



Spokane Public Schools Biomedical Innovation PLTW Year 4

Course: Biomedical Innovation	Total Framework Hours up to: 180 hours
CIP Code: 260104 <input type="checkbox"/> Exploratory <input checked="" type="checkbox"/> Preparatory	Date Last Modified: 10/7/15
Career Cluster: Health Science	Cluster Pathway: Biotechnology Research and Development

In this capstone course, students apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century as they work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health. They have the opportunity to work on an independent project and may work with a mentor or advisor from a university, hospital, physician’s office, or industry. Throughout the course, students are expected to present their work to an adult audience that may include representatives from the local business and healthcare community.

COMPONENTS AND ASSESSMENTS

Performance Assessments:

In this problem, students apply their knowledge of emergency medical careers, diagnostic testing and patient evaluation, human body systems, and medical interventions to analyze the workings of an emergency room and discuss inefficiencies that may hinder appropriate clinical care. Student teams will work collaboratively to design a more efficient emergency medicine delivery system. As students work through their designs, they will review research methods, practice effective presentation skills, and learn project management techniques.

Leadership Alignment:

CTE 21st Century Skill Emphasis:

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Initiative and Self-Direction
- Information Literacy
- ICT Literacy

Students will create, manage and produce projects to submit to the Spokane STEMposium competition.

Standards and Competencies

Lesson One: Design of an Effective Emergency Room

1. Biomedical innovation is vital to treating disease and disability and to prolonging life in the face of illness and injury.
2. Internet and print resources must be evaluated for accurate content and reliability.
3. Producing effective presentations of scientific material relies on accurate content, effective delivery, and if applicable, visuals that support the key points.

Standards and Benchmarks: (knowledge and skills addressed)

1. Describe unique solutions to the health and medical problems of this century.
2. Describe the design of effective oral and visual presentations.
3. Recognize that innovations in healthcare and medicine can help reduce wait time and promote efficient care in emergency rooms and emergency care centers.
4. Assess web resources for credibility.
5. Use online search engines and journal databases to locate scientific articles.
6. Analyze the format of a presentation and list strengths and weaknesses in design.
7. Design an efficient emergency room or department.
8. Produce a Gantt chart to manage the work of a design project.
9. Deliver an effective formal presentation.

Total Learning Hours for Problem: 24 hours

National Health Science Standards

1.32 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

2.11 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Model verbal and nonverbal communication.

2.13 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Identify the differences between subjective and objective information.

2.15 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Practice speaking and active listening skills.

2.16 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Modify communication to meet the needs of the patient/client and be appropriate to the situation.

2.31 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Utilize proper elements of written and electronic communication (spelling, grammar, and formatting).

2.32 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Prepare examples of technical, informative, and creative writing.

4.21 Foundation Standard 4: Employability Skills: Utilize employability skills to enhance employment opportunities and job satisfaction

Apply employability skills in healthcare.

a. Chain of command

- b. Correct grammar
- c. Decision making
- d. Flexible
- e. Initiative
- f. Integrity
- g. Loyalty
- h. Positive attitude
- i. Professional characteristics
- j. Prompt and prepared
- k. Responsibility
- l. Scope of practice
- m. Teamwork
- n. Willing to learn

8.12 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Identify characteristics of effective teams.

- a. Active participation
- b. Commitment
- c. Common goals
- d. Cultural sensitivity
- e. Flexibility
- f. Open to feedback
- g. Positive attitude
- h. Reliability
- i. Trust
- j. Value individual contributions

8.21 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Recognize methods for building positive team relationships (such as: mentorships and teambuilding).

8.22 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Analyze attributes and attitudes of an effective leader.

- a. Characteristics (interpersonal skills, focused on results, positive)
- b. Types (autocratic, democratic, laissez faire)
- c. Roles (sets vision, leads change, manages accountability)

8.23 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Apply effective techniques for managing team conflict (negotiation, assertive communication, gather the facts, clear expectations, mediation).

11.31 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across

health professions.

Apply basic computer concepts and terminology necessary to use computers and other mobile devices.

11.32 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate basic computer troubleshooting procedures (such as: restart, check power supply, refresh browser, check settings).

11.33 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate use of file organization and information storage.

11.34 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Identify uses of basic word processing, spreadsheet, and database applications.

11.35 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Evaluate validity of web-based resources.

Aligned Washington State Standards

Arts	
Educational Technology	
Health and Fitness	
Language	<p><u>Conventions of Standard English</u></p> <ol style="list-style-type: none"> 1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. (AS.L.1) 2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. (AS.L.2) 4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate. (AS.L.4)
Math	<p><u>Number and Quantity</u></p> <p>-Reason Quantitatively And Use Units To Solve Problems.</p> <ol style="list-style-type: none"> 2. Define appropriate quantities for the purpose of descriptive modeling. (N.Q .2) <p><u>Statistics and Probability</u></p> <p>-Summarize, Represent, And Interpret Data On A Single Count Or Measurement Variable</p> <ol style="list-style-type: none"> 1. Represent data with plots on the real number line (dot plots, histograms, and box plots). (S.ID.1) <p><u>Making Inferences And Justifying Conclusions</u></p> <p>-Make Inferences And Justify Conclusions From Sample Surveys, Experiments, And Observational Studies</p> <ol style="list-style-type: none"> 6. Evaluate reports based on data. (S.IC.6)
Reading	<p><u>Key Ideas and Details</u></p> <ol style="list-style-type: none"> 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. (AS.R.1)

	<p>6. Assess how point of view or purpose shapes the content and style of a text. (AS.R.6)</p> <p>7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. (AS.R.7)</p> <p>8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence. (AS.R.8)</p> <p>10. Read and comprehend complex literary and informational texts independently and proficiently. (AS.R.10)</p>
Science	<p><u>From Molecules to Organisms: Structures and Processes</u></p> <p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS.LS1.2)</p> <p><u>Engineering Design</u></p> <p>HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS.ETS1.2)</p> <p>HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. (HS.ETS1.3)</p>
Social Studies	
Speaking and Listening	<p><u>Comprehension and Collaboration</u></p> <p>1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. (AS.SL.1)</p> <p>2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. (AS.SL.2)</p> <p>3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric. (AS.SL.3)</p> <p>4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. (AS.SL.4)</p> <p>5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. (AS.SL.5)</p>
Writing	<p><u>Text Types and Purposes</u></p> <p>1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. (AS.W.1)</p> <p>2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (AS.W.2)</p> <p>3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. (AS.W.3)</p> <p>4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (AS.W.4)</p> <p>5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (AS.W.5)</p> <p>6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. (AS.W.6)</p> <p>7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (AS.W.7)</p> <p>8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (AS.W.8)</p> <p>9. Draw evidence from literary or informational texts to support analysis, reflection, and research. (AS.W.9)</p> <p>10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. (AS.W.10)</p>

COMPONENTS AND ASSESSMENTS

Performance Assessments:

In this problem, students build upon what they know about the research process in order to design, conduct, and analyze an experimental study. Students will choose a question relating to one or more body systems that they are interested in studying and will work with a team to investigate and answer that question. As students work through the experimental process, they will review and expand what they know about experimental design, collection of data, statistical analysis of data, and the presentation of data.

Leadership Alignment:

CTE 21st Century Skill Emphasis:

- Critical Thinking and Problem Solving
- Initiative and Self-Direction
- Flexibility and Adaptability
- Information Literacy

Students will create, manage and produce projects to submit to the Spokane STEMposium competition.

Standards and Competencies

Lesson Two: Exploring Human Physiology

1. A variety of research study designs can be used to find answers to testable questions.
2. Experiments are designed to find answers to testable questions.
3. Scientists use various statistical analysis methods to draw meaningful conclusions from experimental results.

