

## Personal Financial Literacy Expectations

*Addendum to Social Studies and Mathematics Standards Documents*



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## Principles of the Standards Review Process

The Colorado Model Content Standards revision process has been informed by these guiding principles:

- Begin with the end in mind; define what prepared graduates need to be successful using 21<sup>st</sup> century skills in our global economy.
- Align K-12 standards with early childhood expectations and higher education.
- Change is necessary.
- Standards will be deliberately designed for clarity, rigor, and coherence.
- Standards will be fewer, higher, and clearer.
- Standards will be actionable.

### Notable Information regarding to the Colorado Academic Standards and Personal Financial Literacy

The most evident change to the Colorado standards result from a change from grade band standards (K-4, 5-8, and 9-12) to grade level expectations. These are explained here in addition to other changes to the standards.

1. **Impact of standards articulation by grade level.** The original Colorado Model Content Standards were designed to provide districts with benchmarks of learning for grades 4, 8, and 12. The standards revision subcommittee was charged with providing more a specific learning trajectory of concepts and skills across grade levels, from early school readiness to post-secondary preparedness. Articulating standards by grade level in each area affords greater specificity (clearer standards) in describing the learning path of important across levels (higher standards), while focusing on a few key ideas at each grade level (fewer standards).
2. **Articulation of high school standards.** High school standards are not articulated by grade level but by standard. This is intended to support district decisions on how best to design curriculum and courses, whether through an integrated approach, a traditional course sequence, or through alternative approaches such as through Career and Technical Education. The high school standards delineate what all high school students should know and be able to do in order to be well prepared for any post-secondary option. The individual standards are not meant to represent a course or a particular timeframe. All students should be able to reach these rigorous standards within four years. Students with advanced capability may accomplish these expectations in a shorter timeframe leaving open options for study of other advanced mathematics.
3. **Integration of P-2 Council's recommendations.** The subcommittees have integrated the P-2 Building Blocks document into the P-12 standards, aligning expectations to a great degree. Important concepts and skill are clearly defined across these foundational years, detailing expectations to a much greater extent for teachers and parents.
4. **Standards are written for mastery.** The proposed revisions to standards define mastery of concepts and skills. Mastery means that a student has facility with a skill or concept in multiple contexts. This is not an indication that instruction on a grade level expectation begins and only occurs at that grade level. Maintenance of previously mastered concepts and skills and scaffolding future learning are the domain of curriculum and instruction, not standards.

5. **Intentional integration of technology use, most notably at the high school level.** Using appropriate technology to allow students access to concepts and skills in ways that mirror the 21<sup>st</sup> century workplace.
6. **Intentional integration of personal financial literacy.** Personal financial literacy was integrated P-13 in the Economics and Mathematics standards in order to ensure the school experience prepared students for the financial expectations that await them on leaving school. Financial Literacy expectations are indicated with (PFL) within the Mathematics and Economics document and the content focuses on four main areas of learning that are considered essential:

**Goal Setting, Financial Responsibility and Careers**

Understand the importance of personal financial goal setting and responsibility and apply those concepts in a consumer-driven, global marketplace.

**Planning, Income, Saving and Investing**

Create and manage a financial plan for short-term and long-term financial security to make informed spending and saving decisions that are compatible with changing personal goals.

**Using Credit**

Analyze and manage factors that affect the choice, credit, costs, sources and legal aspects of using credit.

**Risk Management and Insurance**

Analyze and apply appropriate and cost effect risk management strategies.

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## **References used by the financial literacy subcommittee**

The subcommittees used a variety of resources representing a broad range of perspectives to inform their work. Those references include:

- **Jump\$tart Coalition for Personal Financial Literacy**
- **Arizona: Standards Based Teaching and Learning**
- **Wisconsin's Model Academic Standards for Personal Financial Literacy**
- **Economics Education and Financial Literacy: Commonwealth of Virginia**
- **Personal Finance and Building Wealth: Tennessee**

## Standards Organization and Construction

As the subcommittee began the revision process to improve the existing standards, it became evident that the way the standards information was organized, defined, and constructed needed to change from the existing documents. The new design is intended to provide more clarity and direction for teachers, and to show how 21<sup>st</sup> century skills and the elements of school readiness and postsecondary and workforce readiness indicators give depth and context to essential learning.

The “Continuum of State Standards Definitions” section that follows shows the hierarchical order of the standards components. The “Standards Template” section demonstrates how this continuum is put into practice.

The elements of the revised standards are:

**Prepared Graduate Competencies:** The preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

**Standard:** The topical organization of an academic content area.

**High School Expectations:** The articulation of the concepts and skills of a standard that indicates a student is making progress toward being a prepared graduate. *What do students need to know in high school?*

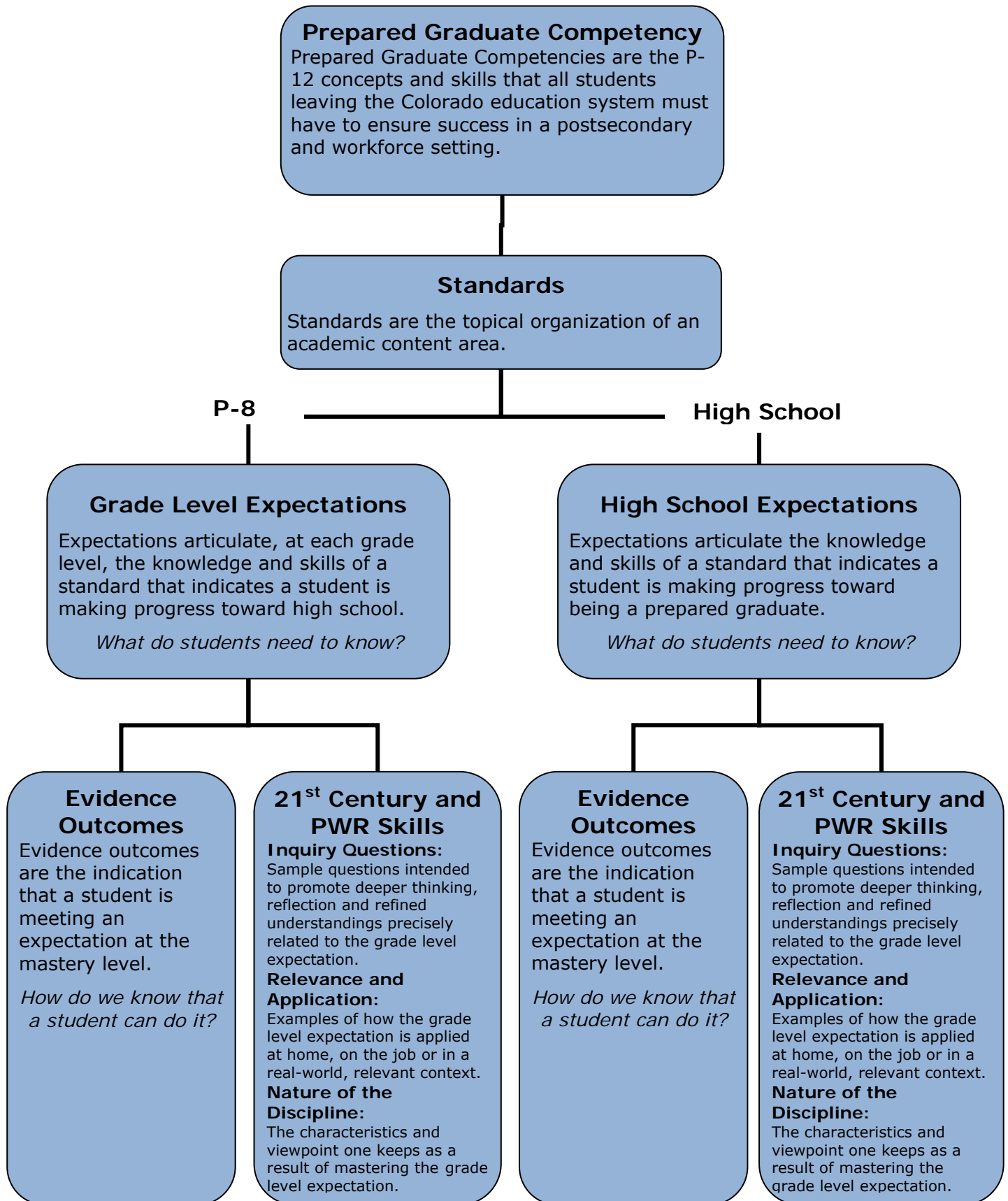
**Grade Level Expectations:** The articulation (at each grade level), concepts, and skills of a standard that indicate a student is making progress toward being ready for high school. *What do students need to know from preschool through eighth grade?*

**Evidence Outcomes:** The indication that a student is meeting an expectation at the mastery level. *How do we know that a student can do it?*

**21<sup>st</sup> Century Skills and Readiness Competencies:** Includes the following:

- ***Inquiry Questions:***  
Sample questions are intended to promote deeper thinking, reflection and refined understandings precisely related to the grade level expectation.
- ***Relevance and Application:***  
Examples of how the grade level expectation is applied at home, on the job or in a real-world, relevant context.
- ***Nature of the Discipline:***  
The characteristics and viewpoint one keeps as a result of mastering the grade level expectation.

## Continuum of State Standards Definitions





## STANDARDS TEMPLATE

**Content Area: NAME OF CONTENT AREA**

**Standard:** The topical organization of an academic content area.

**Prepared Graduates:**

- The P-12 concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting

### High School and Grade Level Expectations

**Concepts and skills students master:**

Grade Level Expectation: High Schools: The articulation of the concepts and skills of a standard that indicates a student is making progress toward being a prepared graduate.

Grade Level Expectations: The articulation, at each grade level, the concepts and skills of a standard that indicates a student is making progress toward being ready for high school.

*What do students need to know?*

**Evidence Outcomes**

**Students can:**

Evidence outcomes are the indication that a student is meeting an expectation at the mastery level.

*How do we know that a student can do it?*

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

Sample questions intended to promote deeper thinking, reflection and refined understandings precisely related to the grade level expectation.

**Relevance and Application:**

Examples of how the grade level expectation is applied at home, on the job or in a real-world, relevant context.

**Nature of the Discipline:**

The characteristics and viewpoint one keeps as a result of mastering the grade level expectation.

## **Colorado's Description for School Readiness**

*(Adopted by the State Board of Education, December 2008)*

School readiness describes both the preparedness of a child to engage in and benefit from learning experiences, and the ability of a school to meet the needs of all students enrolled in publicly funded preschools or kindergartens. School readiness is enhanced when schools, families, and community service providers work collaboratively to ensure that every child is ready for higher levels of learning in academic content.

