

Warren County School District

PLANNED INSTRUCTION

COURSE DESCRIPTION

Course Title: Medical Detectives (PLTW STEM COURSE)

Course Number: 00757

Course Prerequisites: None

Course Description:

In the Medical Detectives Course, students play the role of real-life medical detectives as they analyze genetic testing results to diagnose disease and study DNA evidence found at a 'crime scene.' They solve medical mysteries through hands-on projects and labs, investigate how to measure and interpret vital signs, and learn how the systems of the human body work together to maintain health.

Suggested Grade Level: 6 – 8

Length of Course: ☒ One Semester ☐ Two Semesters ☐ Other (Describe)

Units of Credit: .50 Middle Level Credit (Insert *None* if appropriate)

PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:
CSPG 32, CSPG 54, CSPG 65

Certification verified by WCSD Human Resources Department: ☒ Yes ☐ No

TEXTBOOK AND SUPPLEMENTAL MATERIALS

Continue using Board approved textbook? ☐ Yes ☒ No (If yes, then complete the information below.)

Board Approved Textbooks, Software, Supplemental Materials:

Title: Project Lead the Way Durable and Consumable Resources

Publisher:

ISBN #:

Copyright Date:

Date of WCSD Board Approval:

BOARD APPROVAL:

Date Written: 8/28/2018

Date Approved: October 8, 2018; March 11, 2019 Revised

Implementation Date: 2018-2019

SPECIAL EDUCATION AND GIFTED REQUIREMENTS

The teacher shall make appropriate modification to instruction and assessment based on a student's Individual Education Plan (IEP) or Gifted Individual Education Plan (GIEP).

COURSE OVERVIEW

(List the content to be taught)

For standards, essential questions, content, and skills see Curriculum Map – See Attached Course Outline and Academic Standards taught within this course.

ASSESSMENT

Portfolio Assessment: ☐ Yes ☒ No

District-Wide Common Final Examination Required: ☐ Yes ☒ No

Course Challenge Assessment (Describe): None Available

WRITING TEAM: Warren County School District

WCSD STUDENT DATA SYSTEM INFORMATION

1. Is there a required final examination? ☐ Yes ☒ No
**Warren County School District Policy 9741 and 9744 state, "All classes in grades 9-12 shall have a final exam."*
2. Does this course issue a mark/grade for the report card? ☒ Yes ☐ No
3. Does this course issue a Pass/Fail mark? ☐ Yes ☒ No
4. Is the course mark/grade part of the GPA calculation? ☒ Yes ☐ No
5. Is the course eligible for Honor Roll calculation? ☒ Yes ☐ No
6. What is the academic weight of the course?

☐ No weight/Non credit☒ Standard weight☐ Enhanced weight

Solve medical mysteries by performing a brain dissection and conducting crime scene investigations! Students use tools such as the engineering design process, an engineering notebook, and electrophoresis to solve a murder.

Learn how creative thinking and problem solving can change your world!

In the Medical Detectives (MD) unit, students play the role of real-life medical detectives as they analyze genetic testing results to diagnose disease and study DNA evidence found at a “crime scene.” They solve medical mysteries through hands-on projects and labs, investigate how to measure and interpret vital signs, and learn how the systems of the human body work together to maintain health.

MD Lesson Summary

Lesson 1	What Is a Medical Detective?
Lesson 2	Mysteries of the Human Body System
Lesson 3	Murder Mystery

Lesson 1: What Is a Medical Detective?

Students will discover how healthcare professionals act as medical detectives in identifying, treating, and preventing injury and illness in their patients. Students examine patient medical histories and investigate how these histories guide medical detectives to the correct diagnosis and treatment of a particular illness. Students also investigate and collect vital signs such as heart rate, blood pressure, and temperature. Finally, students research pathogens involved in foodborne illness and act as medical detectives in diagnosing and proposing a treatment plan for a patient with a mystery illness.

Lesson 2: Mysteries of the Human Body System

This lesson introduces the human body as a compilation of body systems. Students investigate the nervous system, including brain anatomy and physiology. A mysterious illness prompts the students to explore the role of genetics in disease. Students investigate how mutations in DNA can cause disease and learn how genetic diseases are passed through families.

Lesson 3: Murder Mystery

This lesson begins with a murder victim found in an elevator and immerses the students in the world of crime scene investigators, medical examiners, and pathologists. Students have the opportunity to work through a virtual autopsy and explore how a suspect may be identified through DNA analysis in the process of solving the crime.

Medical Detectives (MD)

Common Core State Standards for English Language Arts

Lesson 8.1 - What is a Medical Detective?