Standards and Benchmarks: (knowledge and skills addressed)

1. Recognize that statistics can be used inappropriately to manipulate data and/or mislead readers.
2. Recognize that research results presented in the popular media differ from research results presented in scientific literature.
3. Write a brief study design to investigate the association between an activity/treatment and disease pair.
4. Complete a statistical analysis for an assigned study.
5. Design a controlled experiment.
6. Design, conduct, and analyze an experimental study to find the answers to a question relating to one or multiple body systems.
7. Create and present a poster presentation to display results of an experimental study.

Total Learning Hours for Problem: 23 hours

National Health Science Standards

1.13 Foundation Standard 1: Academic Foundation Understand human anatomy, physiology, common diseases and disorders, and medical math principles.
Analyze basic structures and functions of human body systems (skeletal, muscular, integumentary, cardiovascular, lymphatic, respiratory,

nervous, special senses, endocrine, digestive, urinary, and reproductive).

- a. Skeletal (bone anatomy, axial and appendicular skeletal bones, functions of bones, ligaments, types of joints)
- b. Muscular (microscopic anatomy of muscle tissue, types of muscle, locations of skeletal muscles, functions of muscles, tendons, directional movements)
- c. Integumentary (layers, structures and functions of skin)
- d. Cardiovascular (components of blood, structures and functions of blood components, structures and functions of the cardiovascular system, conduction system of the heart, cardiac cycle)
- e. Lymphatic (structures and functions of lymphatic system, movement of lymph fluid)
- f. Respiratory (structures and functions of respiratory system, physiology of respiration)
- g. Nervous (structures and functions of nervous tissue and system, organization of nervous system)
- h. Special senses (structures and functions of eye, ear, nose and tongue; identify senses for sight, hearing, smell, taste, touch)
- i. Endocrine (endocrine versus exocrine, structures and functions of endocrine system, hormones, regulation of hormones)
- j. Digestive (structures and functions of gastrointestinal tract, chemical and mechanical digestion, structures and functions of accessory organs)
- k. Urinary (structures and functions of urinary system, gross and microscopic anatomy, process of urine formation, urine composition, homeostatic balance)
- l. Reproductive (structures and functions of male and female reproductive systems, formation of gametes, hormone production and effects, menstrual cycle, and conception)

1.31 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Demonstrate competency in basic math skills and mathematical conversions as they relate to healthcare.

- a. Metric system (such as: centi, milli, kilo)
- b. Mathematical (average, ratios, fractions, percentages, addition, subtraction, multiplication, division)
- c. Conversions (height, weight/mass, length, volume, temperature, household measurements)

1.32 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

2.11 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Model verbal and nonverbal communication.

2.13 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Identify the differences between subjective and objective information.

2.15 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Practice speaking and active listening skills.

2.16 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Modify communication to meet the needs of the patient/client and be appropriate to the situation.

2.31 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Utilize proper elements of written and electronic communication (spelling, grammar, and formatting).

2.32 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Prepare examples of technical, informative, and creative writing.

4.21 Foundation Standard 4: Employability Skills: Utilize employability skills to enhance employment opportunities and job satisfaction. Apply employability skills in healthcare.

- a. Chain of command
- b. Correct grammar
- c. Decision making
- d. Flexible
- e. Initiative
- f. Integrity
- g. Loyalty
- h. Positive attitude
- i. Professional characteristics
- j. Prompt and prepared
- k. Responsibility
- l. Scope of practice
- m. Teamwork
- n. Willing to learn

7.22 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness. Demonstrate principles of body mechanics.

8.12 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Identify characteristics of effective teams.

- a. Active participation
- b. Commitment
- c. Common goals
- d. Cultural sensitivity
- e. Flexibility
- f. Open to feedback
- g. Positive attitude
- h. Reliability
- i. Trust
- j. Value individual contributions

8.21 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Recognize methods for building positive team relationships (such as: mentorships and teambuilding).

8.22 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Analyze attributes and attitudes of an effective leader.

- a. Characteristics (interpersonal skills, focused on results, positive)
- b. Types (autocratic, democratic, laissez faire)
- c. Roles (sets vision, leads change, manages accountability)

8.23 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Apply effective techniques for managing team conflict (negotiation, assertive communication, gather the facts, clear expectations, mediation).

10.11 *Foundation Standard 10: Technical Skills: Apply technical skills required for all career specialties and demonstrate skills and knowledge as appropriate.

Apply procedures for measuring and recording vital signs including the normal ranges (temperature, pulse, respirations, blood pressure, pain).

11.31 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Apply basic computer concepts and terminology necessary to use computers and other mobile devices.

11.32 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate basic computer troubleshooting procedures (such as: restart, check power supply, refresh browser, check settings).

11.33 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate use of file organization and information storage.

11.34 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Identify uses of basic word processing, spreadsheet, and database applications.

11.35 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Evaluate validity of web-based resources.

Aligned Washington State Standards

Arts	
Educational Technology	
Health and Fitness	
Language	<p><u>Conventions of Standard English</u></p> <ol style="list-style-type: none"> 1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. (AS.L.1) 2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. (AS.L.2) 4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate. (AS.L.4)
Math	<p><u>Number and Quantity</u></p> <p>-Reason Quantitatively And Use Units To Solve Problems.</p> <ol style="list-style-type: none"> 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (N.Q .1) 2. Define appropriate quantities for the purpose of descriptive modeling. (N.Q .2) 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (N.Q .3) <p><u>Algebra</u></p> <p>-Interpret The Structure Of Expressions</p> <ol style="list-style-type: none"> 1. Interpret expressions that represent a quantity in terms of its context. (A.SSE.1) <ol style="list-style-type: none"> 1.a. Interpret parts of an expression, such as terms, factors, and coefficients. (A.SSE.1.a) <p>-Create Equations That Describe Numbers Or Relationships</p> <ol style="list-style-type: none"> 4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. <i>For example, rearrange Ohm's law $V = IR$ to highlight resistance R.</i> (A.CED.4) <p><u>Reasoning With Equations And Inequalities</u></p> <p>-Understand Solving Equations As A Process Of Reasoning And Explain The Reasoning</p> <ol style="list-style-type: none"> 1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. (A.REI.1) 2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. (A.REI.2) <p>-Solve Equations And Inequalities In One Variable</p> <ol style="list-style-type: none"> 3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. (A.REI.3) <p><u>Statistics and Probability</u></p> <p>-Summarize, Represent, And Interpret Data On A Single Count Or Measurement Variable</p> <ol style="list-style-type: none"> 2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. (S.ID.2) 3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). (S.ID.3)

	<p>-Interpret Linear Models 9. Distinguish between correlation and causation. (S.ID.9)</p> <p>-Understand And Evaluate Random Processes Underlying Statistical Experiments 1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (S.IC.1) 2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. <i>For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?</i> (S.IC.2)</p> <p>-Make Inferences And Justify Conclusions From Sample Surveys, Experiments, And Observational Studies 3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. (S.IC.3) 4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. (S.IC.4) 5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. (S.IC.5) 6. Evaluate reports based on data. (S.IC.6)</p>
Reading	<p><u>Key Ideas and Details</u> 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. (AS.R.1) 2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. (AS.R.2) 4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. (AS.R.4) 6. Assess how point of view or purpose shapes the content and style of a text. (AS.R.6) 7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. (AS.R.7) 8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence. (AS.R.8) 9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. (AS.R.9) 10. Read and comprehend complex literary and informational texts independently and proficiently. (AS.R.10)</p>
Science	<p><u>From Molecules to Organisms: Structures and Processes</u> HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS.LS1.2)</p> <p><u>Engineering Design</u> HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS.ETS1.2) HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. (HS.ETS1.3)</p>
Social Studies	

<p>Speaking and Listening</p>	<p><u>Comprehension and Collaboration</u></p> <ol style="list-style-type: none"> 1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. (AS.SL.1) 2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. (AS.SL.2) 4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. (AS.SL.4) 5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. (AS.SL.5) 6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate. (AS.SL.6)
<p>Writing</p>	<p><u>Text Types and Purposes</u></p> <ol style="list-style-type: none"> 1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. (AS.W.1) 2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (AS.W.2) 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (AS.W.4) 6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. (AS.W.6) 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (AS.W.7) 8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (AS.W.8) 9. Draw evidence from literary or informational texts to support analysis, reflection, and research. (AS.W.9) 10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. (AS.W.10)

COMPONENTS AND ASSESSMENTS

Performance Assessments:

In this problem, students review the diseases and disorders as well as the corresponding medical interventions they have investigated in the previous courses and propose a new or better medical device, pharmaceutical, surgical procedure, or genetic intervention. Students will work with a team to build a prototype, model, or schematic of the intervention as well as develop a marketing plan for the product. As students work through this problem, they will review the design process, complete a literature review, and further practice effective presentation skills.