## **Colorado's Description of Postsecondary and Workforce Readiness**

*(Adopted by the State Board of Education, June 2009)*

Postsecondary and workforce readiness describes the knowledge, skills, and behaviors essential for high school graduates to be prepared to enter college and the workforce and to compete in the global economy. The description assumes students have developed consistent intellectual growth throughout their high school career as a result of academic work that is increasingly challenging, engaging, and coherent. Postsecondary education and workforce readiness assumes that students are ready and able to demonstrate the following without the need for remediation: Critical thinking and problem-solving; finding and using information/information technology; creativity and innovation; global and cultural awareness; civic responsibility; work ethic; personal responsibility; communication; and collaboration.

## **How These Skills and Competencies are Embedded in the Revised Standards**

Three themes are used to describe these important skills and competencies and are interwoven throughout the standards: *inquiry questions; relevance and application; and the nature of each discipline*. These competencies should not be thought of stand-alone concepts, but should be integrated throughout the curriculum in all grade levels. Just as it is impossible to teach thinking skills to students without the content to think about, it is equally impossible for students to understand the content of a discipline without grappling with complex questions and the investigation of topics.

**Inquiry Questions** – Inquiry is a multifaceted process requiring students to think and pursue understanding. Inquiry demands that students (a) engage in an active observation and questioning process; (b) investigate to gather evidence; (c) formulate explanations based on evidence; (d) communicate and justify explanations, and; (e) reflect and refine ideas. Inquiry is more than hands-on activities; it requires students to cognitively wrestle with core concepts as they make sense of new ideas.

**Relevance and Application** – The hallmark of learning a discipline is the ability to apply the knowledge, skills, and concepts in real-world, relevant contexts. Components of this include solving problems, developing, adapting, and refining solutions for the betterment of society. The application of a discipline, including how technology assists or accelerates the work, enables students to more fully appreciate how the mastery of the grade level expectation matters after formal schooling is complete.

**Nature of Discipline** – The unique advantage of a discipline is the perspective it gives the mind to see the world and situations differently. The characteristics and viewpoint one keeps as a result of mastering the grade level expectation is the nature of the discipline retained in the mind's eye.

## **Personal Financial Literacy in the 21<sup>st</sup> Century**

Colorado's description of 21st century skills is a synthesis of the essential abilities students must apply in our fast changing world. Today's students need a repertoire of knowledge and skills that are more diverse, complex, and integrated than any previous generation. Personal Financial Literacy is inherently demonstrated in each of Colorado 21<sup>st</sup> Century Skills, as follows:

### Critical Thinking & Reasoning

Financial responsibility is grounded in critical thinking and reasoning. Personal financial literacy provides the content and structure that make it possible to be a productive decision making citizen.

### Information Literacy

Personal financial literacy equips a student with the tools and habits of mind to organize and interpret a multitude of resources. Students literate in information discernment can effectively analyze various sources for both positive and negative implications, detect bias, use learning tools, including technology, and clearly communicate thoughts using sound reasoning.

### Collaboration

Financial responsibility involves the give and take of ideas between people. In the course of understanding personal financial responsibility, students offer ideas, strategies, solutions, justifications, and proofs for others to evaluate. In turn, the student interprets and evaluates the ideas, strategies, solutions, justifications of others.

### Self-direction

Understanding personal financial literacy requires a productive disposition, curiosity and self-direction. This involves monitoring and assessing one's thinking and persisting in search of patterns, relationships, cause and effect, and an understanding of the events.

### Invention

Invention is the key element of the expansion both within as students make and test theories, create and use financial tools, understand cause and effect, make connections among ideas, strategies and solutions and embrace an entrepreneurial spirit.

# Personal Financial Literacy

## Grade Level Expectations at a Glance

Standard	Grade Level Expectation	Page
<b>High School</b>		
Social Studies: 3. Economics	4. Design, analyze, and apply a financial plan based on short- and long-term financial goals	13
	5. Analyze strategic spending, saving, and investment options to achieve the objectives of diversification, liquidity, income, and growth	14
	6. The components of personal credit to manage credit and debt	15
	7. Identify, develop, and evaluate risk-management strategies	16
Mathematics: 1. Number Sense, Properties, and Operations	2. Quantitative reasoning is used to make sense of quantities and their relationship in problem situations	17
Mathematics: 2. Patterns, Functions, and Algebraic Structures	1. Functions model situations where one quantity determines another and can be represented algebraically, graphically, and using tables	18
	2. Quantitative relationships in the real world can be modeled and solved using functions	20
Mathematics: 3. Data Analysis, Statistics, and Probability	3. Probability models outcomes for situations in which there is inherent randomness	22
<b>Eighth Grade</b>		
Social Studies: 3. Economics	2. Manage personal credit and debt	24
Mathematics: 2. Patterns, Functions, and Algebraic Structures	3. Graphs, tables and equations can be used to distinguish between linear and nonlinear functions	25
<b>Seventh Grade</b>		
Social Studies: 3. Economics	1. The distribution of resources influences economic production and individual choices	27
Mathematics: 1. Number Sense, Properties, and Operations	1. Proportional reasoning involves comparisons and multiplicative relationships among ratios	28
<b>Sixth Grade</b>		
Social Studies: 3. Economics	2. Saving and investing are key contributors to financial well being	30
Mathematics: 1. Number Sense, Properties, and Operations	1. Quantities can be expressed and compared using ratios and rates	31
<b>Fifth Grade</b>		
Social Studies: 3. Economics	2. Use financial institutions to manage personal finances	33
Mathematics: 2. Patterns, Functions, and Algebraic Structures	1. Number patterns are based on operations and relationships	34

# Personal Financial Literacy

## Grade Level Expectations at a Glance

Standard	Grade Level Expectation	Page
<b>Fourth Grade</b>		
Social Studies: 3. Economics	2. The relationship between choice and opportunity cost	36
Mathematics: 1. Number Sense, Properties and Operations	3. Formulate, represent, and use algorithms to compute with flexibility, accuracy, and efficiency	37
<b>Third Grade</b>		
Social Studies: 3. Economics	2. Describe how to meet short-term financial goals	39
Mathematics: 1. Number Sense, Properties, and Operations	3. Multiplication and division are inverse operations and can be modeled in a variety of ways	40
<b>Second Grade</b>		
Social Studies: 3. Economics	1. The scarcity of resources affects the choices of individuals and communities	42
	2. Apply decision-making processes to financial decision making	43
Mathematics: 1. Number Sense, Properties, and Operations	2. Formulate, represent, and use strategies to add and subtract within 100 with flexibility, accuracy, and efficiency	44
<b>First Grade</b>		
Social Studies: 3. Economics	2. Identify short term financial goals	46
Mathematics: 1. Number Sense, Properties, and Operations	1. The whole number system describes place value relationships within and beyond 100 and forms the foundation for efficient algorithms	47

## Personal Financial Literacy Grade Level Expectations at a Glance

Standard	Grade Level Expectation	Page
<b>Kindergarten</b>		
Social Studies: 3. Economics	2. Discuss how purchases can be made to meet wants and needs	49
Mathematics: 1. Number Sense, Properties, and Operations	2. Composing and decomposing quantity forms the foundation for addition and subtraction	50
Mathematics: 4. Shape, Dimension, and Geometric Relationships	2. Measurement is used to compare and order objects	52
<b>Preschool</b>		
Social Studies: 3. Economics	2. Recognize money and identify its purpose	54
Mathematics: 1. Number Sense, Properties, and Operations	1. Quantities can be represented and counted	55
Mathematics: 4. Shape, Dimension, and Geometric Relationships	2. Measurement is used to compare objects	56

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)

**Grade Level Expectation: High School**

**Concepts and skills students master:**

- 1. Design, analyze, and apply a financial plan based on short- and long-term financial goals (PFL)**

**Evidence Outcomes**

**Students can:**

- Develop a financial plan including a budget based on short- and long- term goals
- Analyze financial information for accuracy, relevance, and steps for identity protection
- Describe factors affecting take-home pay
- Identify sources of personal income and likely deductions and expenditures as a basis for a financial plan
- Describe legal and ethical responsibilities regarding tax liabilities

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- How can you develop short- and long-term financial goals and plans that reflect personal objectives?
- How does a consumer determine the accuracy, relevancy, and security of financial information?
- What is the role that various sources of income play in a financial plan?
- What are the financial and legal consequences of not paying your taxes?
- What is the role of education in building financial security?

**Relevance and Application:**

- Individuals create long- and short-term financial plans that include predictions about education, costs; potential to achieve financial goals; projected income; likely expenditures, savings and interest; credit or loans; and investment decisions including diversification.
- Individuals are able use the appropriate contracts and identify each party's basic rights and responsibilities to protect financial well-being.
- Technology allows individuals to research and track information regarding personal finances using such tools as online banking and brokerage accounts.

**Nature of Economics:**

- Financially responsible individuals describe factors that influence financial planning.
- Financially responsible individuals plan for tax liabilities.
- Financially responsible individuals consider opportunity costs of saving over spending and vice versa.
- Financially responsible individuals analyze economic cycles and make predictions regarding economic trends.

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)

**Grade Level Expectation: High School**

**Concepts and skills students master:**

**5. Analyze strategic spending, saving, and investment options to achieve the objectives of diversification, liquidity, income, and growth (PFL)**

**Evidence Outcomes**

**Students can:**

- Compare and contrast the variety of investments available for a diversified portfolio
- Evaluate factors to consider when managing savings and investment accounts
- Explain how economic cycles affect personal financial decisions
- Describe the appropriate types of investments to achieve the objectives of liquidity, income and growth

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- How does a consumer choose between investment options?
- How might changes in the economic cycle affect future earnings on an individual's investments?
- What are some ways that you might rate the security, accuracy, and relevancy of financial information?
- How does compound interest manifest in investment and debt situations?

**Relevance and Application:**

- Investigation of different investment strategies helps to identify which strategies are appropriate for different life stages such as early adulthood through to retirement.
- The creation of a plan to diversify a portfolio of investments balances risks and returns and prepares for a solid financial future.
- A personal career plan includes educational requirements, costs, and analysis of the potential job demand to achieve financial well-being.

**Nature of Economics:**

- Financially responsible individuals carefully consider the amount of financial risk that they can tolerate based on life stage and plan for changes in the economic cycles.
- Financially responsible individuals create plans based on sound economic principles to maximize their standard of living over time.



**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)

**Grade Level Expectation: High School**

**Concepts and skills students master:**

**6. The components of personal credit to manage credit and debt (PFL)**

**Evidence Outcomes**

**Students can:**

- Analyze various lending sources, services, and financial institutions
- Investigate legal and personal responsibilities affecting lenders and borrowers
- Make connections between building and maintaining a credit history and its impact on lifestyle

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- Why is it important to know the similarities and differences of revolving credit, personal loans, and mortgages?
- How does the law protect both borrowers and lenders?
- Why is a good credit history essential to the ability to purchase goods and insurance, and gain employment?
- When should you use revolving credit and/or personal loans?

