English Language Arts and Literacy

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Grade 7

Reading Literature [RL]

1. Cite several pieces of textual evidence to support analysis of what a text states explicitly as well as inferences drawn from the text, quoting or paraphrasing as appropriate. (See grade 7 Writing Standard 8 for more on quoting and paraphrasing.)
2. Determine a theme or central idea of a text and analyze its development over the course of the text; provide an objective summary of a text.
3. Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning, tone, or mood, including the impact of repeated use of particular images. (See grade 7 Language Standards 4–6 on applying knowledge of vocabulary to reading.)

Reading Informational Text [RI]

1. Cite several pieces of textual evidence to support analysis of what a text states explicitly as well as inferences drawn from the text, quoting or paraphrasing as appropriate. (See grade 7 Writing Standard 8 for more on quoting and paraphrasing.)
2. Determine a text's central idea(s) and analyze its/their development over the course of the text; provide an objective summary of a text.
8. Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.
10. Independently and proficiently read and comprehend literature **and** literary nonfiction representing a variety of genres, cultures, and perspectives and exhibiting complexity appropriate for at least grade 7.

Writing [W]

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3.)
9. Draw evidence from literary or informational texts to support written analysis, interpretation, reflection, and research, applying one or more grade 7 Standards for Reading Literature or Reading Informational Text as needed.

Language [L]

1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking; retain and further develop language skills learned in previous grades. (See grade 7 Writing Standard 5 and Speaking and Listening Standard 6 on strengthening writing and presentations by applying knowledge of conventions.)
   Sentence Structure, Variety, and Meaning

   a. Use phrases and clauses to communicate ideas precisely, with attention to skillful use of verb tenses to add clarity.
   b. Recognize and correct vague pronouns (those that have unclear or ambiguous antecedents).[17]
   c. Recognize and correct inappropriate shifts in pronoun number and person in sentences with multiple clauses and phrases.
   d. Recognize that changing the placement of a phrase or clause can add variety, emphasize particular relationships among ideas, or alter the meaning of a sentence or paragraph.[17]

2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
   a. Use a comma to separate coordinate adjectives (e.g., *a fascinating, enjoyable movie*).
   b. Spell correctly, recognizing that some words have commonly accepted variations (e.g., donut/doughnut).

Science and Technology/Engineering

Grade 7

Earth and Space Sciences   7.MS-ESS

6.MS-ESS2-2. Construct an explanation based on evidence for how Earth's surface has changed over scales that range from local to global in size.

Life Science   7.MS-LS

7.MS-LS2-3. Develop a model to describe that matter and energy are transferred among living and nonliving parts of an ecosystem and that both matter and energy are conserved through these processes.

Physical Science   7.MS-PS

7.MS-PS2-5. Use scientific evidence to argue that fields exist between objects with mass, between magnetic objects, and between electrically charged objects that exert force on each other even though the objects are not in contact.

7.MS-PS3-3. Apply scientific principles of energy and heat transfer to design, construct, and test a device to minimize or maximize thermal energy transfer.*

7.MS-PS3-7(MA). Use informational text to describe the relationship between kinetic and potential energy and illustrate conversions from one form to another.

Technology/Engineering   7.MS-ETS

7.   MS-ETS1-2. Evaluate competing solutions to a given design problem using a decision matrix to determine how well each meets the criteria and constraints of the problem. Use a model of each solution to evaluate how variations in one or more design features, including size, shape, weight, or cost, may affect the function or effectiveness of the solution.*

History and Social Science

Grade 6 and 7

Grades 6 and 7 form a two-year sequence in which students study regions of the world by examining physical geography, nations in the region today, and selected ancient and classical societies. The standards listed below are pre-requisites for success in grade 8.

Practice Standards
2. Develop focused questions or problem statements and conduct inquiries
3. Organize information and data from multiple primary and secondary sources.

Content Topic 1: Studying complex societies, past and present [6.T1]
1. Explain how different academic fields in the social sciences concentrate on different means of studying societies in the past and present.
2. Give examples of ways in which a current historical interpretation might build on, extend, or reject an interpretation of the past.
3. Give examples of how archaeologists, historians, geographers, economists, and political scientists work as teams to analyze evidence, develop hypotheses, and construct interpretations of ancient and classical civilizations.

Content Topics 6.T2- 7.T4c
Teachers are encouraged to use Practice Standards 2 and 3 to facilitate inquiry-based investigations of a civilization/region not yet studied.

Mathematics

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Grade 7
Ratios and Proportional Relationships   7.RP
A. Analyze proportional relationships and use them to solve real-world and mathematical problems.
1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.
   For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½/¼ miles per hour, equivalently 2 miles per hour.
2. Recognize and represent proportional relationships between quantities.

a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table, or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.

c. Represent proportional relationships by equations.
d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.

3. Use proportional relationships to solve multi-step ratio, rate, and percent problems.

For example: simple interest, tax, price increases and discounts, gratuities and commissions, fees, percent increase and decrease, percent error.