Leadership Alignment:

CTE 21st Century Skill Emphasis:

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Communication and Collaboration
- Information Literacy
- Media Literacy
- Information Literacy

- ICT Literacy
- Initiative and Self-Direction
- Social and Cross-Cultural
- Productivity and Accountability
- Leadership and Responsibility

Students will create, manage and produce projects to submit to the Spokane STEMposium competition.

Standards and Competencies

Lesson Three: Design of a Medical Innovation

1. The design process is a series of steps used to design a new product or system.

Standards and Benchmarks: (knowledge and skills addressed)

1. Describe the evolution of various biomedical products, such as an insulin pump or artificial skin.
2. Recognize that when designing a solution to a problem, all criteria need to be specified and all possible designs need to be explored.
3. Develop ideas for a new biomedical product or for a way to improve an existing product.
4. Research and compile information about a chosen problem and evaluate solutions of the past and present.
5. Explore possible design solutions, select the best approach, and develop a design proposal.
6. Create a model, prototype, or schematic for the chosen solution.

Total Learning Hours for Problem: 16 hours

National Health Science Standards

1.23 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Describe biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

- a. Gene testing
- b. Gene therapy
- c. Human proteomics
- d. Cloning
- e. Stem cell research

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2.13 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Identify the differences between subjective and objective information.

2.15 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively.

Practice speaking and active listening skills.

2.16 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Modify communication to meet the needs of the patient/client and be appropriate to the situation.

2.31 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Utilize proper elements of written and electronic communication (spelling, grammar, and formatting).

2.32 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Prepare examples of technical, informative, and creative writing.

4.21 Foundation Standard 4: Employability Skills: Utilize employability skills to enhance employment opportunities and job satisfaction. Apply employability skills in healthcare.

- a. Chain of command
- b. Correct grammar
- c. Decision making
- d. Flexible
- e. Initiative
- f. Integrity
- g. Loyalty
- h. Positive attitude
- i. Professional characteristics
- j. Prompt and prepared
- k. Responsibility
- l. Scope of practice
- m. Teamwork
- n. Willing to learn

8.12 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Identify characteristics of effective teams.

- a. Active participation
- b. Commitment
- c. Common goals
- d. Cultural sensitivity
- e. Flexibility
- f. Open to feedback
- g. Positive attitude
- h. Reliability
- i. Trust
- j. Value individual contributions

8.21 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Recognize methods for building positive team relationships (such as: mentorships and teambuilding).

8.22 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Analyze attributes and attitudes of an effective leader.

- a. Characteristics (interpersonal skills, focused on results, positive)
- b. Types (autocratic, democratic, laissez faire)
- c. Roles (sets vision, leads change, manages accountability)

8.23 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Apply effective techniques for managing team conflict (negotiation, assertive communication, gather the facts, clear expectations, mediation).

11.31 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Apply basic computer concepts and terminology necessary to use computers and other mobile devices.

11.32 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate basic computer troubleshooting procedures (such as: restart, check power supply, refresh browser, check settings).

11.33 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate use of file organization and information storage.

11.34 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Identify uses of basic word processing, spreadsheet, and database applications.

11.35 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Evaluate validity of web-based resources.

Aligned Washington State Standards

Arts	
Educational Technology	
Health and Fitness	
Language	<u>Conventions of Standard English</u> 1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. (AS.L.1) 2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. (AS.L.2)

	<p>4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate. (AS.L.4)</p> <p>6. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. (AS.L.6)</p>
Math	
Reading	<p><u>Key Ideas and Details</u></p> <p>1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. (AS.R.1)</p> <p>2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. (AS.R.2)</p> <p>7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. (AS.R.7)</p> <p>9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. (AS.R.9)</p> <p>10. Read and comprehend complex literary and informational texts independently and proficiently. (AS.R.10)</p>
Science	<p><u>From Molecules to Organisms: Structures and Processes</u></p> <p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS.LS1.2)</p> <p><u>Engineering Design</u></p> <p>HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS.ETS1.2)</p> <p>HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. (HS.ETS1.3)</p>
Social Studies	
Speaking and Listening	<p><u>Comprehension and Collaboration</u></p> <p>1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. (AS.SL.1)</p> <p>2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. (AS.SL.2)</p> <p>4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. (AS.SL.4)</p> <p>5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. (AS.SL.5)</p>
Writing	<p><u>Text Types and Purposes</u></p> <p>1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. (AS.W.1)</p> <p>2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (AS.W.2)</p> <p>4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (AS.W.4)</p> <p>5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (AS.W.5)</p> <p>6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. (AS.W.6)</p>

- 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (AS.W.7)
- 8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (AS.W.8)
- 9. Draw evidence from literary or informational texts to support analysis, reflection, and research. (AS.W.9)
- 10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. (AS.W.10)

COMPONENTS AND ASSESSMENTS

Performance Assessments:

In this problem, students will explore how substances or chemicals in the environment impact human health. Students will investigate a disease cluster in a fictional family and assess the activities of the individuals for environmental risks. Students will test water samples for the presence of contaminants that could be detrimental to human health and use molecular biology techniques to identify specific microorganisms. Students will also design an experiment to test the effects of a particular chemical and doses of that chemical on plant growth. Students will then compile a comprehensive environmental health profile for their local area. They will use publicly available databases, as well as personal contacts and visits, to uncover possible sources of environmental contamination in the community and to assess risk and level of exposure to people, wildlife, and environmental resources. Students will use their compiled information to design an action plan to increase awareness, monitor resources or individuals in the community, improve conditions, and ensure a clean and safe environment.

Leadership Alignment:

CTE 21st Century Skill Emphasis:

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Communication and Collaboration
- Information Literacy
- Media Literacy
- ICT Literacy
- Flexibility and Adaptability
- Social and Cross-Cultural
- Productivity and Accountability
- Leadership and Responsibility

Students will create, manage and produce projects to submit to the Spokane STEMposium competition.

Standards and Competencies

Lesson Four: Investigating Environmental Health

1. The field of environmental health focuses on the connections between human wellbeing and the conditions in the environment.
2. Water can be contaminated by a wide variety of chemicals and biological agents that have health implications for humans and animals; such contaminants can be tested for using specific assays.
3. The effect a chemical has on an organism is related to its dose and the resulting concentration of the chemical in the body.
4. Experiments are designed to find answers to testable questions.