**Relevance and Application:**

- The understanding of the components of personal credit allows for the management of credit and debt. For example, individuals can use an amortization schedule to examine how mortgages differ, check a credit history, know the uses of and meaning of a credit score, and use technology to compare costs of revolving credit and personal loans.
- Knowledge of the penalties that accompany bad credit, such as the inability to qualify for loans, leads to good financial planning.

**Nature of Economics:**

- Financially responsible consumers know their rights and obligations when using credit.
- Financially responsible consumers frequently check their own credit history to verify its accuracy and amend it when inaccurate.
- Financially responsible consumers make decisions that require weighing benefit against cost.

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)

**Grade Level Expectation: High School**

**Concepts and skills students master:**

**7. Identify, develop, and evaluate risk-management strategies (PFL)**

**Evidence Outcomes**

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Students can:**

- Differentiate between types of insurance
- Explain the function and purpose of insurance
- Select and evaluate strategies to mitigate risk

**Inquiry Questions:**

- What are the benefits of car, health, life, mortgage, long-term care, liability, disability, home and apartment insurance?
- How does a consumer choose between various insurance plans?
- How does insurance help consumers to prepare for the unexpected?
- What additional ways can individuals alleviate financial risks?

**Relevance and Application:**

- The knowledge of how to evaluate, develop, revise, and implement risk-management strategies allow individuals to be prepared for the future. For example, a plan for insurance may change over the course of life depending on changing circumstances.
- Individuals seek advice and counsel from insurance companies, financial planners, and other businesses on risk management.

**Nature of Economics:**

- Financially responsible individuals mitigate the risks associated with everyday life through planning, saving, and insurance.
- Financially responsible individuals consider insurance as a part of their financial plan.

**Content Area: Mathematics**

**Standard: 1. Number Sense, Properties, and Operations**

<p><b>Prepared Graduates:</b></p> <ul style="list-style-type: none"> <li>➤ Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error</li> </ul>
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**Grade Level Expectation: High School**

<p><b>Concepts and skills students master:</b></p> <p>2. Quantitative reasoning is used to make sense of quantities and their relationships in problem situations</p>
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Evidence Outcomes	21 <sup>st</sup> Century Skills and Readiness Competencies
<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>a. Reason quantitatively and use units to solve problems (CCSS: N-Q)               <ul style="list-style-type: none"> <li>i. Use units as a way to understand problems and to guide the solution of multi-step problems. (CCSS: N-Q.1)                   <ul style="list-style-type: none"> <li>1. Choose and interpret units consistently in formulas. (CCSS: N-Q.1)</li> <li>2. Choose and interpret the scale and the origin in graphs and data displays. (CCSS: N-Q.1)</li> </ul> </li> <li>ii. Define appropriate quantities for the purpose of descriptive modeling. (CCSS: N-Q.2)</li> <li>iii. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (CCSS: N-Q.3)</li> <li>iv. <b>Describe factors affecting take-home pay and calculate the impact (PFL)</b></li> <li>v. <b>Design and use a budget, including income (net take-home pay) and expenses (mortgage, car loans, and living expenses) to demonstrate how living within your means is essential for a secure financial future (PFL)</b></li> </ul> </li> </ul>	<p><b>Inquiry Questions:</b></p> <ol style="list-style-type: none"> <li>1. Can numbers ever be too big or too small to be useful?</li> <li>2. <b>How much money is enough for retirement? (PFL)</b></li> <li>3. <b>What is the return on investment of post-secondary educational opportunities? (PFL)</b></li> </ol> <p><b>Relevance and Application:</b></p> <ol style="list-style-type: none"> <li>1. The choice of the appropriate measurement tool meets the precision requirements of the measurement task. For example, using a caliper for the manufacture of brake discs or a tape measure for pant size.</li> <li>2. The reading, interpreting, and writing of numbers in scientific notation with and without technology is used extensively in the natural sciences such as representing large or small quantities such as speed of light, distance to other planets, distance between stars, the diameter of a cell, and size of a micro-organism.</li> <li>3. Fluency with computation and estimation allows individuals to analyze aspects of personal finance, such as calculating a monthly budget, estimating the amount left in a checking account, making informed purchase decisions, and computing a probable paycheck given a wage (or salary), tax tables, and other deduction schedules.</li> </ol> <p><b>Nature of Mathematics:</b></p> <ol style="list-style-type: none"> <li>1. Using mathematics to solve a problem requires choosing what mathematics to use; making simplifying assumptions, estimates, or approximations; computing; and checking to see whether the solution makes sense.</li> <li>2. Mathematicians reason abstractly and quantitatively. (MP)</li> <li>3. Mathematicians attend to precision. (MP)</li> </ol>

**Content Area: Mathematics**

**Standard: 2. Patterns, Functions, and Algebraic Structures**

**Prepared Graduates:**  
➤ Make sound predictions and generalizations based on patterns and relationships that arise from numbers, shapes, symbols, and data

**Grade Level Expectation: High School**

**Concepts and skills students master:**  
1. Functions model situations where one quantity determines another and can be represented algebraically, graphically, and using tables

**Evidence Outcomes** | **21<sup>st</sup> Century Skills and Readiness Competencies**

**Students can:**

- a. Formulate the concept of a function and use function notation. (CCSS: F-IF)
  - i. Explain that a function is a correspondence from one set (called the domain) to another set (called the range) that assigns to each element of the domain exactly one element of the range.<sup>1</sup> (CCSS: F-IF.1)
  - ii. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. (CCSS: F-IF.2)
  - iii. Demonstrate that sequences are functions,<sup>2</sup> sometimes defined recursively, whose domain is a subset of the integers. (CCSS: F-IF.3)
- b. Interpret functions that arise in applications in terms of the context. (CCSS: F-IF)
  - i. 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<sup>3</sup> given a verbal description of the relationship. \* (CCSS: F-IF.4)
  - ii. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.<sup>4</sup> \* (CCSS: F-IF.5)
  - iii. Calculate and interpret the average rate of change<sup>5</sup> of a function over a specified interval. Estimate the rate of change from a graph.\* (CCSS: F-IF.6)
- c. Analyze functions using different representations. (CCSS: F-IF)
  - i. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. \* (CCSS: F-IF.7)
  - ii. Graph linear and quadratic functions and show intercepts, maxima, and minima. (CCSS: F-IF.7a)
  - iii. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. (CCSS: F-IF.7b)
  - iv. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. (CCSS: F-IF.7c)
  - v. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. (CCSS: F-IF.7e)
  - vi. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. (CCSS: F-IF.8)

**Inquiry Questions:**

- 1. Why are relations and functions represented in multiple ways?
- 2. How can a table, graph, and function notation be used to explain how one function family is different from and/or similar to another?
- 3. What is an inverse?
- 4. How is “inverse function” most likely related to addition and subtraction being inverse operations and to multiplication and division being inverse operations?
- 5. How are patterns and functions similar and different?
- 6. How could you visualize a function with four variables, such as  $x^2 + y^2 + z^2 + w^2 = 1$ ?
- 7. Why couldn't people build skyscrapers without using functions?
- 8. How do symbolic transformations affect an equation, inequality, or expression?

**Relevance and Application:**

- 1. **Knowledge of how to interpret rate of change of a function allows investigation of rate of return and time on the value of investments. (PFL)**
- 2. Comprehension of rate of change of a function is important preparation for the study of calculus.
- 3. The ability to analyze a function for the intercepts, asymptotes, domain, range, and local and global behavior provides insights into the situations modeled by the function. For example, epidemiologists could compare the rate of flu infection among people who received flu shots to the rate of flu infection among people who did not receive a flu shot to gain insight into the effectiveness of the flu shot.
- 4. The exploration of multiple representations of functions develops a deeper understanding of the relationship

<ol style="list-style-type: none"> <li>1. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. (CCSS: F-IF.8a)</li> <li>2. Use the properties of exponents to interpret expressions for exponential functions.<sup>6</sup> (CCSS: F-IF.8b)</li> <li>3. Compare properties of two functions each represented in a different way<sup>7</sup> (algebraically, graphically, numerically in tables, or by verbal descriptions). (CCSS: F-IF.9)</li> </ol> <p>d. Build a function that models a relationship between two quantities. (CCSS: F-BF)</p> <ol style="list-style-type: none"> <li>i. Write a function that describes a relationship between two quantities.* (CCSS: F-BF.1) <ol style="list-style-type: none"> <li>1. Determine an explicit expression, a recursive process, or steps for calculation from a context. (CCSS: F-BF.1a)</li> <li>2. Combine standard function types using arithmetic operations.<sup>8</sup> (CCSS: F-BF.1b)</li> </ol> </li> <li>ii. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.* (CCSS: F-BF.2)</li> </ol> <p>e. Build new functions from existing functions. (CCSS: F-BF)</p> <ol style="list-style-type: none"> <li>i. Identify the effect on the graph of replacing <math>f(x)</math> by <math>f(x) + k</math>, <math>k f(x)</math>, <math>f(kx)</math>, and <math>f(x + k)</math> for specific values of <math>k</math>,<sup>9</sup> and find the value of <math>k</math> given the graphs.<sup>10</sup> (CCSS: F-BF.3)</li> <li>ii. Experiment with cases and illustrate an explanation of the effects on the graph using technology.</li> <li>iii. Find inverse functions.<sup>11</sup> (CCSS: F-BF.4)</li> </ol> <p>f. Extend the domain of trigonometric functions using the unit circle. (CCSS: F-TF)</p> <ol style="list-style-type: none"> <li>i. Use radian measure of an angle as the length of the arc on the unit circle subtended by the angle. (CCSS: F-TF.1)</li> <li>ii. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. (CCSS: F-TF.2)</li> </ol> <p><i>*Indicates a part of the standard connected to the mathematical practice of Modeling</i></p>	<p>between the variables in the function.</p> <ol style="list-style-type: none"> <li>5. The understanding of the relationship between variables in a function allows people to use functions to model relationships in the real world such as compound interest, population growth and decay, projectile motion, or payment plans.</li> <li>6. Comprehension of slope, intercepts, and common forms of linear equations allows easy retrieval of information from linear models such as rate of growth or decrease, an initial charge for services, speed of an object, or the beginning balance of an account.</li> <li>7. Understanding sequences is important preparation for calculus. Sequences can be used to represent functions including <math>e^x</math>, <math>e^{x^2}</math>, <math>\sin x</math>, and <math>\cos x</math>.</li> </ol>
	<p><b>Nature of Mathematics:</b></p> <ol style="list-style-type: none"> <li>1. Mathematicians use multiple representations of functions to explore the properties of functions and the properties of families of functions.</li> <li>2. Mathematicians model with mathematics. (MP)</li> <li>3. Mathematicians use appropriate tools strategically. (MP)</li> <li>4. Mathematicians look for and make use of structure. (MP)</li> </ol>