Reading

Key Ideas and Details

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)
7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. (AS.R.7)

Text Types and Purposes

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)
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)

Comprehension and Collaboration

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)

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)

Conventions of Standard English

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)
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)

Lesson 8.2 - Mysteries of the Human Body Systems

Reading

Key Ideas and Details

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)
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)
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)

Text Types and Purposes

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)
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)

Comprehension and Collaboration

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)
5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. (AS.SL.5)

Conventions of Standard English

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)

Lesson 8.3 - Murder Mystery

Reading

Text Types and Purposes

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)
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)

Comprehension and Collaboration

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)
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)

Conventions of Standard English

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)
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)

Standards for Technological Literacy

Lesson 8.1 - What Is a Medical Detective?

Students will develop an understanding of the cultural, social, economic, and political effects of technology.

6-8

- D. The use of technology affects humans in various ways, including their safety, comfort, choices, and attitudes about technology's development and use. (4.6-8.D)

Students will develop the abilities to use and maintain technological products and systems.

6-8

- J. Use computers and calculators in various applications. (12.6-8.J)

Students will develop the abilities to assess the impact of products and systems.

6-8

- F. Design and use instruments to gather data. (13.6-8.F)
- G. Use data collected to analyze and interpret trends in order to identify the positive and negative effects of a technology. (13.6-8.G)

Students will develop an understanding of and be able to select and use medical technologies.

6-8

- G. Advances and innovations in medical technologies are used to improve healthcare. (14.6-8.G)
- H. Sanitation processes used in the disposal of medical products help to protect people from harmful organisms and disease, and shape the ethics of medical safety. (14.6-8.H)
- I. The vaccines developed for use in immunization require specialized technologies to support environments in which a sufficient amount of vaccines is produced. (14.6-8.I)

Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.

6-8

- H. Biotechnology applies the principles of biology to create commercial products or processes. (15.6-8.H)
- J. The development of refrigeration, freezing, dehydration, preservation, and irradiation provide long-term storage of food and reduce the health risks caused by tainted food. (15.6-8.J)

Lesson 8.2 - Mysteries of the Human Body Systems

Students will develop the abilities to use and maintain technological products and systems.

6-8

J. Use computers and calculators in various applications. (12.6-8.J)

Students will develop an understanding of and be able to select and use medical technologies.

6-8

G. Advances and innovations in medical technologies are used to improve healthcare. (14.6-8.G)

Lesson 8.3 - Murder Mystery

Students will develop an understanding of the characteristics and scope of technology.

6-8

F. New products and systems can be developed to solve problems or to help do things that could not be done without the help of technology. (1.6-8.F)

Students will develop an understanding of and be able to select and use medical technologies.

6-8

G. Advances and innovations in medical technologies are used to improve healthcare. (14.6-8.G)

Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.

6-8

H. Biotechnology applies the principles of biology to create commercial products or processes. (15.6-8.H)

Next Generation Science Standards

Lesson 8.1 - What Is a Medical Detective?

Middle School

Energy

4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. (MS.PS3.4)

Lesson 8.2 - Mysteries of the Human Body Systems

Middle School

From Molecules to Organisms: Structures and Processes

3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. (MS.LS1.3)
5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. (MS.LS1.5)
8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. (MS.LS1.8)

Heredity: Inheritance and Variation of Traits

1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. (MS.LS3.1)

Lesson 8.3 - Murder Mystery

Middle School

Biological Evolution: Unity and Diversity

5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. (MS.LS4.5)

National Healthcare Foundation Standards and Accountability Criteria

Lesson 8.1 - What Is a Medical Detective?

Academic Foundation

Diseases and Disorders

- 1 Describe common diseases and disorders of each body system (prevention, pathology, diagnosis, and treatment). (1.2.1)
- 3 Investigate biomedical therapies as they relate to the prevention, pathology, and treatment of disease. (1.2.3)

Medical Mathematics

- 1 Apply mathematical computations related to healthcare procedures (metric and household, conversions and measurements). (1.3.1)
- 2 Analyze diagrams, charts, graphs, and tables to interpret healthcare results. (1.3.2)

Communications

Concepts of Effective Communication

- 5 Apply speaking and active listening skills. (2.1.5)

Written Communication Skills

- 1 Recognize elements of written and electronic communication (spelling, grammar, and formatting). (2.3.1)

Employability Skills

Personal Traits of the Healthcare Professional

- 1 Classify the personal traits and attitudes desirable in a member of the healthcare team (4.1.1)

Career Decision-making

- 1 Discuss levels of education, credentialing requirements, and employment trends in healthcare. (4.3.1)
- 2 Compare careers within the health science career pathways (diagnostic services, therapeutic services, health informatics, support services, or biotechnology research and development). (4.3.2)

Safety Practices

Infection Control

- 2 Describe methods of controlling the spread and growth of microorganisms. (7.1.2)

Technical Skills

Technical Skills

- 1 Apply procedures for measuring and recording vital signs including the normal ranges. (10.1.1)