Standards and Benchmarks: (knowledge and skills addressed)

1. Identify environmental concerns potentially harmful to health.
2. Recognize that the presence of coliform in water indicates contamination with human or animal fecal material and that disease-causing agents may be present.
3. Explain how various factors affect how individuals respond to a given toxin.
4. Recognize that an environmental health profile outlines the quality of the local environment and the health of local residents.
5. Perform and analyze a culture assay to detect coliform and E. Coli in water.
6. Use PCR and gel electrophoresis to determine which bacterial strain is present in a simulated water sample.
7. Use a variety of chemical assays to detect specific contaminants in water samples.
8. Design and conduct an experiment to test the effects of a particular chemical and doses of that chemical on plant growth.
9. Graph and analyze a dose-responsive curve.
10. Compile a comprehensive environmental health profile for the local area.
11. Design an action plan to increase awareness, monitor resources or individuals in the community, improve conditions, and ensure a clean and safe environment.

Total Learning Hours for Problem: 25 hours

National Health Science Standards

1.31 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Demonstrate competency in basic math skills and mathematical conversions as they relate to healthcare.

- a. Metric system (such as: centi, milli, kilo)
- b. Mathematical (average, ratios, fractions, percentages, addition, subtraction, multiplication, division)
- c. Conversions (height, weight/mass, length, volume, temperature, household measurements)

1.32 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

2.11 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Model verbal and nonverbal communication.

2.13 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Identify the differences between subjective and objective information.

2.15 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Practice speaking and active listening skills.

2.16 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively.

Modify communication to meet the needs of the patient/client and be appropriate to the situation.

2.31 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Utilize proper elements of written and electronic communication (spelling, grammar, and formatting).

2.32 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Prepare examples of technical, informative, and creative writing.

**4.21 Foundation Standard 4: Employability Skills: Utilize employability skills to enhance employment opportunities and job satisfaction
Apply employability skills in healthcare.**

- a. Chain of command
- b. Correct grammar
- c. Decision making
- d. Flexible
- e. Initiative
- f. Integrity
- g. Loyalty
- h. Positive attitude
- i. Professional characteristics
- j. Prompt and prepared
- k. Responsibility
- l. Scope of practice
- m. Teamwork
- n. Willing to learn

7.11 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Explain principles of infection control.

- a. Chain of infection
- b. Mode of transmission (direct, indirect, vectors, common vehicle [air, food, water], healthcare-associated infections [nosocomial], opportunistic)
- c. Microorganisms (non-pathogenic, pathogenic, aerobic, anaerobic)
- d. Classifications (bacteria, protozoa, fungi, viruses, parasites)

7.12 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Differentiate methods of controlling the spread and growth of microorganisms.

- a. Aseptic control (antisepsis, disinfection, sterilization, sterile technique)
- b. Standard precautions
- c. Isolation precautions

d. Blood borne pathogen precautions

e. Vaccinations

7.21 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.

7.31 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Apply safety techniques in the work environment.

a. Ergonomics

b. Safe operation of equipment

c. Patient/client safety measures (check area for safety)

7.41 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Observe all safety standards related to the Occupational Exposure to Hazardous Chemicals Standard (Safety Data Sheets (SDSs)). (www.osha.gov)

7.42 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Comply with safety signs, symbols, and labels.

8.12 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team.

Identify characteristics of effective teams.

a. Active participation

b. Commitment

c. Common goals

d. Cultural sensitivity

e. Flexibility

f. Open to feedback

g. Positive attitude

h. Reliability

i. Trust

j. Value individual contributions

8.21 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team.

Recognize methods for building positive team relationships (such as: mentorships and teambuilding).

8.22 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team.

- Analyze attributes and attitudes of an effective leader.
- a. Characteristics (interpersonal skills, focused on results, positive)
 - b. Types (autocratic, democratic, laissez faire)
 - c. Roles (sets vision, leads change, manages accountability)

8.23 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Apply effective techniques for managing team conflict (negotiation, assertive communication, gather the facts, clear expectations, mediation).

11.31 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions. Apply basic computer concepts and terminology necessary to use computers and other mobile devices.

11.32 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions. Demonstrate basic computer troubleshooting procedures (such as: restart, check power supply, refresh browser, check settings).

11.33 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions. Demonstrate use of file organization and information storage.

11.34 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions. Identify uses of basic word processing, spreadsheet, and database applications.

11.35 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions. Evaluate validity of web-based resources.

Aligned Washington State Standards

Arts	
Educational Technology	
Health and Fitness	
Language	<p><u>Conventions of Standard English</u></p> <ul style="list-style-type: none"> 1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. (AS.L.1) 2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. (AS.L.2) 4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate. (AS.L.4)
Math	<p><u>Number and Quantity</u></p> <p>-Reason Quantitatively And Use Units To Solve Problems.</p> <ul style="list-style-type: none"> 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (N.Q .1)

	<p>2. Define appropriate quantities for the purpose of descriptive modeling. (N.Q .2) 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (N.Q .3)</p> <p><u>Algebra</u> -Interpret The Structure Of Expressions 1. Interpret expressions that represent a quantity in terms of its context. (A.SSE.1)</p> <p><u>Functions</u> -Interpret Functions That Arise In Applications In Terms Of The Context 4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*</i> (F.IF.4) -Analyze Functions Using Different Representations 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* (F.IF.7)</p> <p><u>Statistics and Probability</u> -Summarize, Represent, And Interpret Data On A Single Count Or Measurement Variable 1. Represent data with plots on the real number line (dot plots, histograms, and box plots). (S.ID.1) -Make Inferences And Justify Conclusions From Sample Surveys, Experiments, And Observational Studies 6. Evaluate reports based on data. (S.IC.6)</p>
Reading	<p><u>Key Ideas and Details</u> 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. (AS.R.1) 2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. (AS.R.2) 7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. (AS.R.7) 9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. (AS.R.9) 10. Read and comprehend complex literary and informational texts independently and proficiently. (AS.R.10)</p>
Science	<p><u>From Molecules to Organisms: Structures and Processes</u> HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS.LS1.2)</p> <p><u>Ecosystems: Interactions, Energy, and Dynamics</u> HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.* (HS.LS2.7)</p> <p><u>Engineering Design</u> HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. (HS.ETS1.1)</p>
Social Studies	

Speaking and Listening	<p><u>Comprehension and Collaboration</u></p> <ol style="list-style-type: none"> 1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. (AS.SL.1) 2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. (AS.SL.2) 4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. (AS.SL.4) 5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. (AS.SL.5)
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Writing	<p><u>Text Types and Purposes</u></p> <ol style="list-style-type: none"> 1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. (AS.W.1) 2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (AS.W.2) 3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. (AS.W.3) 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (AS.W.4) 5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (AS.W.5) 6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. (AS.W.6) 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (AS.W.7) 8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (AS.W.8) 9. Draw evidence from literary or informational texts to support analysis, reflection, and research. (AS.W.9) 10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. (AS.W.10)
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COMPONENTS AND ASSESSMENTS

Performance Assessments:

In this problem, students draw on information they have learned in the previous courses about public health, epidemiology, and disease diagnosis to work through one of two epidemiology studies. In each study, students will analyze data to define the outbreak, generate a hypothesis by diagnosing the patients' symptoms and identifying the disease pathogen, design and analyze an epidemiological study to test the hypothesis, and outline a plan for initiating control and prevention measures. Students will then identify a local, national, or global public health crisis and write a mini-grant proposal, based on the National Institutes of Health grant structure, outlining a plan with intervention strategies. As students work through this problem, they will review evidence analysis, the design process, methodology, and analyze study data to evaluate risk.

Leadership Alignment:

CTE 21st Century Skill Emphasis:

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Communication and Collaboration
- Information Literacy
- ICT Literacy

- Flexibility and Adaptability
- Initiative and Self-Direction
- Social and Cross-Cultural
- Productivity and Accountability
- Leadership and Responsibility

Students will create, manage and produce projects to submit to the Spokane STEMposium competition.

