

Course Syllabus

Science, Grade 8

Grade 8 Science, Final
Guardian Angels School

The ITBS Form A for science measures the skills and achievement of students.

The MEAP assesses student progress in Science.

The Science performance standards are built upon the National Research Council's "National Science Education Standards" (1996) and the American Association for the Advancement of Science's Project 2061 "Benchmarks for Science Literacy" (1993).

Science is a way of making sense of the natural world. Scientists seek to describe its complexity, to explain its systems and events, and to find the patterns that allow for predictions. Science is the basis for the design of technologies that solve real world problems.

Not all students will become scientists or engineers. But science and technology occupy ever-expanding places in our everyday lives. As citizens, we are asked to make decisions about social issues that involve science and technology. As workers, we have occupations that increasingly involve science and technology. In the 21st century, adults will need to be comfortable and competent in a complex, scientific and technological world. Schools have the responsibility of preparing students for the future. Schools must prepare all students -- regardless of their future aspirations -- to be scientifically literate.

Therefore, all graduates of our schools should be:

*knowledgable about the important concepts and theories of the three major branches of scientific study: earth, life, and physical sciences;

*able to think scientifically and use scientific knowledge to make decisions about real world problems;

*able to construct new knowledge for themselves through research, reading, and discussion;

*familiar with the natural world, and respectful of its unity, diversity, and fragility;

*able to make informed judgments on statements and

debates claiming to have a scientific basis; and,

*able to reflect in an informed way on the role of science in human affairs.

To make this happen, education needs to:

1. emphasize understanding, not content coverage;
2. promote learning that is useful and relevant;
3. emphasize scientific literacy for ALL students; and,
4. promote interdisciplinary learning.

The "Michigan Content Standards and Benchmarks" describe three broad categories of activities that are common in scientifically literate individuals: using scientific knowledge; constructing new scientific knowledge, and reflecting o knowledge. The content strands are directly related to these types of activities.

The New Standards for Science provide Performance Standards for students in grades 5-8.

The Michigan Science Curriculum Framework provides standards and benchmarks for students in grades 6-8.

The MEAP assesses student performance in science at grade eight.

The ITBS Form A for science measures the skills and achievement of students in eighth grade.

Physical Science

The Physical Science unit includes concepts related to matter, forces, motion, and energy, as well as their interactions. Topics include chemical and physical changes, electricity, magnetism, heat, light, sound, machines, work and power.

- The learner will be able to qualitatively explain and compare two-dimensional motion.
- The learner will be able to measure objects.

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- The learner will be able to use mass, volume, and density to describe objects.
- The learner will be able to use mass, volume, and density to compare objects.
- The learner will be able to classify substances as elements, compounds or mixtures.
- The learner will be able to justify the categorization of elements, compounds, and mixtures based on atoms and molecules.
- The learner will be able to explain changes in matter.
- The learner will be able to explain how matter changes due to organisms.
- The learner will be able to explain how matter changes due to technology.
- The learner will be able to describe how observable matter alterations are associated with molecules and atoms.
- The learner will be able to investigate alterations in matter.
- The learner will be able to analyze alterations in matter.
- The learner will be able to explain the forces put into effect by magnets, electrically charged objects, and gravity.
- The learner will be able to describe how objects move.
- The learner will be able to associate an object's motion to two-dimensional unbalanced forces.
- The learner will be able to explain color.
- The learner will be able to describe shadows and other light phenomena.
- The learner will be able to explain sounds.
- The learner will be able to describe how electrical devices function while using instructions and proper safety precautions.
- The learner will be able to explore electrical devices.
- The learner will be able to explain how energy is transformed by technology.
- The learner will be able to explain typical energy transformations in daily scenarios.
- The learner will be able to associate energy transformations with motion.
- The learner will be able to describe how changes in matter and energy are related.
- The learner will be able to describe how basic circuits function based on current flow.
- The learner will be able to build basic electrical circuits.
- The learner will be able to explain typical physical changes of matter including evaporation.
- The learner will be able to explain typical physical changes in matter including condensation, sublimation, thermal expansion and contraction.
- The learner will be able to describe the ways that the motion of objects can be controlled.
- The learner will be able to show the ways that the motion of objects can be controlled.
- The learner will be able to describe when the properties of objects or substances can be properly explained by length, mass, weight, density, area, volume, or temperature.
- The learner will be able to explain how echoes are produced.
- The learner will be able to explain how echoes are used.
- The learner will be able to explain sound waves.
- The learner will be able to explain how sounds travel through various media.
- The learner will be able to describe how matter interacts with electricity and magnetism.