**Content Area: Mathematics**

**Standard: 2. Patterns, Functions, and Algebraic Structures**

<p><b>Prepared Graduates:</b></p> <ul style="list-style-type: none"> <li>➤ Use critical thinking to recognize problematic aspects of situations, create mathematical models, and present and defend solutions</li> </ul>	
<p><b>Grade Level Expectation: High School</b></p>	
<p><b>Concepts and skills students master:</b></p> <p>2. Quantitative relationships in the real world can be modeled and solved using functions</p>	
<p><b>Evidence Outcomes</b></p> <p><b>Students can:</b></p> <p>a. Construct and compare linear, quadratic, and exponential models and solve problems. (CCSS: F-LE)</p> <ul style="list-style-type: none"> <li>i. Distinguish between situations that can be modeled with linear functions and with exponential functions. (CCSS: F-LE.1)                     <ul style="list-style-type: none"> <li>1. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. (CCSS: F-LE.1a)</li> <li>2. Identify situations in which one quantity changes at a constant rate per unit interval relative to another. (CCSS: F-LE.1b)</li> <li>3. Identify situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. (CCSS: F-LE.1c)</li> </ul> </li> <li>ii. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs.<sup>12</sup> (CCSS: F-LE.2)</li> <li>iii. Use graphs and tables to describe that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. (CCSS: F-LE.3)</li> <li>iv. For exponential models, express as a logarithm the solution to <math>ab^{ct} = d</math> where <math>a</math>, <math>c</math>, and <math>d</math> are numbers and the base <math>b</math> is 2, 10, or <math>e</math>; evaluate the logarithm using technology. (CCSS: F-LE.4)</li> </ul> <p>b. Interpret expressions for function in terms of the situation they model. (CCSS: F-LE)</p> <ul style="list-style-type: none"> <li>i. Interpret the parameters in a linear or exponential function in terms of a context. (CCSS: F-LE.5)</li> </ul> <p>c. Model periodic phenomena with trigonometric functions. (CCSS: F-TF)</p> <ul style="list-style-type: none"> <li>i. Choose the trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. * (CCSS: F-TF.5)</li> </ul> <p>d. <b>Model personal financial situations</b></p> <ul style="list-style-type: none"> <li>i. <b>Analyze the impact of interest rates on a personal financial plan (PFL)</b></li> <li>ii. <b>Evaluate the costs and benefits of credit (PFL)</b></li> <li>iii. <b>Analyze various lending sources, services, and financial institutions (PFL)</b></li> </ul>	<p><b>21<sup>st</sup> Century Skills and Readiness Competencies</b></p> <p><b>Inquiry Questions:</b></p> <ol style="list-style-type: none"> <li>1. Why do we classify functions?</li> <li>2. What phenomena can be modeled with particular functions?</li> <li>3. <b>Which financial applications can be modeled with exponential functions? Linear functions? (PFL)</b></li> <li>4. What elementary function or functions best represent a given scatter plot of two-variable data?</li> <li>5. <b>How much would today's purchase cost tomorrow? (PFL)</b></li> </ol> <p><b>Relevance and Application:</b></p> <ol style="list-style-type: none"> <li>1. The understanding of the qualitative behavior of functions allows interpretation of the qualitative behavior of systems modeled by functions such as time-distance, population growth, decay, heat transfer, and temperature of the ocean versus depth.</li> <li>2. The knowledge of how functions model real-world phenomena allows exploration and improved understanding of complex systems such as how population growth may affect the environment, how interest rates or inflation affect a personal budget, how stopping distance is related to reaction time and velocity, and how volume and temperature of a gas are related.</li> <li>3. Biologists use polynomial curves to model the shapes of jaw bone fossils. They analyze the polynomials to find potential evolutionary relationships among the species.</li> <li>4. Physicists use basic linear and quadratic functions to model the motion of projectiles.</li> </ol> <p><b>Nature of Mathematics:</b></p> <ol style="list-style-type: none"> <li>1. Mathematicians use their knowledge of functions to create accurate models of complex systems.</li> <li>2. Mathematicians use models to better understand systems and make predictions about future systemic behavior.</li> <li>3. Mathematicians reason abstractly and quantitatively. (MP)</li> <li>4. Mathematicians construct viable arguments and critique the reasoning of others. (MP)</li> <li>5. Mathematicians model with mathematics. (MP)</li> </ol>
<p><i>*Indicates a part of the standard connected to the mathematical practice of Modeling.</i></p>	

## Standard: 2. Patterns, Functions, and Algebraic Structures High School

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<sup>1</sup> If  $f$  is a function and  $x$  is an element of its domain, then  $f(x)$  denotes the output of  $f$  corresponding to the input  $x$ . The graph of  $f$  is the graph of the equation  $y = f(x)$ . (CCSS: F-IF.1)

<sup>2</sup> For example, the Fibonacci sequence is defined recursively by  $f(0) = f(1) = 1$ ,  $f(n+1) = f(n) + f(n-1)$  for  $n \geq 1$ . (CCSS: F-IF.3)

<sup>3</sup> Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. (CCSS: F-IF.4)

<sup>4</sup> For example, if the function  $h(n)$  gives the number of person-hours it takes to assemble  $n$  engines in a factory, then the positive integers would be an appropriate domain for the function. (CCSS: F-IF.5)

<sup>5</sup> presented symbolically or as a table. (CCSS: F-IF.6)

<sup>6</sup> For example, identify percent rate of change in functions such as  $y = (1.02)^t$ ,  $y = (0.97)^t$ ,  $y = (1.01)^{12t}$ ,  $y = (1.2)^t/10$ . (CCSS: F-IF.8b)

<sup>7</sup> For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. (CCSS: F-IF.9)

<sup>8</sup> For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. (CCSS: F-BF.1b)

<sup>9</sup> both positive and negative. (CCSS: F-BF.3)

<sup>10</sup> Include recognizing even and odd functions from their graphs and algebraic expressions for them. (CCSS: F-BF.3)

<sup>11</sup> Solve an equation of the form  $f(x) = c$  for a simple function  $f$  that has an inverse and write an expression for the inverse.

For example,  $f(x) = 2x^3$  or  $f(x) = (x+1)/(x-1)$  for  $x \neq 1$ . (CCSS: F-BF.4a)

<sup>12</sup> include reading these from a table. (CCSS: F-LE.2)

**Content Area: Mathematics**  
**Standard: 3. Data Analysis, Statistics, and Probability**

**Prepared Graduates:**

- Recognize and make sense of the many ways that variability, chance, and randomness appear in a variety of contexts

**Grade Level Expectation: High School**

**Concepts and skills students master:**

**3. Probability models outcomes for situations in which there is inherent randomness**

**Evidence Outcomes**

**Students can:**

- a. Understand independence and conditional probability and use them to interpret data. (CCSS: S-CP)
  - i. Describe events as subsets of a sample space<sup>5</sup> using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events.<sup>6</sup> (CCSS: S-CP.1)
  - ii. Explain that two events  $A$  and  $B$  are independent if the probability of  $A$  and  $B$  occurring together is the product of their probabilities, and use this characterization to determine if they are independent. (CCSS: S-CP.2)
  - iii. Using the conditional probability of  $A$  given  $B$  as  $P(A \text{ and } B)/P(B)$ , interpret the independence of  $A$  and  $B$  as saying that the conditional probability of  $A$  given  $B$  is the same as the probability of  $A$ , and the conditional probability of  $B$  given  $A$  is the same as the probability of  $B$ . (CCSS: S-CP.3)
  - iv. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.<sup>7</sup> (CCSS: S-CP.4)
  - v. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.<sup>8</sup> (CCSS: S-CP.5)
- b. Use the rules of probability to compute probabilities of compound events in a uniform probability model. (CCSS: S-CP)
  - i. Find the conditional probability of  $A$  given  $B$  as the fraction of  $B$ 's outcomes that also belong to  $A$ , and interpret the answer in terms of the model. (CCSS: S-CP.6)
  - ii. Apply the Addition Rule,  $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ , and interpret the answer in terms of the model. (CCSS: S-CP.7)
- c. **Analyze the cost of insurance as a method to offset the risk of a situation (PFL)**

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

1. Can probability be used to model all types of uncertain situations? For example, can the probability that the 50<sup>th</sup> president of the United States will be female be determined?
2. How and why are simulations used to determine probability when the theoretical probability is unknown?
3. **How does probability relate to obtaining insurance? (PFL)**

**Relevance and Application:**

1. **Comprehension of probability allows informed decision-making, such as whether the cost of insurance is less than the expected cost of illness, when the deductible on car insurance is optimal, whether gambling pays in the long run, or whether an extended warranty justifies the cost. (PFL)**
2. Probability is used in a wide variety of disciplines including physics, biology, engineering, finance, and law. For example, employment discrimination cases often present probability calculations to support a claim.

**Nature of Mathematics:**

1. Some work in mathematics is much like a game. Mathematicians choose an interesting set of rules and then play according to those rules to see what can happen.
2. Mathematicians explore randomness and chance through probability.
3. Mathematicians construct viable arguments and critique the reasoning of others. (MP)
4. Mathematicians model with mathematics. (MP)

*\*Indicates a part of the standard connected to the mathematical practice of Modeling.*



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**Standard: 3. Data Analysis, Statistics, and Probability**

**High School**

<sup>5</sup> the set of outcomes. (CCSS: S-CP.1)

<sup>6</sup> "or," "and," "not". (CCSS: S-CP.1)

<sup>7</sup> For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results. (CCSS: S-CP.4)

<sup>8</sup> For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer. (CCSS: S-CP.5)

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- **Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)**

**Grade Level Expectation: Eighth Grade**

**Concepts and skills students master:**

**2. Manage personal credit and debt (PFL)**

**Evidence Outcomes**

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Students can:**

- Identify and differentiate between purposes and reasons for debt
- Analyze benefits and costs of credit and debt
- Compare sources of credit
- Describe the components of a credit history

**Inquiry Questions:**

- Why is understanding credit and debt important?
- How do you manage debt?
- Why is it important to know about different types of credit?
- How do you view debt and credit?
- When is debt useful?

**Relevance and Application:**

- Technology aids in the research of purchases to find the lowest available cost, compare sources of credit, and track debt.
- Analysis of the cost of borrowing helps to determine how to manage debt for such items as higher education and automobile purchases.
- Technology is used to research credit history, credit scores, and the variables that impact a credit history to protect personal financial security.

**Nature of Economics:**

- Financially responsible individuals manage debt.
- Financially responsible individuals understand the responsibilities associated with the use of credit.