Standards and Competencies

Lesson Five: Combating a Public Health Issue

1. Epidemiologists or other public health investigators analyze patient symptoms, results of diagnostic tests, and other clues relevant to person, place, and time of the outbreak to successfully pinpoint the specific nature of the disease as well as a source.
2. Public health intervention plans may include education efforts, screening and diagnosis, treatment, distribution of medication or vaccinations, and research.

Standards and Benchmarks: (knowledge and skills addressed)

1. Recognize that measures of association such as relative risk, and the odds ratio describe the correlation between specific risk factors and the development of disease.
2. Describe how to set up case-control and cohort studies.
3. Recognize local, national, and global disease trends.
4. Analyze evidence documents to determine the source of a disease outbreak.
5. Calculate measures of risk used to demonstrate a possible association between a risk factor and a disease.
6. Write a grant proposal outlining an intervention plan for a particular disease, illness or injury.
7. Present and defend an intervention plan to a professional audience.

Total Learning Hours for Problem: 18 hours

National Health Science Standards

1.31 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Demonstrate competency in basic math skills and mathematical conversions as they relate to healthcare.

- a. Metric system (such as: centi, milli, kilo)
- b. Mathematical (average, ratios, fractions, percentages, addition, subtraction, multiplication, division)
- c. Conversions (height, weight/mass, length, volume, temperature, household measurements)

1.32 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

2.11 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Model verbal and nonverbal communication.

2.13 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Identify the differences between subjective and objective information.

2.15 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Practice speaking and active listening skills.

2.16 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Modify communication to meet the needs of the patient/client and be appropriate to the situation.

2.31 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Utilize proper elements of written and electronic communication (spelling, grammar, and formatting).

2.32 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Prepare examples of technical, informative, and creative writing.

4.21 Foundation Standard 4: Employability Skills: Utilize employability skills to enhance employment opportunities and job satisfaction. Apply employability skills in healthcare.

- a. Chain of command
- b. Correct grammar
- c. Decision making
- d. Flexible
- e. Initiative
- f. Integrity
- g. Loyalty
- h. Positive attitude
- i. Professional characteristics
- j. Prompt and prepared
- k. Responsibility
- l. Scope of practice
- m. Teamwork
- n. Willing to learn

8.12 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Identify characteristics of effective teams.

- a. Active participation
- b. Commitment
- c. Common goals
- d. Cultural sensitivity
- e. Flexibility
- f. Open to feedback

- g. Positive attitude
- h. Reliability
- i. Trust
- j. Value individual contributions

8.21 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Recognize methods for building positive team relationships (such as: mentorships and teambuilding).

8.22 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Analyze attributes and attitudes of an effective leader.

- a. Characteristics (interpersonal skills, focused on results, positive)
- b. Types (autocratic, democratic, laissez faire)
- c. Roles (sets vision, leads change, manages accountability)

8.23 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Apply effective techniques for managing team conflict (negotiation, assertive communication, gather the facts, clear expectations, mediation).

9.11 Foundation Standard 9: Health Maintenance Practices: Differentiate between wellness and disease. Promote disease prevention and model healthy behaviors.

Promote behaviors of health and wellness (such as: nutrition, weight control, exercise, sleep habits).

9.12 Foundation Standard 9: Health Maintenance Practices: Differentiate between wellness and disease. Promote disease prevention and model healthy behaviors.

Describe strategies for prevention of disease.

- a. Routine physical exams
- b. Medical, dental, and mental health screenings
- c. Community health education outreach programs
- d. Immunizations
- e. Stress management
- f. Avoid risky behaviors

11.31 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Apply basic computer concepts and terminology necessary to use computers and other mobile devices.

11.32 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate basic computer troubleshooting procedures (such as: restart, check power supply, refresh browser, check settings).

11.33 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across

health professions.
 Demonstrate use of file organization and information storage.

11.34 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.
 Identify uses of basic word processing, spreadsheet, and database applications.

11.35 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.
 Evaluate validity of web-based resources.

Aligned Washington State Standards

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Educational Technology	
Health and Fitness	
Language	<p><u>Conventions of Standard English</u></p> <ol style="list-style-type: none"> 1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. (AS.L.1) 2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. (AS.L.2) 4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate. (AS.L.4) 5. Demonstrate understanding of word relationships and nuances in word meanings. (AS.L.5) 6. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. (AS.L.6)
Math	<p><u>Number and Quantity</u></p> <p>-Reason Quantitatively And Use Units To Solve Problems.</p> <ol style="list-style-type: none"> 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (N.Q .1) 2. Define appropriate quantities for the purpose of descriptive modeling. (N.Q .2) 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (N.Q .3) <p><u>Algebra</u></p> <p>-Interpret The Structure Of Expressions</p> <ol style="list-style-type: none"> 1. Interpret expressions that represent a quantity in terms of its context. (A.SSE.1) <p>-Understand Solving Equations As A Process Of Reasoning And Explain The Reasoning</p> <ol style="list-style-type: none"> 1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. (A.REI.1) <p><u>Statistics and Probability</u></p> <p>-Interpret Linear Models</p> <ol style="list-style-type: none"> 9. Distinguish between correlation and causation. (S.ID.9)

	<p>-Understand And Evaluate Random Processes Underlying Statistical Experiments</p> <ol style="list-style-type: none"> 1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (S.IC.1) <p>-Make Inferences And Justify Conclusions From Sample Surveys, Experiments, And Observational Studies</p> <ol style="list-style-type: none"> 3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. (S.IC.3) 5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. (S.IC.5) 6. Evaluate reports based on data. (S.IC.6)
Reading	<p><u>Key Ideas and Details</u></p> <ol style="list-style-type: none"> 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. (AS.R.1) 2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. (AS.R.2) 7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. (AS.R.7) 8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence. (AS.R.8) 10. Read and comprehend complex literary and informational texts independently and proficiently. (AS.R.10)
Science	<p><u>From Molecules to Organisms: Structures and Processes</u></p> <p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS.LS1.2)</p> <p>HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS.LS1.3)</p> <p><u>Engineering Design</u></p> <p>HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. (HS.ETS1.1)</p>
Social Studies	
Speaking and Listening	<p><u>Comprehension and Collaboration</u></p> <ol style="list-style-type: none"> 1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. (AS.SL.1) 2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. (AS.SL.2) 4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. (AS.SL.4) 5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. (AS.SL.5) 6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate. (AS.SL.6)
Writing	<p><u>Text Types and Purposes</u></p> <ol style="list-style-type: none"> 1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. (AS.W.1) 2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through

- the effective selection, organization, and analysis of content. (AS.W.2)
3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. (AS.W.3)
 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (AS.W.4)
 5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (AS.W.5)
 6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. (AS.W.6)
 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (AS.W.7)
 8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (AS.W.8)
 9. Draw evidence from literary or informational texts to support analysis, reflection, and research. (AS.W.9)
 10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. (AS.W.10)

COMPONENTS AND ASSESSMENTS

Performance Assessments:

In this problem, students will complete a multi-step, long-term molecular biology experiment. Students will design and work through a protocol to construct and clone recombinant DNA. They will perform DNA ligation and transformation, as well as restriction analysis of the completed plasmid. Alternatively, students will work through a more in-depth DNA cloning and sequencing project. This laboratory investigation provides students with the opportunity to isolate plant DNA, perform a ligation and transformation, purify a plasmid, submit DNA for sequencing, and present all work to GenBank, the NIH genetic sequence database, for publication. As students work through either of these problems, they will learn new laboratory skills, practice laboratory troubleshooting techniques, as well as review proper protocol for research notebook documentation.

Leadership Alignment:

CTE 21st Century Skill Emphasis:

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Communication and Collaboration
- Information Literacy
- Media Literacy
- ICT Literacy
- Flexibility and Adaptability
- Initiative and Self-Direction
- Productivity and Accountability
- Leadership and Responsibility

Students will create, manage and produce projects to submit to the Spokane STEMposium competition.