Information Technology ApplicationsHealth Information Management

- 1 Utilize current computer hardware and software. (11.1.1)

Lesson 8.2 - Mysteries of the Human Body Systems**Academic Foundation**Human Structure and Function

- 1 Classify the basic structural and functional organization of the human body (tissue, organ, and system). (1.1.1)
- 3 Analyze the basic structure and function of the human body. (1.1.3)

Diseases and Disorders

- 1 Describe common diseases and disorders of each body system (prevention, pathology, diagnosis, and treatment). (1.2.1)
- 3 Investigate biomedical therapies as they relate to the prevention, pathology, and treatment of disease. (1.2.3)

Medical Mathematics

- 2 Analyze diagrams, charts, graphs, and tables to interpret healthcare results. (1.3.2)

CommunicationsConcepts of Effective Communication

- 5 Apply speaking and active listening skills. (2.1.5)

Written Communication Skills

- 1 Recognize elements of written and electronic communication (spelling, grammar, and formatting). (2.3.1)

EthicsEthical Boundaries

- 2 Recognize ethical issues and their implications related to healthcare. (6.1.2)

Information Technology ApplicationsHealth Information Management

- 1 Utilize current computer hardware and software. (11.1.1)

Lesson 8.3 - Murder Mystery

Academic Foundation

Medical Mathematics

- 1 Apply mathematical computations related to healthcare procedures (metric and household, conversions and measurements). (1.3.1)
- 2 Analyze diagrams, charts, graphs, and tables to interpret healthcare results. (1.3.2)

Communications

Concepts of Effective Communication

- 5 Apply speaking and active listening skills. (2.1.5)

Written Communication Skills

- 1 Recognize elements of written and electronic communication (spelling, grammar, and formatting). (2.3.1)

Information Technology Applications

Health Information Management

- 1 Utilize current computer hardware and software. (11.1.1)
- 2 Identify records, files and technology applications common to healthcare. (11.1.2)

Information Technology

- 1 Communicate using technology to access and distribute data and other information. (11.2.1)

Common Core State Standards for Mathematical Practice (6- 8)

Lesson 8.1 - What is a Medical Detective?

Grade 6

Ratios and Proportional Relationships

Understand ratio concepts and use ratio reasoning to solve problems.

- 3.d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. (6.RP.A.3d)

The Number System

Apply and extend previous understandings of numbers to the system of rational numbers.

7. Understand ordering and absolute value of rational numbers. (6.NS.C.7)
7.d. Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars. (6.NS.C.7d)

Expressions and Equations

Apply and extend previous understandings of arithmetic to algebraic expressions.

2. Write, read, and evaluate expressions in which letters stand for numbers. (6.EE.A.2)
2.c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$. (6.EE.A.2c)

Reason about and solve one-variable equations and inequalities.

6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (6.EE.B.6)
7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers. (6.EE.B.7)

Statistics and Probability

Summarize and describe distributions.

5. Summarize numerical data sets in relation to their context, such as by: (6.SP.B.5)
5.a. Reporting the number of observations. (6.SP.B.5a)
5.b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. (6.SP.B.5b)

Grade 7The Number System

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. (7.NS.A.1)
3. Solve real-world and mathematical problems involving the four operations with rational numbers. (7.NS.A.3)

Expressions and Equations

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. (7.EE.B.3)
4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.B.4)

Lesson 8.2 - Mysteries of the Human Body Systems**Grade 6**Statistics and Probability

Develop understanding of statistical variability.

2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. (6.SP.A.2)
3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. (6.SP.A.3)

Summarize and describe distributions.

5. Summarize numerical data sets in relation to their context, such as by: (6.SP.B.5)
 - 5.a. Reporting the number of observations. (6.SP.B.5a)
 - 5.b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. (6.SP.B.5b)

Grade 7The Number System

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. (7.NS.A.1)
3. Solve real-world and mathematical problems involving the four operations with rational numbers. (7.NS.A.3)

Expressions and Equations

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. (7.EE.B.3)

Lesson 8.3 - Murder Mystery**Grade 6**Expressions and Equations

Apply and extend previous understandings of arithmetic to algebraic expressions.

1. Write and evaluate numerical expressions involving whole-number exponents. (6.EE.A.1)
- 2.c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$. (6.EE.A.2c)

Reason about and solve one-variable equations and inequalities.

6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (6.EE.B.6)

Represent and analyze quantitative relationships between dependent and independent variables.

9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph

ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time. (6.EE.C.9)

Grade 7

The Number System

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. (7.NS.A.1)
3. Solve real-world and mathematical problems involving the four operations with rational numbers. (7.NS.A.3)

Expressions and Equations

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. (7.EE.B.3)
4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.B.4)

Grade 8

Expressions and Equations

Understand the connections between proportional relationships, lines, and linear equations.

5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. (8.EE.B.5)