**Content Area: Mathematics**

**Standard: 2. Patterns, Functions, and Algebraic Structures**

**Prepared Graduates:**  
➤ Use critical thinking to recognize problematic aspects of situations, create mathematical models, and present and defend solutions

**Grade Level Expectation: Eighth Grade**

**Concepts and skills students master:**  
3. Graphs, tables and equations can be used to distinguish between linear and nonlinear functions

**Evidence Outcomes** | **21<sup>st</sup> Century Skills and Readiness Competencies**

**Students can:**

- a. Define, evaluate, and compare functions. (CCSS: 8.F)
  - i. Define a function as a rule that assigns to each input exactly one output.<sup>5</sup> (CCSS: 8.F.1)
  - ii. Show that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (CCSS: 8.F.1)
  - iii. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).<sup>6</sup> (CCSS: 8.F.2)
  - iv. Interpret the equation  $y = mx + b$  as defining a linear function, whose graph is a straight line. (CCSS: 8.F.3)
  - v. Give examples of functions that are not linear.<sup>7</sup>
- a. Use functions to model relationships between quantities. (CCSS: 8.F)
  - i. Construct a function to model a linear relationship between two quantities. (CCSS: 8.F.4)
  - ii. 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. (CCSS: 8.F.4)
  - iii. 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. (CCSS: 8.F.4)
  - iv. Describe qualitatively the functional relationship between two quantities by analyzing a graph.<sup>8</sup> (CCSS: 8.F.5)
  - v. Sketch a graph that exhibits the qualitative features of a function that has been described verbally. (CCSS: 8.F.5)
  - vi. **Analyze how credit and debt impact personal financial goals (PFL)**

**Inquiry Questions:**

- 1. How can change best be represented mathematically?
- 2. Why are patterns and relationships represented in multiple ways?
- 3. What properties of a function make it a linear function?

**Relevance and Application:**

- 1. Recognition that non-linear situations is a clue to non-constant growth over time helps to understand such concepts as compound interest rates, population growth, appreciations, and depreciation.
- 2. Linear situations allow for describing and analyzing the situation mathematically such as using a line graph to represent the relationships of the circumference of circles based on diameters.

**Nature of Mathematics:**

- 1. Mathematics involves multiple points of view.
- 2. Mathematicians look at mathematical ideas arithmetically, geometrically, analytically, or through a combination of these approaches.
- 3. Mathematicians look for and make use of structure. (MP)
- 4. Mathematicians look for and express regularity in repeated reasoning. (MP)

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**Standard: 2. Patterns, Functions, and Algebraic Structures**  
**Eighth Grade**

<sup>5</sup> Function notation is not required in 8<sup>th</sup> grade. (CCSS: 8.F.1)

<sup>6</sup> 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. (CCSS: 8.F.2)

<sup>7</sup> 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. (CCSS: 8.F.3)

<sup>8</sup> e.g., where the function is increasing or decreasing, linear or nonlinear. (CCSS: 8.F.5)

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- **Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)**

**Grade Level Expectation: Seventh Grade**

**Concepts and skills students master:**

- 2. The distribution of resources influences economic production and individual choices (PFL)**

<b>Evidence Outcomes</b>	<b>21<sup>st</sup> Century Skills and Readiness Competencies</b>
<p><b>Students can:</b></p> <ul style="list-style-type: none"><li>a. Give examples that illustrate connections between resources and manufacturing</li><li>b. Identify patterns of trade between places based on distribution of resources</li><li>c. Compare and contrast the relative value and different uses of several types of resources</li><li>d. Use supply and demand analysis to explain how prices allocate scarce goods in a market economy</li><li>e. Define resources from an economic and personal finance perspective</li><li><b>f. Explain the role of taxes in economic production and distribution of resources (PFL)</b></li><li><b>g. Define the various types of taxes students will pay as adults (PFL)</b></li><li><b>h. Demonstrate the impact of taxes on individual income and spending (PFL)</b></li></ul>	<p><b>Inquiry Questions:</b></p> <ul style="list-style-type: none"><li>1. How is it advantageous and disadvantageous when a country has valuable resources located within its borders?</li><li>2. How does a country acquire resources it does not have?</li><li>3. How does the availability or the lack of resources influence production and distribution?</li><li>4. What would countries look like without taxes?</li></ul> <p><b>Relevance and Application:</b></p> <ul style="list-style-type: none"><li>1. <b>Various factors that influence production, including resources, supply and demand, and price (PFL), affect individual consumer choices over time.</b></li><li>2. Technology is used to explore relationships of economic factors and issues related to individual consumers.</li><li>3. Analysis of the distribution and location of resources helps businesses to determine business practices such as large companies locating near transportation.</li></ul> <p><b>Nature of Economics:</b></p> <ul style="list-style-type: none"><li>1. Economic thinkers analyze factors impacting production, distribution, and consumption.</li><li>2. Economic thinkers gather data regarding trends in production, use of resources, and consumer choices.</li><li>3. Financially responsible individuals understand the purposes of and responsibility to pay various taxes such as property, income and sales.</li></ul>

## Content Area: Mathematics

### Standard: 1. Number Sense, Properties, and Operations

#### Prepared Graduates:

- Make both relative (multiplicative) and absolute (arithmetic) comparisons between quantities. Multiplicative thinking underlies proportional reasoning

### Grade Level Expectation: Seventh Grade

#### Concepts and skills students master:

1. Proportional reasoning involves comparisons and multiplicative relationships among ratios

#### Evidence Outcomes

##### Students can:

- a. Analyze proportional relationships and use them to solve real-world and mathematical problems.(CCSS: 7.RP)
- b. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.<sup>1</sup> (CCSS: 7.RP.1)
- c. Identify and represent proportional relationships between quantities. (CCSS: 7.RP.2)
  - i. Determine whether two quantities are in a proportional relationship.<sup>2</sup> (CCSS: 7.RP.2a)
  - ii. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. (CCSS: 7.RP.2b)
  - iii. Represent proportional relationships by equations.<sup>3</sup> (CCSS: 7.RP.2c)
  - iv. 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. (CCSS: 7.RP.2d)
- d. Use proportional relationships to solve multistep ratio and percent problems.<sup>4</sup> (CCSS: 7.RP.3)
  - i. **Estimate and compute unit cost of consumables (to include unit conversions if necessary) sold in quantity to make purchase decisions based on cost and practicality (PFL)**
  - ii. **Solve problems involving percent of a number, discounts, taxes, simple interest, percent increase, and percent decrease (PFL)**

#### 21<sup>st</sup> Century Skills and Readiness Competencies

##### Inquiry Questions:

1. What information can be determined from a relative comparison that cannot be determined from an absolute comparison?
2. What comparisons can be made using ratios?
3. How do you know when a proportional relationship exists?
4. How can proportion be used to argue fairness?
5. When is it better to use an absolute comparison?
6. When is it better to use a relative comparison?

##### Relevance and Application:

1. The use of ratios, rates, and proportions allows sound decision-making in daily life such as determining best values when shopping, mixing cement or paint, adjusting recipes, calculating car mileage, using speed to determine travel time, or enlarging or shrinking copies.
2. Proportional reasoning is used extensively in the workplace. For example, determine dosages for medicine; develop scale models and drawings; adjusting salaries and benefits; or prepare mixtures in laboratories.
3. Proportional reasoning is used extensively in geometry such as determining properties of similar figures, and comparing length, area, and volume of figures.

##### Nature of Mathematics:

1. Mathematicians look for relationships that can be described simply in mathematical language and applied to a myriad of situations. Proportions are a powerful mathematical tool because proportional relationships occur frequently in diverse settings.
2. Mathematicians reason abstractly and quantitatively. (MP)
3. Mathematicians construct viable arguments and critique the reasoning of others. (MP)

**Standard: 1. Number Sense, Properties, and Operations**  
**Seventh Grade**

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<sup>1</sup> For example, if a person walks  $\frac{1}{2}$  mile in each  $\frac{1}{4}$  hour, compute the unit rate as the complex fraction  $\frac{1/2}{1/4}$  miles per hour, equivalently 2 miles per hour. (CCSS: 7.RP.1)

<sup>2</sup> 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. (CCSS: 7.RP.2a)

<sup>3</sup> 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  $t = pn$ . (CCSS: 7.RP.2c)

<sup>4</sup> Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. (CCSS: 7.RP.3)

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- Understand the allocation of scarce resources in societies through analysis of individual choice, market interaction, and public policy

**Grade Level Expectation: Sixth Grade**

**Concepts and skills students master:**

**2. Saving and investing are key contributors to financial well-being (PFL)**

**Evidence Outcomes**

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Students can:**

- Differentiate between saving and investing
- Give examples of how saving and investing can improve financial well-being
- Describe the advantages and disadvantages of saving for short- and medium-term goals
- Explain the importance of an emergency fund
- Explain why saving is a prerequisite to investing
- Explain how saving and investing income can improve financial well-being

**Inquiry Questions:**

- Why is it important to save and invest?
- What types of items would an individual save for to purchase?
- What are risky investments and why would someone make that type of investment?
- Why is it important to research and analyze information prior to making financial decisions?

**Relevance and Application:**

- It's important to understand why to save and invest for the future.
- Technology allows individuals and businesses to track investment earnings.
- The creation of criteria for us of emergency funds helps to save responsibly.
- The comparison of returns of various savings and investment options and an adjustment of the investments for good financial decision-making.

**Nature of Economics:**

- Financially responsible individuals manage savings and investments for their financial well-being.
- Financially responsible individuals understand the risks and rewards associated with investing and saving.



**Content Area: Mathematics**

**Standard: 1. Number Sense, Properties, and Operations**

**Prepared Graduates:**

- Make both relative (multiplicative) and absolute (arithmetic) comparisons between quantities. Multiplicative thinking underlies proportional reasoning

**Grade Level Expectation: Sixth Grade**

**Concepts and skills students master:**

1. Quantities can be expressed and compared using ratios and rates

**Evidence Outcomes**

**Students can:**

- a. Apply the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.<sup>1</sup> (CCSS: 6.RP.1)
- b. Apply the concept of a unit rate  $a/b$  associated with a ratio  $a:b$  with  $b \neq 0$ , and use rate language in the context of a ratio relationship.<sup>2</sup> (CCSS: 6.RP.2)
- c. Use ratio and rate reasoning to solve real-world and mathematical problems.<sup>3</sup> (CCSS: 6.RP.3)
  - i. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. (CCSS: 6.RP.3a)
  - ii. Use tables to compare ratios. (CCSS: 6.RP.3a)
  - iii. Solve unit rate problems including those involving unit pricing and constant speed.<sup>4</sup> (CCSS: 6.RP.3b)
  - iv. Find a percent of a quantity as a rate per 100.<sup>5</sup> (CCSS: 6.RP.3c)
  - v. Solve problems involving finding the whole, given a part and the percent. (CCSS: 6.RP.3c)
  - vi. **Use common fractions and percents to calculate parts of whole numbers in problem situations including comparisons of savings rates at different financial institutions (PFL)**
  - vii. **Express the comparison of two whole number quantities using differences, part-to-part ratios, and part-to-whole ratios in real contexts, including investing and saving (PFL)**
  - viii. Use ratio reasoning to convert measurement units.<sup>6</sup> (CCSS: 6.RP.3d)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

1. How are ratios different from fractions?
2. What is the difference between quantity and number?

**Relevance and Application:**

1. Knowledge of ratios and rates allows sound decision-making in daily life such as determining best values when shopping, creating mixtures, adjusting recipes, calculating car mileage, using speed to determine travel time, or making saving and investing decisions.
2. Ratios and rates are used to solve important problems in science, business, and politics. For example developing more fuel-efficient vehicles, understanding voter registration and voter turnout in elections, or finding more cost-effective suppliers.
3. Rates and ratios are used in mechanical devices such as bicycle gears, car transmissions, and clocks.