Standards and Competencies

Lesson Six: Molecular Biology in Action (Optional)

1. Plasmids can be used to assemble recombinant DNA and clone a gene of interest.

Standards and Benchmarks: (knowledge and skills addressed)

1. Recognize that plasmids, circular rings of DNA, that are cut with restriction enzymes can be joined or ligated to DNA (from any species) that has been cut with the same enzymes.
2. Recognize that the DNA inserted into a plasmid may provide the code for a new protein
3. Recognize that the results of a ligation experiment can be gauged by restriction analysis of an extracted plasmid and subsequent visualization of resultant bands via electrophoresis.
4. Map a plasmid in terms of the location of their restriction sites, sites that are recognized and cut by specific restriction enzymes.
5. Predict the results of a ligation experiment.
6. Ligate DNA from two organisms to create a unique plasmid vector.
7. Insert a new plasmid into bacterial cells through the process of bacterial transformation.
8. Isolate the plasmid DNA from the bacterial cells and analyze the composition of the plasmid using restriction enzymes and gel electrophoresis.
9. Analyze a gene sequence using bioinformatics tools and databases (Optional)

Total Learning Hours for Problem: 19 hours or 45 hours

National Health Science Standards

1.23 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Describe biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

- a. Gene testing
- b. Gene therapy
- c. Human proteomics
- d. Cloning
- e. Stem cell research

2.11 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Model verbal and nonverbal communication.

2.13 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Identify the differences between subjective and objective information.

2.15 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Practice speaking and active listening skills.

2.16 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Modify communication to meet the needs of the patient/client and be appropriate to the situation.

2.31 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Utilize proper elements of written and electronic communication (spelling, grammar, and formatting).

2.32 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Prepare examples of technical, informative, and creative writing.

4.21 Foundation Standard 4: Employability Skills: Utilize employability skills to enhance employment opportunities and job satisfaction

Apply employability skills in healthcare.

- a. Chain of command
- b. Correct grammar
- c. Decision making
- d. Flexible
- e. Initiative
- f. Integrity
- g. Loyalty
- h. Positive attitude
- i. Professional characteristics
- j. Prompt and prepared
- k. Responsibility
- l. Scope of practice
- m. Teamwork
- n. Willing to learn

7.12 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Differentiate methods of controlling the spread and growth of microorganisms.

- a. Aseptic control (antisepsis, disinfection, sterilization, sterile technique)
- b. Standard precautions
- c. Isolation precautions
- d. Blood borne pathogen precautions
- e. Vaccinations

7.21 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.

7.31 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Apply safety techniques in the work environment.

- a. Ergonomics
- b. Safe operation of equipment
- c. Patient/client safety measures (check area for safety)

7.41 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices

and follow health and safety policies and procedures to prevent injury and illness.
Observe all safety standards related to the Occupational Exposure to Hazardous Chemicals Standard (Safety Data Sheets (SDSs)). (www.osha.gov)

7.42 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.
Comply with safety signs, symbols, and labels.

7.51 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.
Practice fire safety in a healthcare setting.

8.12 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team.
Identify characteristics of effective teams.

- a. Active participation
- b. Commitment
- c. Common goals
- d. Cultural sensitivity
- e. Flexibility
- f. Open to feedback
- g. Positive attitude
- h. Reliability
- i. Trust
- j. Value individual contributions

8.21 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team.
Recognize methods for building positive team relationships (such as: mentorships and teambuilding).

8.22 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team.
Analyze attributes and attitudes of an effective leader.

- a. Characteristics (interpersonal skills, focused on results, positive)
- b. Types (autocratic, democratic, laissez faire)
- c. Roles (sets vision, leads change, manages accountability)

8.23 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team.
Apply effective techniques for managing team conflict (negotiation, assertive communication, gather the facts, clear expectations, mediation).

11.31 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.
Apply basic computer concepts and terminology necessary to use computers and other mobile devices.

11.32 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate basic computer troubleshooting procedures (such as: restart, check power supply, refresh browser, check settings).

11.33 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate use of file organization and information storage.

11.34 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Identify uses of basic word processing, spreadsheet, and database applications.

11.35 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Evaluate validity of web-based resources.

Aligned Washington State Standards

Arts	
Educational Technology	
Health and Fitness	
Language	<p><u>Conventions of Standard English</u></p> <ol style="list-style-type: none"> 1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. (AS.L.1) 2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. (AS.L.2) 4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate. (AS.L.4)
Math	<p><u>Number and Quantity</u></p> <p>-Reason Quantitatively And Use Units To Solve Problems.</p> <ol style="list-style-type: none"> 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (N.Q .1) 2. Define appropriate quantities for the purpose of descriptive modeling. (N.Q .2) <p><u>Algebra</u></p> <p>-Interpret The Structure Of Expressions</p> <ol style="list-style-type: none"> 1. Interpret expressions that represent a quantity in terms of its context. (A.SSE.1) <p><u>Statistics and Probability</u></p> <p>-Understand And Evaluate Random Processes Underlying Statistical Experiments</p> <ol style="list-style-type: none"> 1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (S.IC.1) [OPTIONAL] <p>-Make Inferences And Justify Conclusions From Sample Surveys, Experiments, And Observational Studies</p> <ol style="list-style-type: none"> 6. Evaluate reports based on data. (S.IC.6)
Reading	<p><u>Key Ideas and Details</u></p> <ol style="list-style-type: none"> 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence

	<p>when writing or speaking to support conclusions drawn from the text. (AS.R.1)</p> <p>2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. (AS.R.2)</p> <p>7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. (AS.R.7)</p> <p>10. Read and comprehend complex literary and informational texts independently and proficiently. (AS.R.10)</p>
Science	<p><u>From Molecules to Organisms: Structures and Processes</u></p> <p>HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. (HS.LS1.1)</p>
Social Studies	
Speaking and Listening	<p><u>Comprehension and Collaboration</u></p> <p>1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. (AS.SL.1)</p>
Writing	<p><u>Text Types and Purposes</u></p> <p>1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. (AS.W.1)</p> <p>2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (AS.W.2)</p> <p>4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (AS.W.4)</p> <p>6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. (AS.W.6)</p> <p>7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (AS.W.7)</p> <p>8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (AS.W.8)</p>

COMPONENTS AND ASSESSMENTS

Performance Assessments:

In this problem, students will work as medical experts to work through mysterious deaths. First, as forensic pathologists, students will examine a fetal pig using the same protocol as a human autopsy, including examination of the tissues, organs, systems, and body fluids, and note any abnormalities. Second, students will draw on information they have learned in the previous courses about human body systems to design a fictional death. Students will showcase the clues left behind in the body and tell the story of how the person died through documents including an autopsy report, and medical history forms. Students will finally be tasked with solving another group's mystery.

Leadership Alignment

CTE 21st Century Skill Emphasis:

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Information Literacy
- ICT Literacy
- Social and Cross-Cultural
- Productivity and Accountability
- Leadership and Responsibility

Students will create, manage and produce projects to submit to the Spokane STEMposium competition.

Standards and Competencies

Lesson Seven: Forensic Autopsy (Optional)

1. External and internal investigations of the body during an autopsy allow forensic pathologists to determine the cause of death.

Standards and Benchmarks: (knowledge and skills addressed)

1. Recognize that size measurements and weights of organs are used in an autopsy to determine any abnormalities.
2. Recognize that whether cause of death is natural, accident, or homicide, the body leaves clues to tell the story of how a person died.
3. Complete a fetal pig autopsy using the same protocol used for humans, including examination of the tissues, organs, systems, and body fluids.
4. Create a fictitious death scenario, including an autopsy report and medical history forms, to illustrate cause of death.
5. Analyze a fictitious death scenario, including an autopsy report and medical history forms, to determine cause of death.