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- The learner will be able to describe the uses of electric currents creating magnetic fields.
- The learner will be able to create magnetic fields using electric currents.
- The learner will be able to utilize electrophoresis to separate molecules.
- The learner will be able to explain how light interacts with various materials.
- The learner will be able to describe how light is necessary to view objects.
- The learner will be able to describe how the molecules in solids, liquids, and gases are arranged.
- The learner will be able to describe the motion of molecules in solids, liquids, and gases.
- The learner will be able to use the properties of reactants and products to describe chemical changes.
- The learner will be able to explain the transfer of energy through waves.
- The learner will be able to understand the transfer of energy.
- The learner will be able to describe the way that vibrations transfer energy.
- The learner will be able to understand forces and motion.
- The learner will be able to plan methods for moving objects using forces, including the application of simple machines.
- The learner will be able to explain physical changes in the arrangement and motion of atoms and molecules.
- The learner will be able to describe the motion of vibrating objects.
- The learner will be able to measure vibrations.
- The learner will be able to explain waves.
- The learner will be able to measure waves.
- The learner will be able to understand the properties of matter and how those properties change.
- The learner will be able to describe the reasons objects move in particular ways.
- The learner will be able to associate energy with motion.
- The learner will be able to identify the different types of energy.
- The learner will be able to explain various types of energy.
- The learner will be able to describe how mechanical waves transfer energy.
- The learner will be able to discriminate between chemical and physical changes in systems, both natural and technological.
- The learner will be able to describe the flow of electrons in simple electrical circuits.
- The learner will be able to describe energy and its many forms: mechanical, heat, light, sound, electrical, magnetic, chemical, nuclear, and food energy.
- The learner will be able to explain how energy is transmitted through waves.
- The learner will be able to develop strategies for moving objects through the application of forces, including the utilization of simple machines.
- The learner will be able to associate changes in speed and/or direction to unbalanced forces in two-dimensions.
- The learner will be able to describe light absorption, reflection, transmission, and refraction by objects or media.
- The learner will be able to explain how light is used to help humans see.

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- The learner will be able to describe physical changes in materials (evaporation, condensation, thermal expansion, and contraction).
- The learner will be able to apply an understanding of changes of matter.
- The learner will be able to describe matter in terms of atoms bonding together to form molecules.
- The learner will be able to describe when it is appropriate to use the length, mass, weight, area or volume to describe an object's size.
- The learner will be able to measure the physical characteristics of objects or substances.
- The learner will be able to describe when it is appropriate to use the length, mass, weight, area or volume to describe the amount of a substance.
- The learner will be able to qualitatively describe and compare three-dimensional motion.
- The learner will be able to have a comprehension of mechanics.
- The learner will be able to acquire an awareness of and sensitivity to the natural world.
- The learner will be able to communicate information and ideas individually and in a group.
- The learner will be able to describe a scientific procedure or concept to other students.
- The learner will be able to identify sources of bias in data.
- The learner will be able to use scientific evidence to reach explanations.
- The learner will be able to use scientific evidence to develop descriptions.
- The learner will be able to use scientific evidence to develop models.
- The learner will be able to give evidence to defend an argument.
- The learner will be able to identify alternative explanations.
- The learner will be able to propose alternative explanations for data.
- The learner will be able to consider alternative explanations.
- The learner will be able to analyze alternative explanations.
- The learner will be able to judge alternative explanations.
- The learner will be able to express findings of explorations using suitable technology.
- The learner will be able to utilize informational sources that support scientific explorations.
- The learner will be able to plan a scientific investigation.
- The learner will be able to use observation skills to develop scientific questions about the world.

