

MISSOURI ALIGNMENT FOR NIH SUPPLEMENT USING TECHNOLOGY TO STUDY CELLULAR AND MOLECULAR BIOLOGY

USING TECHNOLOGY TO STUDY CELLULAR AND MOLECULAR BIOLOGY

Missouri Grade Level Expectations: Science – Grades 9 – 11

Lesson	Standard	GLE
3	3.1.B.b	Identify factors (e.g., biochemical, temperature) that may affect the differentiation of cells and the development of an organism.
1, 2, 3	3.1.C.a	Recognize all organisms are composed of cells, the fundamental units of structure and function.
3	3.2.A.c	Explain physical and chemical interactions that occur between organelles as they carry out life processes.
3	3.2.G	Life processes can be disrupted by disease (intrinsic failures of the organ systems or by infection due to other organisms).
2	7.1.A.a	Formulate testable questions and hypotheses.
3	7.1.A.b	Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment.
3	7.1.A.c	Design and conduct a valid experiment.
3	7.1.A.d	Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature).
2	7.1.A.e	Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using the standard experimental “scientific method” due to the limits of the laboratory environment, resources, and/or technologies.
2	7.1.A.f	Acknowledge there is no fixed procedure called “the scientific method”, but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations.
3	7.1.A.g	Evaluate the design of an experiment and make suggestions for reasonable improvements.
1, 2, 3	7.1.B.a	Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders).
1	7.1.B.b	Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second.
1, 2, 3	7.1.B.c	Determine the appropriate tools and techniques to collect, analyze, and interpret data.
1, 2, 3	7.1.B.d	Judge whether measurements and computation of quantities are reasonable.
1, 2, 3	7.1.C.a	Use quantitative and qualitative data as support for reasonable explanations (conclusions).
2, 3	7.1.C.b	Analyze experimental data to determine patterns, relationship, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable).
1, 2, 3	7.1.C.c	Identify the possible effects of errors in observations, measurements, and calculations, on the validity and

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		reliability of data and resultant explanations (conclusions).
2, 3	7.1.D.a	Analyze whether evidence (data) and scientific principles support proposed explanations (hypotheses, laws, theories).
1, 2, 3	7.1.D.b	Evaluate the reasonableness of an explanation (conclusion).
2, 3	7.1.E.a	Communicate the procedures and results of investigations and explanations through: oral presentations; drawings and maps; data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities); graphs (bar, single, and multiple line); equations and writings.
2, 3	7.1.E.b	Communicate and defend a scientific argument.
3	7.1.E.c	Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work).
All lessons	8.1.A	Designed objects are used to do things better or more easily and to do some things that could not otherwise be done at all.
All lessons	8.1.B.a	Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science).
1, 2, 4	8.2.A.a	Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups.
1, 2, 3	8.2.B.a	Identify and describe how explanations (hypotheses, laws, theories) of scientific phenomena have changed over time as a result of new evidence (e.g., model of the solar system, basic structure of matter, structure of an atom, Theory of Plate Tectonics, Big Bang and nebular theory of the Universe, explanation of electric current).
1, 2, 4	8.3.B.a	Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges).
2, 3, 4	8.3.B.b	Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research).
3	8.3.B.c	Analyze and evaluate the social, political, economic, ethical, and environmental factors affecting progress toward meeting major scientific and technological challenges (e.g., limitations placed on stem-cell research or genetic engineering, introduction of alien species, deforestation, bioterrorism, nuclear energy, genetic counseling, computer technology).
1, 2, 3	8.3.C.c	Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for a stream rather than pouring oil in an existing stream when studying the effects of oil pollution).

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Missouri Grade Level Expectations: Mathematics – Grades 9 & 10

Lesson	Standard	GLE
1	MA 1 3.4	Use real numbers to solve problems.
1	MA 5 3.6	Use a variety of representations to demonstrate an understanding of very large and very small numbers.
1	MA 4 1.6,1.10	Apply properties of exponents (including order of operations) to simplify expressions.
1	MA 1,4,5 1.4,3.4	Apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases.
1	MA 5 1.10,3.3	Apply all operations on real numbers
1	MA 1 3.8	Judge the reasonableness of numerical computations and their results.
1	MA 1,4 3.3	Solve problems involving proportions.
1	MA 4 1.6	Compare and contrast various forms of representations of patterns.
2, 3	MA 2 3.1	Draw or use visual models to represent and solve problems.
1	MA 2 1.7,3.8	Analyze effects of computation on precision.
2, 3	MA 3 1.2	Formulate questions, design studies and collect data about a characteristic.
2	MA 6 1.8, 3.6	Select, create and use appropriate graphical representation of data.