**Nature of Mathematics:**

1. Mathematicians develop simple procedures to express complex mathematical concepts.
2. Mathematicians make sense of problems and persevere in solving them. (MP)
3. Mathematicians reason abstractly and quantitatively. (MP)

**Standard: 1. Number Sense, Properties, and Operations**  
**Sixth Grade**

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<sup>1</sup> For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.” (CCSS: 6.RP.1)

<sup>2</sup> For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is  $\frac{3}{4}$  cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.” (CCSS: 6.RP.2)

<sup>3</sup> e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. (CCSS: 6.RP.3)

<sup>4</sup> For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? (CCSS: 6.RP.3b)

<sup>5</sup> e.g., 30% of a quantity means  $\frac{30}{100}$  times the quantity. (CCSS: 6.RP.3c)

<sup>6</sup> manipulate and transform units appropriately when multiplying or dividing quantities. (CCSS: 6.RP.3d)

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- **Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)**

**Grade Level Expectation: Fifth Grade**

**Concepts and skills students master:**

**2. Use of financial institutions to manage personal finances (PFL)**

**Evidence Outcomes**

**Students can:**

- a. Identify different financial institutions
- b. Identify the products and services of financial institutions to include but not limited to: checking accounts, savings accounts, investments, and loans
- c. Compare and contrast financial institutions, their products, and services

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- 1. What factors are important when establishing savings or investments goals?
- 2. What risks and benefits are associated with spending versus saving and investing?
- 3. How can a checking account help to decide how to spend and save?
- 4. Why do people use financial institutions and not self-banking?
- 5. How do people choose a financial institution?
- 6. Why do people need income?

**Relevance and Application:**

- 1. Analysis of the benefits and risks of investing and saving with “virtual” and “brick and mortar” financial institutions helps to make informed financial decisions.
- 2. Evaluation of the opportunity costs help to make financial decisions.
- 3. Technology is used to track and graph the interest accrued on a “virtual” investments, checking and savings accounts, investments, and loans.

**Nature of Economics:**

- 1. Financially responsible individuals make informed decisions about saving and investing for short- and long-term goals.
- 2. Financially responsible individuals research, analyze, and make choices regarding their needs when using financial institutions.

**Content Area: Mathematics**

**Standard: 2. Patterns, Functions, and Algebraic Structures**

**Prepared Graduates:**

- Make sound predictions and generalizations based on patterns and relationships that arise from numbers, shapes, symbols, and data

**Grade Level Expectation: Fifth Grade**

**Concepts and skills students master:**

1. Number patterns are based on operations and relationships

**Evidence Outcomes**

**Students can:**

- a. Generate two numerical patterns using given rules. (CCSS: 5.OA.3)
- b. Identify apparent relationships between corresponding terms. (CCSS: 5.OA.3)
- c. Form ordered pairs consisting of corresponding terms from the two patterns, and graphs the ordered pairs on a coordinate plane.<sup>1</sup> (CCSS: 5.OA.3)
- d. Explain informally relationships between corresponding terms in the patterns. (CCSS: 5.OA.3)
- e. **Use patterns to solve problems including those involving saving and checking accounts<sup>2</sup> (PFL)**
- f. **Explain, extend, and use patterns and relationships in solving problems, including those involving saving and checking accounts such as understanding that spending more means saving less (PFL)**

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

1. How do you know when there is a pattern?
2. How are patterns useful?

**Relevance and Application:**

1. The use of a pattern of elapsed time helps to set up a schedule. For example, classes are each 50 minutes with 5 minutes between each class.
2. The ability to use patterns allows problem-solving. For example, a rancher needs to know how many shoes to buy for his horses, or a grocer needs to know how many cans will fit on a set of shelves.

**Nature of Mathematics:**

1. Mathematicians use creativity, invention, and ingenuity to understand and create patterns.
2. The search for patterns can produce rewarding shortcuts and mathematical insights.
3. Mathematicians construct viable arguments and critique the reasoning of others. (MP)
4. Mathematicians model with mathematics. (MP)
5. Mathematicians look for and express regularity in repeated reasoning. (MP)

**Standard: 2. Patterns, Functions, and Algebraic Structures**  
**Fifth Grade**

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<sup>1</sup> For example, given the rule “add 3” and the starting number 0, and given the rule “add 6” and the starting number 0, generate terms and the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. (CCSS: 5.OA.3)

<sup>2</sup> such as the pattern created when saving \$10 a month

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- **Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)**

**Grade Level Expectation: Fourth Grade**

**Concepts and skills students master:**

**2. The relationship between choice and opportunity cost (PFL)**

**Evidence Outcomes**

**Students can:**

- Define choice and opportunity cost
- Analyze different choices and their opportunity costs
- Give examples of the opportunity costs for individual decisions
- Identify risks that individuals face (PFL)
- Analyze methods of limiting financial risk (PFL)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- What different ways does an individual have to get information when making a decision?
- How do you know when you've made a good decision?
- How do you know when you've made a bad decision?

**Relevance and Application:**

- Knowledge of the relationship between choice and opportunity cost leads to good decision-making. For example, a business may have an opportunity to purchase inexpensive land, but the cost may be in the travel time.
- Decisions are made daily regarding risks such as riding a bicycle, skiing, riding in a car, and spending all of an allowance immediately rather than saving.
- Businesses make choices about risk. For example, a company locates in a country that has an unstable government or extends credit to individuals.

**Nature of Economics:**

- Economic thinkers analyze opportunity costs associated with making decisions.
- Economic thinkers analyze data to forecast possible outcomes.
- Financially responsible individuals understand and categorize the components of risk.
- Financially responsible individuals mitigate and analyze potential risk.

**Content Area: Mathematics**

**Standard: 1. Number Sense, Properties, and Operations**

**Prepared Graduates:**

- Are fluent with basic numerical, symbolic facts and algorithms, and are able to select and use appropriate (mental math, paper and pencil, and technology) methods based on an understanding of their efficiency, precision, and transparency

**Grade Level Expectation: Fourth Grade**

**Concepts and skills students master:**

3. Formulate, represent, and use algorithms to compute with flexibility, accuracy, and efficiency

Evidence Outcomes	21 <sup>st</sup> Century Skills and Readiness Competencies
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**Students can:**

- a. Use place value understanding and properties of operations to perform multi-digit arithmetic. (CCSS: 4.NBT)
  - i. Fluently add and subtract multi-digit whole numbers using standard algorithms. (CCSS: 4.NBT.4)
  - ii. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. (CCSS: 4.NBT.5)
  - iii. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. (CCSS: 4.NBT.6)
  - iv. Illustrate and explain multiplication and division calculation by using equations, rectangular arrays, and/or area models. (CCSS: 4.NBT.6)
- b. Use the four operations with whole numbers to solve problems. (CCSS: 4.OA)
  - i. Interpret a multiplication equation as a comparison.<sup>13</sup> (CCSS: 4.OA.1)
  - ii. Represent verbal statements of multiplicative comparisons as multiplication equations. (CCSS: 4.OA.1)
  - iii. Multiply or divide to solve word problems involving multiplicative comparison.<sup>14</sup> (CCSS: 4.OA.2)
  - iv. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. (CCSS: 4.OA.3)
  - v. Represent multistep word problems with equations using a variable to represent the unknown quantity. (CCSS: 4.OA.3)
  - vi. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (CCSS: 4.OA.3)
  - vii. **Using the four operations analyze the relationship between choice and opportunity cost (PFL)**

**Inquiry Questions:**

1. Is it possible to make multiplication and division of large numbers easy?
2. What do remainders mean and how are they used?
3. When is the “correct” answer not the most useful answer?

**Relevance and Application:**

1. Multiplication is an essential component of mathematics. Knowledge of multiplication is the basis for understanding division, fractions, geometry, and algebra.

**Nature of Mathematics:**

1. Mathematicians envision and test strategies for solving problems.
2. Mathematicians develop simple procedures to express complex mathematical concepts.
3. Mathematicians make sense of problems and persevere in solving them. (MP)
4. Mathematicians construct viable arguments and critique the reasoning of others. (MP)
5. Mathematicians look for and express regularity in repeated reasoning. (MP)

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**Standard: 1. Number Sense, Properties, and Operations**

**Fourth Grade**

<sup>13</sup> e.g., interpret  $35 = 5 \times 7$  as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. (CCSS: 4.OA.1)

<sup>14</sup> e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. (CCSS: 4.OA.2)



**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- **Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)**

**Grade Level Expectation: Third Grade**

**Concepts and skills students master:**

**2. Describe how to meet short term financial goals (PFL)**

**Evidence Outcomes**

- Students can:**
- a. **Identify sources of income including gifts, allowances, and earnings**
  - b. **Recognize that there are costs and benefits associated with borrowing to meet a short-term financial goal**
  - c. **Identify jobs children can do to earn money for personal, philanthropic, or entrepreneurial goals**
  - d. **Create a plan for a short-term financial goal**
  - e. **Describe the steps necessary to reach short-term financial goals**

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- 1. **What would happen if an individual spent all earning on entertainment?**
- 2. **Why do individuals give away money?**
- 3. **How would an individual decide between purchasing a want or a need?**

**Relevance and Application:**

- 1. **Personal financial goal setting is a lifelong activity and short-term goal setting is essential to that process. For example, students save for a fish aquarium or skateboard.**
- 2. **Analysis of various options and creating short- and long-term goals for borrowing is a lifelong skill. For example, adults borrow to buy a car or a vacation.**

**Nature of Economics:**

- 1. **Financially responsible individuals create goals and work toward meeting them.**
- 2. **Financially responsible individuals understand the cost and the accountability associated with borrowing.**

## Content Area: Mathematics

### Standard: 1. Number Sense, Properties, and Operations

#### Prepared Graduates:

- Are fluent with basic numerical and symbolic facts and algorithms, and are able to select and use appropriate (mental math, paper and pencil, and technology) methods based on an understanding of their efficiency, precision, and transparency