Total Learning Hours for Problem: 12 hours

National Health Science Standards

1.11 Foundation Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Identify basic levels of organization of the human body

- a. Chemical
- b. Cellular
- c. Tissue
- d. Organs
- e. Systems
- f. Organism

1.13 Foundation Standard 1: Academic Foundation Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Analyze basic structures and functions of human body systems (skeletal, muscular, integumentary, cardiovascular, lymphatic, respiratory, nervous, special senses, endocrine, digestive, urinary, and reproductive).

- a. Skeletal (bone anatomy, axial and appendicular skeletal bones, functions of bones, ligaments, types of joints)
- b. Muscular (microscopic anatomy of muscle tissue, types of muscle, locations of skeletal muscles, functions of muscles, tendons, directional movements)
- c. Integumentary (layers, structures and functions of skin)
- d. Cardiovascular (components of blood, structures and functions of blood components, structures and functions of the cardiovascular system, conduction system of the heart, cardiac cycle)
- e. Lymphatic (structures and functions of lymphatic system, movement of lymph fluid)
- f. Respiratory (structures and functions of respiratory system, physiology of respiration)
- g. Nervous (structures and functions of nervous tissue and system, organization of nervous system)
- h. Special senses (structures and functions of eye, ear, nose and tongue; identify senses for sight, hearing, smell, taste, touch)
- i. Endocrine (endocrine versus exocrine, structures and functions of endocrine system, hormones, regulation of hormones)
- j. Digestive (structures and functions of gastrointestinal tract, chemical and mechanical digestion, structures and functions of accessory organs)

- k. Urinary (structures and functions of urinary system, gross and microscopic anatomy, process of urine formation, urine composition, homeostatic balance)
- l. Reproductive (structures and functions of male and female reproductive systems, formation of gametes, hormone production and effects, menstrual cycle, and conception)
- 1.32 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.
Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.
- 2.11 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Model verbal and nonverbal communication.
- 2.13 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Identify the differences between subjective and objective information.
- 2.15 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Practice speaking and active listening skills.
- 2.16 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Modify communication to meet the needs of the patient/client and be appropriate to the situation.
- 2.31 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Utilize proper elements of written and electronic communication (spelling, grammar, and formatting).
- 2.32 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Prepare examples of technical, informative, and creative writing.
- 4.21 Foundation Standard 4: Employability Skills: Utilize employability skills to enhance employment opportunities and job satisfaction
Apply employability skills in healthcare.
 - a. Chain of command
 - b. Correct grammar
 - c. Decision making
 - d. Flexible
 - e. Initiative
 - f. Integrity
 - g. Loyalty
 - h. Positive attitude
 - i. Professional characteristics
 - j. Prompt and prepared
 - k. Responsibility

- l. Scope of practice**
- m. Teamwork**
- n. Willing to learn**

8.12 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Identify characteristics of effective teams.

- a. Active participation**
- b. Commitment**
- c. Common goals**
- d. Cultural sensitivity**
- e. Flexibility**
- f. Open to feedback**
- g. Positive attitude**
- h. Reliability**
- i. Trust**
- j. Value individual contributions**

8.21 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Recognize methods for building positive team relationships (such as: mentorships and teambuilding).

8.22 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Analyze attributes and attitudes of an effective leader.

- a. Characteristics (interpersonal skills, focused on results, positive)**
- b. Types (autocratic, democratic, laissez faire)**
- c. Roles (sets vision, leads change, manages accountability)**

8.23 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Apply effective techniques for managing team conflict (negotiation, assertive communication, gather the facts, clear expectations, mediation).

11.31 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Apply basic computer concepts and terminology necessary to use computers and other mobile devices.

11.32 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate basic computer troubleshooting procedures (such as: restart, check power supply, refresh browser, check settings).

11.33 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate use of file organization and information storage.

11.34 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Identify uses of basic word processing, spreadsheet, and database applications.

11.35 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Evaluate validity of web-based resources.

<i>Aligned Washington State Standards</i>	
Arts	
Educational Technology	
Health and Fitness	
Language	<p><u>Conventions of Standard English</u></p> <ol style="list-style-type: none"> 1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. (AS.L.1) 2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. (AS.L.2) 4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate. (AS.L.4)
Math	<p><u>Number and Quantity</u></p> <p>-Reason Quantitatively And Use Units To Solve Problems.</p> <ol style="list-style-type: none"> 2. Define appropriate quantities for the purpose of descriptive modeling. (N.Q .2) 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (N.Q .3) <p><u>Statistics and Probability</u></p> <p>-Make Inferences And Justify Conclusions From Sample Surveys, Experiments, And Observational Studies</p> <ol style="list-style-type: none"> 6. Evaluate reports based on data. (S.IC.6)
Reading	<p><u>Key Ideas and Details</u></p> <ol style="list-style-type: none"> 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. (AS.R.1) 2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. (AS.R.2) 7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. (AS.R.7) 10. Read and comprehend complex literary and informational texts independently and proficiently. (AS.R.10)
Science	<p><u>From Molecules to Organisms: Structures and Processes</u></p> <p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS.LS1.2)</p>
Social Studies	
Speaking and Listening	<p><u>Comprehension and Collaboration</u></p> <ol style="list-style-type: none"> 1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. (AS.SL.1) 2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. (AS.SL.2)
Writing	<p><u>Text Types and Purposes</u></p>

1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. (AS.W.1)
2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (AS.W.2)
3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. (AS.W.3)
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (AS.W.4)
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (AS.W.5)
6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. (AS.W.6)
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (AS.W.8)
9. Draw evidence from literary or informational texts to support analysis, reflection, and research. (AS.W.9)
10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. (AS.W.10)

COMPONENTS AND ASSESSMENTS

Performance Assessments:

In this problem, students will work independently to determine an area of interest in the biomedical sciences and outline milestones in a long-term open-ended problem. Students will use skills learned in the previous courses as well as the previous problems to help them complete their project. Student work will include completing a literature review, writing and carrying out the methodology for their project, analyzing the results, making adjustments as needed, and finally presenting the results of their work to an adult audience. Students may work with mentors or advisors from a university, hospital, physician's office, or industry partner to help guide them as they complete their work.

Leadership Alignment:

CTE 21st Century Skill Emphasis:

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Communication and Collaboration
- Information Literacy
- Media Literacy
- ICT Literacy
- Flexibility and Adaptability
- Initiative and Self-Direction
- Productivity and Accountability
- Leadership and Responsibility

Students will create, manage and produce projects to submit to the Spokane STEMposium competition.

Standards and Competencies

Lesson Eight: Independent Project (*Optional*)

1. A long-term project requires planning in order to have the proper materials and to schedule the work to be completed in time.

Standards and Benchmarks: (knowledge and skills addressed)

1. Recognize that breaking a large project into many smaller tasks allows for modifications to be made as necessary and serves as a means to monitor progress toward completion of the project.
2. Use appropriate internet search techniques to gather information about a topic from appropriate websites.
3. Develop a proposal for an independent project.
4. Establish a protocol, timeline, and a means to measure progress toward completion of the project.
5. Complete an independent project, including making a product, writing a report, compiling a portfolio, and delivering an oral presentation

Total Learning Hours for Problem: 24 hours +

National Health Science Standards

1.31 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Demonstrate competency in basic math skills and mathematical conversions as they relate to healthcare.

- a. Metric system (such as: centi, milli, kilo)
- b. Mathematical (average, ratios, fractions, percentages, addition, subtraction, multiplication, division)
- c. Conversions (height, weight/mass, length, volume, temperature, household measurements)

1.32 Foundation: Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

2.11 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Model verbal and nonverbal communication.

2.13 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Identify the differences between subjective and objective information.

2.15 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Practice speaking and active listening skills.

2.16 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Modify communication to meet the needs of the patient/client and be appropriate to the situation.