The Number System   7.NS

A. 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 integers and other rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
   a. Describe situations in which opposite quantities combine to make zero.

   For example: A hydrogen atom has zero charge because its two constituents are oppositely charged; If you open a new bank account with a deposit of $30 and then withdraw $30, you are left with a $0 balance.
   b. Understand $p + q$ as the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
   c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
   d. Apply properties of operations as strategies to add and subtract rational numbers.

2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide integers and other rational numbers.

a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then

$-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

c. Apply properties of operations as strategies to multiply and divide rational numbers.

d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

3. Solve real-world and mathematical problems involving the four operations with integers and other rational numbers.[3]

Expressions and Equations   7.EE

A. Use properties of operations to generate equivalent expressions.

1. Apply properties of operations to add, subtract, factor, and expand linear expressions

with rational coefficients.

For example, 4x + 2 = 2(2x +1) and -3(x – ⅔) = -3x + 5.

2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05." A shirt at a clothing store is on sale for 20% off the regular price, "p". The discount can be expressed as 0.2p. The new price for the shirt can be expressed as p – 0.2p or 0.8p.

B.   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 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 9¾ inches long in the center of a door that is 27½ 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.

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.

a. Solve word problems leading to equations of the form $px + q = r$ and $p(x \div q) = r$,

where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

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[3] Computations with rational numbers extend the rules for manipulating fractions to complex fractions.

    b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the

inequality and interpret it in the context of the problem.
For example, as a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.

    c. Extend analysis of patterns to include analyzing, extending, and determining an expression for simple arithmetic and geometric sequences (e.g., compounding, increasing area), using tables, graphs, words, and expressions.

Geometry   7.G

B.   **Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.**

    4. Circles and measurement:

        a. Know that a circle is a two-dimensional shape created by connecting all of the points equidistant from a fixed point called the center of the circle.

        b. Understand and describe the relationships among the radius, diameter, and circumference of a circle.

        c. Understand and describe the relationship among the radius, diameter, and area of a circle.

        d. Know the formulas for the area and circumference of a circle and use them to solve problems.

        e. Give an informal derivation of the relationship between the circumference and area of a circle.

    6. Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Statistics and Probability   7.SP

C. Investigate chance processes and develop, use, and evaluate probability models.

    5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

    8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

        a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

        b. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.

        c. Design and use a simulation to generate frequencies for compound events.

For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least four donors to find one with type A blood?

English Language Arts and Literacy

Grade 8
Reading Literature [RL]

1. Cite the textual evidence that most strongly supports analysis of what a text states explicitly as well as inferences drawn from the text, quoting or paraphrasing as appropriate. (See grade 8 Writing Standard 8 for more on quoting and paraphrasing.)
2. Determine a theme or central idea of a text and analyze its development over the course of the text, including its relationship to the characters, setting, and plot; provide an objective summary of a text
4. Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning, tone, or mood, including the impact of allusion and irony. (See grade 8 Language Standards 4–6 on applying knowledge of vocabulary to reading.)

Reading Informational Text [RI]

1. Cite the textual evidence that most strongly supports an analysis of what a text states explicitly as well as inferences drawn from the text, quoting or paraphrasing as appropriate. (See grade 8 Writing Standard 8 for more on quoting and paraphrasing.)
2. Determine a text's central idea(s) and analyze its/their development over the course of the text,
including relationships to supporting ideas; provide an objective summary of a text.
8. Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.
10. Independently and proficiently read and comprehend literature **and** literary nonfiction representing a variety of genres, cultures, and perspectives and exhibiting complexity appropriate for at least grade 8.

Writing [W]

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
9. Draw evidence from literary or informational texts to support written analysis, interpretation, reflection, and research, applying one or more grade 8 standards for Reading Literature or Reading Informational Text as needed.

Language [L]

1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking; retain and further develop language skills learned in previous grades. (See grade 8 Writing Standard 5 and Speaking and Listening Standard 6 on strengthening writing and presentations by applying knowledge of conventions.)
   Sentence Structure, Variety, and Meaning

a. Coordinate phrases and clauses in simple, compound, complex, and compound-complex sentences, with emphasis on agreement of pronouns and their antecedents.
   b. Form and use verbs in the active and passive voices and the indicative, imperative, interrogative, conditional, and subjunctive moods to communicate a particular meaning.
2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
   a. Use punctuation (comma, ellipsis, dash) to indicate a pause or break.
   b. Use an ellipsis to indicate an omission. Spell correctly, recognizing that some words have commonly accepted variations (e.g., donut/doughnut).

Science and Technology/Engineering

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Grade 8

Earth and Space Sciences   8.MS-ESS

8.   MS-ESS1-1b. Develop and use a model of the Earth-Sun system to explain the cyclical pattern of seasons, which includes Earth's tilt and differential intensity of sunlight on different areas of Earth across the year.