### Grade Level Expectation: Third Grade

#### Concepts and skills students master:

#### 3. Multiplication and division are inverse operations and can be modeled in a variety of ways

#### Evidence Outcomes

##### Students can:

- a. Represent and solve problems involving multiplication and division. (CCSS: 3.OA)
  - i. Interpret products of whole numbers.<sup>7</sup> (CCSS: 3.OA.1)
  - ii. Interpret whole-number quotients of whole numbers.<sup>8</sup> (CCSS: 3.OA.2)
  - iii. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.<sup>9</sup> (CCSS: 3.OA.3)
  - iv. Determine the unknown whole number in a multiplication or division equation relating three whole numbers.<sup>10</sup> (CCSS: 3.OA.4)
  - v. **Model strategies to achieve a personal financial goal using arithmetic operations (PFL)**
- b. Apply properties of multiplication and the relationship between multiplication and division. (CCSS: 3.OA)
  - i. Apply properties of operations as strategies to multiply and divide.<sup>11</sup> (CCSS: 3.OA.5)
  - ii. Interpret division as an unknown-factor problem.<sup>12</sup> (CCSS: 3.OA.6)
- c. Multiply and divide within 100. (CCSS: 3.OA)
  - i. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division<sup>13</sup> or properties of operations. (CCSS: 3.OA.7)
  - ii. Recall from memory all products of two one-digit numbers. (CCSS: 3.OA.7)
- d. Solve problems involving the four operations, and identify and explain patterns in arithmetic. (CCSS: 3.OA)
  - i. Solve two-step word problems using the four operations. (CCSS: 3.OA.8)
  - ii. Represent two-step word problems using equations with a letter standing for the unknown quantity. (CCSS: 3.OA.8)
  - iii. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (CCSS: 3.OA.8)
  - iv. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.<sup>14</sup> (CCSS: 3.OA.9)

#### 21<sup>st</sup> Century Skills and Readiness Competencies

##### Inquiry Questions:

1. How are multiplication and division related?
2. How can you use a multiplication or division fact to find a related fact?
3. Why was multiplication invented? Why not just add?
4. Why was division invented? Why not just subtract?

##### Relevance and Application:

1. Many situations in daily life can be modeled with multiplication and division such as how many tables to set up for a party, how much food to purchase for the family, or how many teams can be created.
2. Use of multiplication and division helps to make decisions about spending allowance or gifts of money such as how many weeks of saving an allowance of \$5 per week to buy a soccer ball that costs \$32.

##### Nature of Mathematics:

1. Mathematicians often learn concepts on a smaller scale before applying them to a larger situation.
2. Mathematicians construct viable arguments and critique the reasoning of others. (MP)
3. Mathematicians model with mathematics. (MP)
4. Mathematicians look for and make use of structure. (MP)

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**Standard: 1. Number Sense, Properties, and Operations**

**Third Grade**

<sup>7</sup> e.g., interpret  $5 \times 7$  as the total number of objects in 5 groups of 7 objects each. (CCSS: 3.OA.1)

For example, describe a context in which a total number of objects can be expressed as  $5 \times 7$ . (CCSS: 3.OA.1)

<sup>8</sup> e.g., interpret  $56 \div 8$  as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. (CCSS: 3.OA.2)

For example, describe a context in which a number of shares or a number of groups can be expressed as  $56 \div 8$ . (CCSS: 3.OA.2)

<sup>9</sup> e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (CCSS: 3.OA.3)

<sup>10</sup> For example, determine the unknown number that makes the equation true in each of the equations  $8 \times ? = 48$ ,  $5 = \square \div 3$ ,  $6 \times 6 = ?$ . (CCSS: 3.OA.4)

<sup>11</sup> Examples: If  $6 \times 4 = 24$  is known, then  $4 \times 6 = 24$  is also known. (Commutative property of multiplication.)  $3 \times 5 \times 2$  can be found by  $3 \times 5 = 15$ , then  $15 \times 2 = 30$ , or by  $5 \times 2 = 10$ , then  $3 \times 10 = 30$ . (Associative property of multiplication.) Knowing that  $8 \times 5 = 40$  and  $8 \times 2 = 16$ , one can find  $8 \times 7$  as  $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ . (Distributive property.) (CCSS: 3.OA.5)

<sup>12</sup> For example, find  $32 \div 8$  by finding the number that makes 32 when multiplied by 8. (CCSS: 3.OA.6)

<sup>13</sup> e.g., knowing that  $8 \times 5 = 40$ , one knows  $40 \div 5 = 8$ . (CCSS: 3.OA.7)

<sup>14</sup> For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. (CCSS: 3.OA.9)

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- Understand the allocation of scarce resources in societies through analysis of individual choice, market interaction, and public policy

**Grade Level Expectation: Second Grade**

**Concepts and skills students master:**

1. The scarcity of resources affects the choices of individuals and communities

<b>21<sup>st</sup> Century Skills and Readiness Competencies</b>	
<b>Students can:</b> <ol style="list-style-type: none"><li>a. Explain scarcity</li><li>b. Identify goods and services and recognize examples of each</li><li>c. Give examples of choices people make when resources are scarce</li><li>d. Identify possible solutions when there are limited resources and unlimited demands</li></ol>	<b>Inquiry Questions:</b> <ol style="list-style-type: none"><li>1. How does scarcity affect purchasing decisions?</li><li>2. What goods and services do you use?</li><li>3. How are resources used in various communities?</li><li>4. What are some ways to find out about the goods and services used in other communities?</li></ol>
	<b>Relevance and Application:</b> <ol style="list-style-type: none"><li>1. Comparison of prices of goods and services in relationship to limited income helps to make informed and financially sound decisions.</li><li>2. <b>Decisions must be made if there is a limited amount of income and the need for a costly good or service. For example, you may borrow, save, or get a new job to make the purchase. (PFL)</b></li><li>3. Scarcity of resources affects decisions such as where to buy resources based on cost or where to locate a business.</li></ol>
	<b>Nature of Economics:</b> <ol style="list-style-type: none"><li>1. Economic thinkers analyze how goods and services are produced and priced.</li><li>2. Economic thinkers analyze scarcity of resources and its impact on cost of goods and services.</li></ol>

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- **Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)**

**Grade Level Expectation: Second Grade**

**Concepts and skills students master:**

**2. Apply decision-making processes to financial decisions (PFL)**

**Evidence Outcomes**

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Students can:**

- a. Identify components of financial decision-making including gathering, evaluating, and prioritizing information based on a financial goal, and predicting the possible outcome of a decision
- b. Differentiate between a long-term and a short-term goal

**Inquiry Questions:**

- 1. How do individuals make and analyze the consequences of financial decisions?
- 2. How do individuals meet their short- and long-term goals?

**Relevance and Application:**

- 1. Personal financial decisions are based on responsible evaluation of the consequences.
- 2. Purchase decisions are based on such things as quality, price, and personal goals. For example, you decide whether to spend money on candy or the movies.

**Nature of Economics:**

- 1. Financially responsible individuals use good decision-making tools in planning their spending and saving.

## Content Area: Mathematics

### Standard: 1. Number Sense, Properties, and Operations

#### Prepared Graduates:

- Are fluent with basic numerical and symbolic facts and algorithms, and are able to select and use appropriate (mental math, paper and pencil, and technology) methods based on an understanding of their efficiency, precision, and transparency

#### Grade Level Expectation: Second Grade

##### Concepts and skills students master:

2. Formulate, represent, and use strategies to add and subtract within 100 with flexibility, accuracy, and efficiency

##### Evidence Outcomes

###### Students can:

- Represent and solve problems involving addition and subtraction. (CCSS: 2.OA)
  - Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions.<sup>3</sup> (CCSS: 2.OA.1)
  - Apply addition and subtraction concepts to financial decision-making (PFL)**
- Fluently add and subtract within 20 using mental strategies. (CCSS: 2.OA.2)
- Know from memory all sums of two one-digit numbers. (CCSS: 2.OA.2)
- Use equal groups of objects to gain foundations for multiplication. (CCSS: 2.OA)
  - Determine whether a group of objects (up to 20) has an odd or even number of members.<sup>4</sup> (CCSS: 2.OA.3)
  - Write an equation to express an even number as a sum of two equal addends. (CCSS: 2.OA.3)
  - Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns and write an equation to express the total as a sum of equal addends. (CCSS: 2.OA.4)

##### 21<sup>st</sup> Century Skills and Readiness Competencies

###### Inquiry Questions:

1. What are the ways numbers can be broken apart and put back together?
2. What could be a result of not using pennies (taking them out of circulation)?

###### Relevance and Application:

1. Addition is used to find the total number of objects such as total number of animals in a zoo, total number of students in first and second grade.
2. Subtraction is used to solve problems such as how many objects are left in a set after taking some away, or how much longer one line is than another.
3. The understanding of the value of a collection of coins helps to determine how many coins are used for a purchase or checking that the amount of change is correct.

###### Nature of Mathematics:

1. Mathematicians use visual models to understand addition and subtraction.
2. Mathematicians make sense of problems and persevere in solving them. (MP)
3. Mathematicians reason abstractly and quantitatively. (MP)
4. Mathematicians look for and express regularity in repeated reasoning. (MP)

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**Standard: 1. Number Sense, Properties, and Operations**

**Second Grade**

<sup>3</sup> e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (CCSS: 2.OA.1)

<sup>4</sup> e.g., by pairing objects or counting them by 2s. (CCSS: 2.OA.3)

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- **Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)**

**Grade Level Expectation: First Grade**

**Concepts and skills students master:**

**2. Identify short-term financial goals (PFL)**

**Evidence Outcomes**

**Students can:**

- a. Define a short-term financial goal
- b. Identify examples of short-term financial goals
- c. Discuss sources of income needed to meet short-term goals such as but not limited to gifts, borrowing, allowances, and income

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- 1. How does an individual earn money to meet a goal?
- 2. Why do people donate to charity?
- 3. How does an individual know a good short-term goal?
- 4. Why is personal financial goal setting important?

**Relevance and Application:**

- 1. Short-term financial goals can be met through planning. For example, an individual divides income between current expenses, saving for the future, and philanthropic donations.
- 2. Individuals and organizations track their progress toward meeting short-term financial goals. For example, the food bank creates a chart tracking how much food has been donated toward reaching its goal.

**Nature of Economics:**

- 1. Financially responsible individuals create goals and work toward meeting them.
- 2. Financially responsible individuals understand the cost and the accountability associated with borrowing.