Research and Inquiry

The Research and Inquiry unit focuses on the knowledge, processes, and real world issues associated with science and technology. Topics include experimentation, data analysis, science related careers, and technological advances.

- The learner will be able to describe or analyze an observation using information and previous knowledge.
- The learner will be able to utilize tools and technology to directly, indirectly and remotely measure and observe objects, organisms and events.
- The learner will be able to recognize or control variables in an investigational and non-investigational research setting.
- The learner will be able to find, recognize and utilize a large variety of relevant data to form conclusions in a research project.

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- The learner will be able to pose questions to find out cause and effect.
- The learner will be able to communicate results utilizing various media.
- The learner will be able to analyze claims to determine their scientific merit.
- The learner will be able to evaluate the strengths and weaknesses of an argument, claim, or scientific data.
- The learner will be able to describe the composition of their surroundings.
- The learner will be able to utilize appropriate math to collect data.
- The learner will be able to utilize appropriate math to analyze data.
- The learner will be able to identify a problem.
- The learner will be able to implement a proposed solution to a problem.
- The learner will be able to suggest a solution to a problem.
- The learner will be able to comprehend the fundamental concepts, principles, and facts of science.
- The learner will be able to describe how science and other ways of comprehension are related.
- The learner will be able to learn from books and additional information sources.
- The learner will be able to critique materials that have been published.
- The learner will be able to comprehend the impacts of technology.
- The learner will be able to demonstrate how our society is affected by science and technology.
- The learner will be able to explain limits in personal knowledge.
- The learner will be able to differentiate between fact and opinion.
- The learner will be able to comprehend the most pertinent ideas and principles of science that affect society.
- The learner will be able to comprehend how science and technology both create useful interactions between the natural and designed worlds.
- The learner will be able to recognize significant contributions of individuals and groups from different cultures to science and technology.
- The learner will be able to demonstrate how math, science and technology apply in real world scenarios.
- The learner will be able to follow procedures in the form of step-by-step instructions, formulas, flow diagrams, and sketches.
- The learner will be able to create plans to utilize in learning activities.
- The learner will be able to develop procedures in the form of step-by-step instructions, formulas, flow diagrams, and sketches.
- The learner will be able to utilize metric measurement tools to provide consistency during an exploration.
- The learner will be able to judge the accuracy, design and results of explorations.
- The learner will be able to conduct investigations in various locations.
- The learner will be able to utilize suitable science equipment for an exploration.
- The learner will be able to perform a scientific investigation.
- The learner will be able to perform controlled investigations or simulations to test hypotheses.
- The learner will be able to describe how scientists decide what is considered scientific knowledge.

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- The learner will be able to describe the benefits and consequences of technology.
- The learner will be able to utilize technologies to store data.
- The learner will be able to utilize technologies to record data.
- The learner will be able to gather scientific data from a variety of sources.
- The learner will be able to gather data with a partner or in a small group.
- The learner will be able to create representations of data in a variety of forms.
- The learner will be able to communicate in a manner appropriate to the purpose and audience.
- The learner will be able to explore toys and/or simple appliances and use instructions and suitable safety precautions to explain how they work.
- The learner will be able to use various resources to solve problems.
- The learner will be able to identify the additions to science that individuals from a variety of backgrounds have contributed.
- The learner will be able to explain potential risks and benefits of introducing a new technology.
- The learner will be able to comprehend that analysis and interpretation are components of scientific inquiry.
- The learner will be able to understand methods of scientific inquiry.
- The learner will be able to understand the skills required to do scientific inquiry.