Missouri Grade Level Expectations: Communication Arts – Grades 9 – 12

Lesson	Standard	GLE
2, 3, 4	CA 2, 3 1.6	Apply decoding strategies to “problem-solve” unknown words when reading.
2, 3, 4	CA 2, 3 1.5, 1.6	Develop vocabulary through text, using roots and affixes, context clues, glossary, dictionary and thesaurus.
2, 3, 4	CA 2, 3 1.5 & 1.6	Apply pre-reading strategies to aid comprehension: access prior knowledge, preview, predict, set a purpose and rate for reading.
2, 3, 4	CA 2,3 1.5 & 1.6	During reading, utilize strategies to self-question and correct, infer, visualize, predict and check using cueing systems: meaning, structure, and visual.
2, 3, 4	CA 2, 3 1.6 & 3.5	Apply post-reading skills to comprehend and interpret text: question to clarify, reflect, analyze, draw conclusions, summarize, and paraphrase.
2, 3, 4	CA 2, 3, 7 1.5, 1.6, 1.9	Compare, contrast, analyze and evaluate connections between text ideas and own experiences.

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2, 3, 4	CA 3 1.6, 1.7, 2.4, 3.5, 3.6, 3.1, 3.4	Use details from text to analyze and evaluate the logic, reasonableness, and audience appeal of arguments in texts, identify and analyze faulty reasoning and unfounded inferences, and evaluate for accuracy and adequacy of evidence.
2, 3, 4	CA 3 1.5, 1.6	Read and apply multi-step directions to perform complex procedures and/or tasks.
2, 3, 4	CA 1, 4 1.8, 2.1, 2.2	Follow a writing process to independently create appropriate graphic organizers as needed and apply writing process to write effectively in various forms and types of writing.
2, 3, 4	CA 1 1.6, 2.2	Use conventions of capitalization in written text.
2, 3, 4	CA 1 1.6, 2.2	Use parts of speech correctly in written text.
2, 3, 4	CA 1 1.6, 2.1, 2.2	In writing, use dictionary, spell-check and other resources to spell correctly.
2, 3, 4	CA 1 1.6, 2.1, 2.2	In composing text, use a variety of sentence structures, cohesive devices, and an active voice.
2, 3, 4	CA 2, 3, 4 1.6, 1.8, 4.8	Routinely use an appropriate method for note-taking.
3	CA 2, 3, 4 1.8, 2.1, 4.1	Write multi-paragraph informative and persuasive essays, multi-paragraph texts that interpret, evaluate or persuade, use specific rhetorical devices, and use relevant evidence to defend a position.
2	CA 2, 3, 4 1.2, 2.1, 3.5, 4.1	Write a multi-paragraph text that summarizes large amounts of information clearly and concisely.
All lessons	CA 5, 6 1.5, 1.6, 1.10	Listen for enjoyment, for information, for directions, critically to summarize and evaluate communications that inform, persuade and entertain, to evaluate own and others' effectiveness in presentations and group discussions, using provided criteria, and to evaluate the validity and reliability of speaker's message.
All lessons	CA 5, 6 1.5	Use active-listening behaviors (e.g., asks questions of speaker and uses body language and facial expressions to indicate agreement, disagreement or confusion).
All lessons	CA 1, 6 2.1, 2.3, 4.6	In discussions and presentations, create concise presentations on a variety of topics, incorporate appropriate media or technology, respond to feedback, defend ideas, and demonstrate poise and self-control.
All lessons	CA 1, 6 2.1, 2.3	Give clear and concise multi-step oral directions to perform complex procedures and/or tasks.
3	CA 2, 3 1.1, 1.4, 4.5	Develop an appropriate research plan to guide investigation and research of focus questions.
3	CA 5 1.5, 1.7, 2.7	Analyze, describe and evaluate the elements of messages projected in various media (e.g., videos, pictures, web-sites, artwork, plays and/or news programs).
Missouri Grade Level Expectations: Health Education – Grades 9 – 12 (2006 Draft Version)		
Lesson	Standard	GLE
3	I 1.K.b	Describe the impact heredity has on system functions and disease formation.

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3	III 1.A.b	Conduct research to answer questions regarding epidemiological studies and cite evidence about the management and prevention of communicable and non-communicable diseases (e.g., local health department statistics, youth risk behavior survey [YRBS], Centers for Disease Control and Prevention [CDC], National Institutes of Health [NIH]).
3	III 1.C.c	Use the scientific process or laboratory investigation to test hypotheses on pathogen transmission (e.g., hand sanitizers, Germglow, disinfectants).
3	III 1.J.a	Conduct research to answer questions regarding epidemiological studies and cite evidence about the management and prevention of communicable and non-communicable diseases (e.g., local health department statistics, youth risk behavior survey [YRBS], Centers for Disease Control and Prevention [CDC], National Institutes of Health [NIH]).