Science

Oak Middle School science program has as its goal the achievement of scientific literacy for all students.

The program strives to provide all students with the scientific experiences that are appropriate to their cognitive stages of development, that build confidence, and serve as a foundation for more advanced ideas that prepare them for life in an increasingly complex scientific world.

The science courses are aligned with the Massachusetts Science and Technology Curriculum Frameworks (October, 2006). The frameworks address science concepts in the four major strands: earth and space science, life science, physical science and technology/engineering. Teachers and curriculum specialists continue to work together to integrate science and technology and make connections to the mathematics curriculum whenever possible.

Problem solving skills and science process skills are continually reinforced. Students develop knowledge and gain experience so that they can be successful in high school lab science courses. Students enhance and develop their skills in using scientific equipment to make measurements and collect data.

The Oak Middle School Science Program…

- piques student's curiosity by making connections to student's prior knowledge
- structures laboratory investigations as student-driven inquiry-based lessons that frequently ask open-ended questions
- helps develop habits of mind that emphasize a respect for evidence, persistence, open-mindedness and an awareness of the effects of our actions on our surroundings
- makes connections with student's "real-world" experiences of science and technology

Grade 7 Standards and Units

Standards:

- Understands and applies the process of scientific inquiry
- Identifies the characteristics of living things
- Applies understanding of the diversity & complexity of life

The Science curriculum focuses on different aspects of life sciences

- Trimester 1 - Cells and Human Body Systems
- Trimester 2 - Genetics and Evolution & Biodiversity
- Trimester 3 - Classification and Ecological Relationships

Characteristics of Living Things:

- Understand the six characteristics of living things
- Distinguish between unicellular v. multi-cellular organisms
- Recognize the relationship between stimulus v. response
- Describe the four basic needs of living things
- Understand the difference between autotrophs and heterotrophs
- Recognize the differences between living, nonliving and dead
- Identify the life processes involved in metabolism
- Understand that respiration is the process by which living things burn fuel to produce energy for life
- Recognize the difference between sexual and asexual reproduction - genetic variability and evolutionary advantage

Human Body Systems:

- Understand that body systems work together to meet the organism's needs
- Connect general functions of human body systems with their names
- Recognize and classify the MAJOR organs of the body
- Describe the levels of organization of a multi-cellular organism

Cells:

- Understand that all living things are made of cells, from single cells to millions of cells
- Recognize that animal cells differ from plant cells - plant cells contain chloroplasts and cell walls
- Understand that cells are the basic unit of life, and carry out all of the basic functions of living things
- Recognize that cells can come only from other cells
- Identify specific organelle function (8 major ones)
    - Cell Wall, Cell Membrane, Cytoplasm, Nucleus, Ribosomes, Vacuoles, Mitochondria, Chloroplasts

Genetics

- Understand that every living thing has a set of instructions, stored in chromosomes, which specify its traits
- Recognize that these instructions can be passed from one generation to another through heredity
- Understand that parts of chromosomes that "code" for a particular trait are called genes; humans have about 30,000 genes on 23 different chromosomes
- Distinguish between sexual and asexual reproduction - sexual reproduction means

two sets of genes, asexual reproduction means one set of genes

Evolution:

- Provide examples of genetic variation and environment causing evolutionary change
- Understand that the theory of evolution came from evidence of modern and ancient comparative anatomy
- Relate extinction to the failure of a species to adapt to its environment

Classification:

- Define characteristics for each kingdom
- Give examples of organisms from each kingdom
- Classify organisms by kingdom recognizing the following:
    - Prokaryote v. Eukaryote
    - Autotroph v. Heterotroph
    - Uni-cellular v Multi-cellular
- Understand the levels of classification for organisms (DKPCOFGS)

Ecology:

- Relate ecology to the relationships between living and non-living things in an environment
- Compare ecosystems, communities, populations and habitats
- Distinguish among producers, consumers, and decomposers
- Describe food chains and food webs
- Discuss cycles in nature (energy, water and succession)
- Explain why balance is important in an ecosystem
- Describe how human activities can change the balance of an ecosystem through the discussion of conservation issues
- Describe the process of photosynthesis

Grade 8 Standards and Units

Trimester 1 Standards:

- Understands the properties of matter
- Relates atoms and molecules to elements and compounds
- Understands and applies the process of scientific inquiry

Trimester 2 Standard

- Differentiates between physical and chemical changes.

Properties of Matter:

- Describe & identify matter in terms of specific properties: mass, weight, volume & density
- Explain why the mass of an object is constant, whereas weight can change
- Manipulate scientific instruments to measure mass, weight, volume, & density using appropriate metric units
- Define density & compare the densities of various objects

Atoms and Molecules:

- All matter is made of particles - either atoms or molecules
- Atoms are made of smaller charged and neutral particles, and are organized by atomic number in the periodic table
- Describe the subatomic parts of the atom
- List the information available on the periodic table
- Atoms combine chemically to form molecules
- Describe the part(s) of the atom that interact to form molecules
- A group of all the same atoms is called an element, give examples
- Elements have distinct properties
- A group of all the same molecules is called a compound, give examples
- The properties of a compound differ from the properties of the elements that make it up
- We use standard notation to describe elements and compounds
- We have a standard notation for writing chemical reactions
- Identify the properties of mixtures vs. pure substances
- Differentiate between physical and chemical change
- Mass is conserved in a closed system

Term 2 Standards:

- Describes motion in terms of position, direction and speed
- Graphs and interprets distance vs. time graphs
- Understands and applies the process of scientific inquiry

Motion:

- Recognize that motion is observed according to a particular frame of reference
- Define motion and speed
- Discuss the relationship between mass and inertia
- Calculate speed using the formula, speed equals distance divided by time
- Distinguish between constant speed and average speed
- Graph speed as distance divided by time
- Distinguish between speed and velocity

Term 3 Standards:

- Describes types of energy and energy transformation

- Relates heat transfer to particle motion
- Understands and applies the process of scientific inquiry

Energy:

- Describe the two states of energy, i.e., potential and kinetic, and give examples of each
- Define energy conversion and give examples of in everyday life
- State the law of conservation of energy
- Understand that particle motion within a material is directly related to the heat energy of the material. As particle motion increases, so does the heat energy