## Content Area: Mathematics

### Standard: 1. Number Sense, Properties, and Operations

#### Prepared Graduates:

- Understand the structure and properties of our number system. At their most basic level numbers are abstract symbols that represent real-world quantities

#### Grade Level Expectation: First Grade

##### Concepts and skills students master:

1. The whole number system describes place value relationships within and beyond 100 and forms the foundation for efficient algorithms

##### Evidence Outcomes

###### Students can:

- a. Count to 120 (CCSS: 1.NBT.1)
  - i. Count starting at any number less than 120. (CCSS: 1.NBT.1)
  - ii. Within 120, read and write numerals and represent a number of objects with a written numeral. (CCSS: 1.NBT.1)
- b. Represent and use the digits of a two-digit number. (CCSS: 1.NBT.2)
  - i. Represent the digits of a two-digit number as tens and ones.<sup>1</sup> (CCSS: 1.NBT.2)
  - ii. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols  $>$ ,  $=$ , and  $<$ . (CCSS: 1.NBT.3)
  - iii. **Compare two sets of objects, including pennies, up to at least 25 using language such as "three more or three fewer" (PFL)**
- c. Use place value and properties of operations to add and subtract. (CCSS: 1.NBT)
  - i. Add within 100, including adding a two-digit number and a one-digit number and adding a two-digit number and a multiple of ten, using concrete models or drawings, and/or the relationship between addition and subtraction. (CCSS: 1.NBT.4)
  - ii. **Identify coins and find the value of a collection of two coins (PFL)**
  - iii. Mentally find 10 more or 10 less than any two-digit number, without counting; explain the reasoning used. (CCSS: 1.NBT.5)
  - iv. Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. (CCSS: 1.NBT.6)
  - v. Relate addition and subtraction strategies to a written method and explain the reasoning used. (CCSS: 1.NBT.4 and 1.NBT.6)

##### 21<sup>st</sup> Century Skills and Readiness Competencies

###### Inquiry Questions:

1. Can numbers always be related to tens?
2. Why not always count by one?
3. Why was a place value system developed?
4. How does a position of a digit affect its value?
5. How big is 100?

###### Relevance and Application:

1. The comparison of numbers helps to communicate and to make sense of the world. (For example, if someone has two more dollars than another, gets four more points than another, or takes out three fewer forks than needed.)

###### Nature of Mathematics:

1. Mathematics involves visualization and representation of ideas.
2. Numbers are used to count and order both real and imaginary objects.
3. Mathematicians reason abstractly and quantitatively. (MP)
4. Mathematicians look for and make use of structure. (MP)

**Standard: 1. Number Sense, Properties, and Operations**  
**First Grade**

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<sup>1</sup> 10 can be thought of as a bundle of ten ones — called a “ten.” (CCSS: 1.NBT.2a)

The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. (CCSS: 1.NBT.2b)

The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). (CCSS: 1.NBT.2c)

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- **Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)**

**Grade Level Expectation: Kindergarten**

**Concepts and skills students master:**

**2. Discuss how purchases can be made to meet wants and needs (PFL)**

**Evidence Outcomes**

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Students can:**

- a. Identify the difference between personal wants and needs
- b. Give examples of the difference between spending income on something you want versus something you need

**Inquiry Questions:**

- 1. What are wants and needs?
- 2. How do people balance between wants and needs?
- 3. What is the difference between a want and a need?
- 4. How can money help people to meet their wants and needs?

**Relevance and Application:**

- 1. Individuals make choices about purchasing to serve wants and needs. For example, parents pay bills prior to purchasing movie tickets or toys.

**Nature of Economics:**

- 1. Financially responsible individuals differentiate between needs and wants.

**Content Area: Mathematics**

**Standard: 1. Number Sense, Properties, and Operations**

**Prepared Graduates:**

- Apply transformation to numbers, shapes, functional representations, and data

**Grade Level Expectation: Kindergarten**

**Concepts and skills students master:**

**2. Composing and decomposing quantity forms the foundation for addition and subtraction**

Evidence Outcomes	21 <sup>st</sup> Century Skills and Readiness Competencies
<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>a. Model and describe addition as putting together and adding to, and subtraction as taking apart and taking from, using objects or drawings. (CCSS: K.OA)               <ul style="list-style-type: none"> <li>i. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds,<sup>6</sup> acting out situations, verbal explanations, expressions, or equations. (CCSS: K.OA.1)</li> <li>ii. Solve addition and subtraction word problems, and add and subtract within 10.<sup>7</sup> (CCSS: K.OA.2)</li> <li>iii. Decompose numbers less than or equal to 10 into pairs in more than one way.<sup>8</sup> (CCSS: K.OA.3)</li> <li>iv. For any number from 1 to 9, find the number that makes 10 when added to the given number.<sup>9</sup> (CCSS: K.OA.4)</li> <li>v. <b>Use objects including coins and drawings to model addition and subtraction problems to 10 (PFL)</b></li> </ul> </li> <li>b. Fluently add and subtract within 5. (CCSS: K.OA.5)</li> <li>c. Compose and decompose numbers 11–19 to gain foundations for place value using objects and drawings.<sup>10</sup> (CCSS: K.NBT)</li> </ul>	<p><b>Inquiry Questions:</b></p> <ul style="list-style-type: none"> <li>1. What happens when two quantities are combined?</li> <li>2. What happens when a set of objects is separated into different sets?</li> </ul> <p><b>Relevance and Application:</b></p> <ul style="list-style-type: none"> <li>1. People combine quantities to find a total such as number of boys and girls in a classroom or coins for a purchase.</li> <li>2. People use subtraction to find what is left over such as coins left after a purchase, number of toys left after giving some away.</li> </ul> <p><b>Nature of Mathematics:</b></p> <ul style="list-style-type: none"> <li>1. Mathematicians create models of problems that reveal relationships and meaning.</li> <li>2. Mathematics involves the creative use of imagination.</li> <li>3. Mathematicians reason abstractly and quantitatively. (MP)</li> <li>4. Mathematicians model with mathematics. (MP)</li> </ul>

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**Standard: 1. Number Sense, Properties, and Operations**

**Kindergarten**

<sup>6</sup> e.g., claps. (CCSS: K.OA.1)

<sup>7</sup> e.g., by using objects or drawings to represent the problem. (CCSS: K.OA.2)

<sup>8</sup> e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g.,  $5 = 2 + 3$  and  $5 = 4 + 1$ ). (CCSS: K.OA.3)

<sup>9</sup> e.g., by using objects or drawings, and record the answer with a drawing or equation. (CCSS: K.OA.4)

<sup>10</sup> Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g.,  $18 = 10 + 8$ ); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones. (CCSS: K.NBT.1)

**Content Area: Mathematics**

**Standard: 4. Shape, Dimension, and Geometric Relationships**

**Prepared Graduates:**

- Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error

**Grade Level Expectation: Kindergarten**

**Concepts and skills students master:**

**2. Measurement is used to compare and order objects**

**Evidence Outcomes**

**Students can:**<sup>12345</sup>

- a. Describe and compare measurable attributes. (CCSS: K.MD)
  - i. Describe measurable attributes of objects, such as length or weight. (CCSS: K.MD.1)
  - ii. Describe several measurable attributes of a single object. (CCSS: K.MD.1)
  - iii. Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference.<sup>6</sup> (CCSS: K.MD.2)
  - iv. **Order several objects by length, height, weight, or price (PFL)**
- b. Classify objects and count the number of objects in each category. (CCSS: K.MD)
  - i. Classify objects into given categories. (CCSS: K.MD.3)
  - ii. Count the numbers of objects in each category. (CCSS: K.MD.3)
  - iii. Sort the categories by count. (CCSS: K.MD.3)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- 1. How can you tell when one thing is bigger than another?
- 2. How is height different from length?

**Relevance and Application:**

- 1. Measurement helps to understand and describe the world such as in cooking, playing, or pretending.
- 2. People compare objects to communicate and collaborate with others. For example, we describe items like the long ski, the heavy book, the expensive toy.

**Nature of Mathematics:**

- 1. A system of measurement provides a common language that everyone can use to communicate about objects.
- 2. Mathematicians use appropriate tools strategically. (MP)
- 3. Mathematicians attend to precision. (MP)

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**Standard: 4. Shape, Dimension, and Geometric Relationships**  
**Kindergarten**

<sup>6</sup> For example, directly compare the heights of two children and describe one child as taller/shorter. (CCSS: K.MD.2)

**Content Area: Social Studies**

**Standard: 3. Economics**

**Prepared Graduates:**

- **Acquire the knowledge and economic reasoning skills to make sound financial decisions (PFL)**

**Grade Level Expectation: Preschool**

**Concepts and skills students master:**

**2. Recognize money and identify its purpose (PFL)**

**Evidence Outcomes**

**Students can:**

- Recognize coins and currency as money
- Identify how money is used as a medium of exchange
- Discuss why we need money

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- Why do people use money?
- What are the different forms of money?

**Relevance and Application:**

- Recognition of units of money aids in making purchases. For example, a parent pays for an item using correct change.
- Knowledge of coins and currency ensures accurate transactions. For example, you can check that a cashier gave you the right amount of change.
- Money is a medium of exchange.

**Nature of Economics:**

- Financially responsible individuals use money wisely.



**Content Area: Mathematics**

**Standard: 1. Number Sense, Properties, and Operations**

**Prepared Graduates:**

- Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error

**Grade Level Expectation: Preschool**

**Concepts and skills students master:**

**1. Quantities can be represented and counted**

**Evidence Outcomes**

- Students can:**
- a. **Count and represent objects including coins to 10 (PFL)**
  - b. Match a quantity with a numeral

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- 1. What do numbers tell us?
- 2. Is there a biggest number?

**Relevance and Application:**

- 1. Counting helps people to determine how many such as how big a family is, how many pets there are, such as how many members in one's family, how many mice on the picture book page, how many counting bears in the cup.
- 2. People sort things to make sense of sets of things such as sorting pencils, toys, or clothes.

**Nature of Mathematics:**

- 1. Numbers are used to count and order objects.
- 2. Mathematicians reason abstractly and quantitatively. (MP)
- 3. Mathematicians attend to precision. (MP)

**Content Area: Mathematics**

**Standard: 4. Shape, Dimension, and Geometric Relationships**

**Prepared Graduates:**

- Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error

**Grade Level Expectation: Preschool**

**Concepts and skills students master:**

2. Measurement is used to compare objects

**Evidence Outcomes**

**Students can:**

- a. Describe the order of common events
- b. Group objects according to their size using standard and non-standard forms (height, weight, length, or color brightness) of measurement
- c. **Sort coins by physical attributes such as color or size (PFL)**

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- 1. How do we know how big something is?
- 2. How do we describe when things happened?

**Applying Mathematics in Society and Using Technology:**

- 1. Understanding the order of events allows people to tell a story or communicate about the events of the day.
- 2. Measurements helps people communicate about the world. For example, we describe items like big and small cars, short and long lines, or heavy and light boxes.

**Nature of Mathematics:**

- 1. Mathematicians sort and organize to create patterns. Mathematicians look for patterns and regularity. The search for patterns can produce rewarding shortcuts and mathematical insights.
- 2. Mathematicians reason abstractly and quantitatively. (MP)
- 3. Mathematicians use appropriate tools strategically. (MP)

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