAN, a curriculum-based assessment program developed by the American College Testing Program (ACT) to help students plan their academic careers and prepare for entry into college or the world of work. The test consists of 30 Multiple-Choice Questions dealing with biology, chemistry, earth/space science and physics content.

Upon reviewing assessment results, the Morgan County High School will help the student and parent to determine what courses their child needs to take during their high school career, utilizing the Individual Learning Plan (ILP)

Physical Science (25%)

- 1.1.1 (DOK 2) ASSESSED
The learner will be able to classify or make generalizations about elements from data of observed patterns in atomic structure and/or position on the periodic table. (The periodic table is a consequence of the repeating pattern of outermost electrons.)
- 1.1.2 (DOK) Supporting
The learner will be able to understand that the atom's nucleus is composed of protons and neutrons that are much more massive than electrons; When an element has atoms that differ in the number of neutrons, these atoms are called different isotopes of the element.
- 1.1.3 (DOK) Supporting
The learner will be able to understand that solids, liquids, and gases differ in the distances between molecules or atoms and therefore the energy that binds them together. In solids, the structure is nearly rigid; in liquids, molecules or atoms move around each other but do not move apart; and in gases, molecules or atoms move almost independently of each other and are relatively far apart.
- 1.1.4 (DOK) Supporting
The learner will be able to understand that in conducting materials, electrons flow easily; whereas, in insulating materials, they can hardly flow at all. Semiconducting materials have intermediate behavior. At low temperatures, some materials become superconductors and offer no resistance to the flow of electrons.
- 1.1.5 (DOK 2) ASSESSED
The learner will be able to explain the role of intermolecular or intramolecular interactions on the physical properties (solubility, density, polarity, boiling/melting points) of compounds. The physical properties of compounds reflect the nature of the interactions among molecules. These interactions are determined by the structure of the molecular including the constituent atoms.

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■ 1.1.6 (DOK 3) ASSESSED

The learner will be able to identify variables that affect reaction rates; Predict effects of changes in variables (concentration, temperature, properties of reactants, surface area, and catalysts) based on evidence/data from chemical reactions. Rates of chemical reactions vary. Reaction rates depend on concentration, temperature, and properties of reactants. Catalysts speed up chemical reactions.

■ 1.1.7 (DOK 2) ASSESSED

The learner will be able to construct diagrams to illustrate ionic or covalent bonding; Predict compound formation and bond type as either ionic or covalent (polar, nonpolar). Bonds between atoms are created when outer electrons are paired by being transferred (ionic) or shared (covalent). A compound is formed when two or more kinds of atoms bind together chemically.

■ 1.1.8 (DOK 3) ASSESSED

The learner will be able to explain the importance of chemical reactions in a real world context; Justify conclusions using evidence/data from chemical reactions. Chemical reactions (e.g., acids and bases, oxidation, rusting, tarnishing) occur all around us and in every cell in our bodies. These reactions may release or absorb energy.

Earth/Space Science (16%)

■ 2.3.5 (DOK 2) ASSESSED

The learner will be able to explain the difference between alpha and beta decay, fission, and fusion; Identify the relationship between nuclear reactions and energy. (Nuclear reactions convert a fraction of the mass of interacting particles into energy, and they can release much greater amounts of energy than atomic interactions. Fission (alpha and beta decay) is the splitting of a large nucleus into smaller pieces. Fusion is the joining of two nuclei at extremely high temperature and pressure. Fusion is the process responsible for the energy of the Sun and other stars.).

■ 2.3.6 (DOK) Supporting

The learner will be able to understand that the forces that hold the nucleus together, at nuclear distances, are usually stronger than the forces that would make it fly apart.

Unifying Ideas (34%)

■ 4.6.1 (DOK 3) ASSESSED

The learner will be able to explain the relationships and connections between matter, energy, living systems, and the physical environment; Give examples of conservation of matter and energy. (As matter and energy flow through different organizational levels (e.g., cells, organs, organisms, communities) and between living systems and the physical environment, chemical elements are recombined in different ways. Each recombination results in storage and dissipation of energy into the environment as heat. Matter and energy are conserved in each change.

■ 4.6.2 (DOK 3)

The learner will be able to predict wave behavior and energy transfer: Apply knowledge of waves to real life phenomena/investigations. (Waves, including sound and seismic waves, waves on water, and electromagnetic waves, can transfer energy when they interact with matter. Apparent changes in frequency can provide information about relative motion.

■ 4.6.3 (DOK) Supporting

The learner will be able to understand that electromagnetic waves, including radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, x-rays, and gamma rays, result when a charged object is accelerated.

■ 4.6.6 (DOK) Supporting

The learner will be able to understand that heat is the manifestation of the random motion and vibrations of atoms.