8.MS-ESS2-1. Use a model to illustrate that energy from Earth's interior drives convection that cycles Earth's crust, leading to melting, crystallization, weathering, and deformation of large rock formations, including generation of ocean sea floor at ridges, submergence of ocean sea floor at trenches, mountain building, and active volcanic chains.

8.MS-ESS3-5. Examine and interpret data to describe the role that human activities have played in causing the rise in global temperatures over the past century.

Life Science   8.MS-LS

8.MS-LS1-7. Use informational text to describe that food molecules, including carbohydrates, proteins, and fats, are broken down and rearranged through chemical reactions forming new molecules that support cell growth and/or release of energy.

8.MS-LS3-1. Develop and use a model to describe that structural changes to genes (mutations) may or may not result in changes to proteins, and if there are changes to proteins there may be harmful, beneficial, or neutral changes to traits.

8.MS-LS4-4. Use a model to describe the process of natural selection, in which genetic variations of some traits in a population increase some individuals' likelihood of surviving and reproducing in a changing environment. Provide evidence that natural selection occurs over many generations.

Physical Science   8.MS-PS

8.MS-PS1-4. Develop a model that describes and predicts changes in particle motion, relative spatial arrangement, temperature, and state of a pure substance when thermal energy is added or removed. **8.MS-PS2-2.** Provide evidence that the change in an object's speed depends on the sum of the forces on the object (the net force) and the mass of the object.

Grade 8: U.S. and MA Government and Civic Life

Practice Standards
  1. Demonstrate civic knowledge, skills, and dispositions.
  4. Analyze the purpose and point of view of each source; distinguish opinion from fact.
  5. Evaluate the credibility, accuracy, and relevance of each source.

Content Topic 4: Rights and responsibilities of a citizen [8.T4]
  7. Apply knowledge of the meaning of leadership and the qualities of good leaders to evaluate political leaders at the community, the state and national levels.
  8. Explain the importance of individuals working cooperatively with their elected leaders.

9. Explain the importance of public service, and identify career and other opportunities in public service at the local, state, and national levels.
10. Analyze issues involving liberty in conflict with equality or authority, individual rights in conflict with the common good, or majority rule in conflict with minority rights.
11. Examine the varied understandings of the role of elected representatives and discuss those who have demonstrated political courage or those whose actions have failed to live up to the ideals of the Constitution

Content Topic 6: The Structure of Massachusetts state and local government [8.T6]
1. Compare and contrast the functions of state government and national government.
2. Describe provisions of the United States Constitution and the Massachusetts Constitution that define and distribute powers and authority of the federal or state government

Content Topic 7: The Freedom of Press and News/Media Literacy [8.T7]
2. Give examples of how a free press can provide competing information and views about government and politics.
4. Evaluate the benefits and challenges of digital news and social media to a democratic society.
5. Explain methods for evaluating information and opinion in print and online media (e.g., determining the credibility of news articles; analyzing the messages of editorials and op-ed commentaries; assessing the validity of claims and sufficiency of evidence).
6. Analyze the point of view and evaluate the claims of an editorial, editorial cartoon, or op-ed commentary on a public policy issue at the local, state, or national level (e.g., a mayoral or school committee decision, an action by a state legislature or Governor, a vote in Congress or an action by the President).

Mathematics

Grade 8
Expressions and Equations   8.EE
A. Work with radicals and integer exponents.
1. Know and apply the properties of integer exponents to generate equivalent

    numerical expressions.
    For example, $3^2 \oslash 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$.
2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

A. 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.

B. Analyze and solve linear equations and pairs of simultaneous linear equations.

7. Solve linear equations in one variable.
   a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
   b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

8. Analyze and solve pairs of simultaneous linear equations.
   a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
   b. Solve systems of two linear equations in two variables algebraically (using substitution and elimination strategies), and estimate solutions by graphing

   the equations. Solve simple cases by inspection.
   For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.
   c. Solve real-world and mathematical problems leading to two linear equations in

   two variables.
   For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

Functions   8.F

C. Define, evaluate, and compare functions.

1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.[4]
2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

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[4] Function notation is not required in grade 8.

For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

3. Interpret the equation $y = mx + b$ as defining a linear function whose graph is a

straight line; give examples of functions that are not linear.
For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1, 1), (2, 4) and (3, 9), which are not on a straight line.

D. Use functions to model relationships between quantities.

4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Geometry   8.G

E. Understand congruence and similarity using physical models, transparencies, or geometry software.

2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations. Given two congruent figures, describe a sequence that exhibits the congruence between them.

4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations. Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

F. Understand and apply the Pythagorean Theorem.

7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real- world and mathematical problems in two and three dimensions.

Statistics and Probability   8.SP

A. Investigate patterns of association in bivariate data.

3. Use the equation of a linear model to solve problems in the context of bivariate

measurement data, interpreting the slope and intercept.
For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr

as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

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G. Use functions to model relationships between quantities.

6. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

7. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

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