2.31 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Utilize proper elements of written and electronic communication (spelling, grammar, and formatting).

2.32 Foundation Standard 2: Communications: Demonstrate methods of delivering and obtaining information, while communicating effectively. Prepare examples of technical, informative, and creative writing.

4.21 Foundation Standard 4: Employability Skills: Utilize employability skills to enhance employment opportunities and job satisfaction

Apply employability skills in healthcare.

- a. Chain of command
- b. Correct grammar
- c. Decision making
- d. Flexible
- e. Initiative
- f. Integrity
- g. Loyalty
- h. Positive attitude
- i. Professional characteristics
- j. Prompt and prepared
- k. Responsibility
- l. Scope of practice
- m. Teamwork
- n. Willing to learn

4.41 Foundation Standard 4: Employability Skills: Utilize employability skills to enhance employment opportunities and job satisfaction

Develop components of a personal portfolio.

- a. Letter of introduction
- b. Resume
- c. Sample Projects
- d. Writing Sample
- e. Work-based Learning Documentation
- f. Oral Report
- g. Service Learning/Community Service
- h. Credentials
- i. Technology Skills
- j. Leadership Examples

7.21 Foundation Standard 7: Safety Practices: Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.

8.12 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team.

Identify characteristics of effective teams.

- a. Active participation
- b. Commitment
- c. Common goals
- d. Cultural sensitivity

- e. Flexibility
- f. Open to feedback
- g. Positive attitude
- h. Reliability
- i. Trust
- j. Value individual contributions

8.21 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Recognize methods for building positive team relationships (such as: mentorships and teambuilding).

8.22 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Analyze attributes and attitudes of an effective leader.

- a. Characteristics (interpersonal skills, focused on results, positive)
- b. Types (autocratic, democratic, laissez faire)
- c. Roles (sets vision, leads change, manages accountability)

8.23 Foundation Standard 8: Teamwork: Identify roles and responsibilities of individual members as part of the healthcare team. Apply effective techniques for managing team conflict (negotiation, assertive communication, gather the facts, clear expectations, mediation).

11.31 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Apply basic computer concepts and terminology necessary to use computers and other mobile devices.

11.32 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate basic computer troubleshooting procedures (such as: restart, check power supply, refresh browser, check settings).

11.33 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Demonstrate use of file organization and information storage.

11.34 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Identify uses of basic word processing, spreadsheet, and database applications.

11.35 Foundation Standard 11: Information Technology Applications: Utilize and understand information technology applications common across health professions.

Evaluate validity of web-based resources.

Aligned Washington State Standards

Arts	
Educational Technology	
Health and Fitness	
Language	<p><u>Conventions of Standard English</u></p> <ol style="list-style-type: none"> 1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. (AS.L.1) 2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. (AS.L.2) 4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate. (AS.L.4) 5. Demonstrate understanding of word relationships and nuances in word meanings. (AS.L.5) 6. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. (AS.L.6)
Math	<p><u>Number and Quantity</u></p> <p>-Reason Quantitatively And Use Units To Solve Problems.</p> <ol style="list-style-type: none"> 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (N.Q .1) [OPTIONAL] 2. Define appropriate quantities for the purpose of descriptive modeling. (N.Q .2) [OPTIONAL] 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (N.Q .3) [OPTIONAL] <p><u>Algebra</u></p> <p>-Interpret The Structure Of Expressions</p> <ol style="list-style-type: none"> 1. Interpret expressions that represent a quantity in terms of its context. (A.SSE.1) [OPTIONAL] 1.a. Interpret parts of an expression, such as terms, factors, and coefficients. (A.SSE.1.a) [OPTIONAL] <p>Reasoning With Equations And Inequalities</p> <p>-Understand Solving Equations As A Process Of Reasoning And Explain The Reasoning</p> <ol style="list-style-type: none"> 1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. (A.REI.1) [OPTIONAL] <p><u>Functions</u></p> <p>-Interpret Functions That Arise In Applications In Terms Of The Context</p> <ol style="list-style-type: none"> 4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*</i> (F.IF.4) [OPTIONAL] <p>-Analyze Functions Using Different Representations</p> <ol style="list-style-type: none"> 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* (F.IF.7) [OPTIONAL] <p><u>Statistics and Probability</u></p> <p>-Summarize, Represent, And Interpret Data On A Single Count Or Measurement Variable</p>

	<p>1. Represent data with plots on the real number line (dot plots, histograms, and box plots). (S.ID.1) [OPTIONAL]</p> <p>2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. (S.ID.2) [OPTIONAL]</p> <p>3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). (S.ID.3) [OPTIONAL]</p> <p>-Interpret Linear Models</p> <p>9. Distinguish between correlation and causation. (S.ID.9) [OPTIONAL]</p> <p>-Understand And Evaluate Random Processes Underlying Statistical Experiments</p> <p>1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (S.IC.1) [OPTIONAL]</p> <p>-Make Inferences And Justify Conclusions From Sample Surveys, Experiments, And Observational Studies</p> <p>3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. (S.IC.3) [OPTIONAL]</p> <p>4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. (S.IC.4) [OPTIONAL]</p> <p>5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. (S.IC.5) [OPTIONAL]</p> <p>6. Evaluate reports based on data. (S.IC.6) [OPTIONAL]</p>
Reading	<p><u>Key Ideas and Details</u></p> <p>1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. (AS.R.1)</p> <p>2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. (AS.R.2)</p> <p>7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. (AS.R.7)</p> <p>8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence. (AS.R.8)</p> <p>10. Read and comprehend complex literary and informational texts independently and proficiently. (AS.R.10)</p>
Science	<p><u>Engineering Design</u></p> <p>HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. (HS.ETS1.1)</p> <p>HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS.ETS1.2)</p> <p>HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. (HS.ETS1.3)</p>
Social Studies	
Speaking and Listening	<p><u>Comprehension and Collaboration</u></p> <p>1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. (AS.SL.1)</p> <p>2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. (AS.SL.2)</p> <p>4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. (AS.SL.4)</p>

	<p>5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. (AS.SL.5)</p> <p>6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate. (AS.SL.6)</p>
Writing	<p><u>Text Types and Purposes</u></p> <p>1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. (AS.W.1)</p> <p>2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (AS.W.2)</p> <p>3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. (AS.W.3)</p> <p>4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (AS.W.4)</p> <p>5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (AS.W.5)</p> <p>6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. (AS.W.6)</p> <p>7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (AS.W.7)</p> <p>8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (AS.W.8)</p> <p>9. Draw evidence from literary or informational texts to support analysis, reflection, and research. (AS.W.9)</p> <p>10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. (AS.W.10)</p>

21st Century Skills

<p>LEARNING & INNOVATION</p> <p>Creativity and Innovation X Think Creatively X Work Creatively with Others X Implement Innovations</p> <p>Critical Thinking and Problem Solving X Reason Effectively X Use Systems Thinking X Make Judgments and Decisions X Solve Problems</p> <p>Communication and Collaboration X Communicate Clearly X Collaborate with Others</p>	<p>INFORMATION, MEDIA & TECHNOLOGY SKILLS</p> <p>Information Literacy X Access and /evaluate Information X Use and Manage Information</p> <p>Media Literacy X Analyze Media X Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy) X Apply Technology Effectively</p>	<p>LIFE & CAREER SKILLS</p> <p>Flexibility and Adaptability X Adapt to Change X Be Flexible</p> <p>Initiative and Self-Direction X Manage Goals and Time X Work Independently X Be Self-Directed Learners</p> <p>Social and Cross-Cultural X Interact Effectively with Others X Work Effectively in Diverse Teams</p> <p>Productivity and Accountability X Manage Projects X Produce Results</p> <p>Leadership and Responsibility X Guide and Lead Others X Be Responsible to Others</p>
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