MATHEMATICS

Business Math: Unit 1
Managing Your Money
Course Philosophy/Description

Business Mathematics is an elective Mathematics course of which students learn to use mathematics effectively as a tool in their personal and business lives. After students have completed this course, they will be able to apply mathematical concepts in various personal and business situations. All standards are aligned to New Jersey Student Learning Standards of Mathematics and the New Jersey Personal Financial Literacy Standards.

Students will review and apply mathematical concepts that they learned in four of the conceptual categories, namely Number and Quantity, Algebra, Functions, and Statistics and Probability. They will understand terminology relating to personal and business mathematics applications and apply basic math skills to the solution of both personal and business applications. They will use common mathematical formulas to solve a variety of personal and business mathematics as well as apply knowledge of computer and calculator use. Students will also learn strategies for critical thinking and problem solving both in finance and business ethics.
<table>
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<tr>
<th>#</th>
<th>Student Learning Objective</th>
<th>NJSLS – Math</th>
<th>NJ-Personal Financial Literacy Standards</th>
<th>Marking Period 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analyze various forms of compensation including straight time pay, overtime, weekly time card, piece work, salary, commission and graduated commission.</td>
<td>N.Q.A.1, N.Q.A.2, N.Q.A.3</td>
<td>9.1.12.A.3, 9.1.12.A.4</td>
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<tr>
<td>4</td>
<td>Perform bank reconciliation after creating and maintaining a check register.</td>
<td>A.CED.A.3, A.REI.C.6, A.REI.C.5</td>
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</tbody>
</table>
| 5 | Analyze simple and compound interest rates for saving accounts and calculate their earnings and balances. Calculate earnings for t=2 and expand the analysis for longer periods of investments. | A.REI.B.4  
A.CED.A.1  
A.APR.A.1  
A.SSE.A.2  
A.SSE.B.3  
F.IF.A.1  
F.IF.A.2  
F.LE.A.1 |
| 6 | Analyze sales tax, markups and markdowns to calculate the final cost of cash purchases. | A.CED.A.2  
A.RELD.10  
A.RELD.12 |
Research about Teaching and Learning Mathematics

Structure teaching of mathematical concepts and skills around problems to be solved (Checkly, 1997; Wood & Sellars, 1996; Wood & Sellars, 1997)
Encourage students to work cooperatively with others (Johnson & Johnson, 1975; Davidson, 1990)
Use group problem-solving to stimulate students to apply their mathematical thinking skills (Artzt & Armour-Thomas, 1992)
Students interact in ways that support and challenge one another’s strategic thinking (Artzt, Armour-Thomas, & Curcio, 2008)
Activities structured in ways allowing students to explore, explain, extend, and evaluate their progress (National Research Council, 1999)

There are three critical components to effective mathematics instruction (Shellard & Moyer, 2002):

- Teaching for conceptual understanding
- Developing children’s procedural literacy
- Promoting strategic competence through meaningful problem-solving investigations

Teachers should be:

- Demonstrating acceptance and recognition of students’ divergent ideas.
- Challenging students to think deeply about the problems they are solving, extending thinking beyond the solutions and algorithms required to solve the problem
- Influencing learning by asking challenging and interesting questions to accelerate students’ innate inquisitiveness and foster them to examine concepts further.
- Projecting a positive attitude about mathematics and about students’ ability to “do” mathematics

Students should be:

- Actively engaging in “doing” mathematics
- Solving challenging problems
- Investigating meaningful real-world problems
- Making interdisciplinary connections
- Developing an understanding of mathematical knowledge required to “do” mathematics and connect the language of mathematical ideas with numerical representations
- Sharing mathematical ideas, discussing mathematics with one another, refining and critiquing each other’s ideas and understandings
- Communicating in pairs, small group, or whole group presentations
- Using multiple representations to communicate mathematical ideas
- Using connections between pictures, oral language, written symbols, manipulative models, and real-world situations
- Using technological resources and other 21st century skills to support and enhance mathematical understanding
Mathematics is not a stagnate field of textbook problems; rather, it is a dynamic way of constructing meaning about the world around us, generating knowledge and understanding about the real world every day. Students should be metaphorically rolling up their sleeves and “doing mathematics” themselves, not watching others do mathematics for them or in front of them. (Protheroe, 2007)

Conceptual-Based Model

The purpose of the Conceptual-Based Model is to allow students the time to explore mathematical concepts to promote academic rigor and high level of student discourse to concurrently develop conceptual understanding, procedural fluency, and problem-solving skills. During the Mathematics block of instruction, teachers will select and set up a mathematical task that targets the mathematical goal(s) for the lesson. The teacher sets the stage for learning by ensuring the objective/rationale of the lesson is well-defined and connected to the task. The task should build on student’s prior knowledge, life experiences, and culture allowing students to share their prior knowledge and life/cultural experiences as it relates to the task to ensure that students understand the context of the problem. The instructional goal is to introduce the activity/task to the students allowing them to have access to learning while maintaining the cognitive demands of the task. Teachers will then support the students’ exploration of the task; this can be done independently, in pairs or in small groups or a combination of all. It is highly recommended that students be given the opportunity to privately work on a task to generate solutions on their own. Students are encouraged to share their findings with their peers in small group to compare their solutions. As students are actively engaged in constructing meaning of the mathematical concept(s) being taught and communicating their understanding of the concept(s) with their peers, the teacher monitors the development of student understanding by observing student thinking and using questions to stimulate thinking to drive students toward the aimed mathematical goal(s). The teacher assesses students’ understanding of key mathematical ideas, problem-solving strategies, and the use of and connection between models and representations to determine what the student knows. The teacher advances the students’ understanding to move the student beyond their present thinking and expand what they know to an additional situation. Teachers have been trained to strategically select groups of students who have different solution paths to the same task, different representations and errors/misconceptions to share, discuss, and analyze as a whole group. By providing these instructional opportunities, the teacher will then be able to orchestrate the class discussion by providing students with the opportunities to make their learning public as students share, discuss, analyze, clarify, extend, connect, strengthen, and record their thinking strategies. After students discuss, justify, and challenge the various solution paths that were shared, a summary of the learning is articulated and connected to the objective of the lesson. Students should be given an opportunity to close the lesson with a reflection on their learning.
<table>
<thead>
<tr>
<th>Effective Pedagogical Routines/Instructional Strategies</th>
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<td><strong>Collaborative Problem Solving</strong></td>
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<td>Connect Previous Knowledge to New Learning</td>
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<td>Making Thinking Visible</td>
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<td>Develop and Demonstrate Mathematical Practices</td>
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<td>Inquiry-Oriented and Exploratory Approach</td>
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<td>Multiple Solution Paths and Strategies</td>
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<td>Use of Multiple Representations</td>
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<td>Explain the Rationale of your Math Work</td>
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<td>Quick Writes</td>
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<td>Pair/Trio Sharing</td>
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<td>Turn and Talk</td>
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<td>Charting</td>
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<td>Gallery Walks</td>
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<td>Small Group and Whole Class Discussions</td>
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<td>Student Modeling</td>
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<td><strong>Analyze Student Work</strong></td>
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<td>Identify Student’s Mathematical Understanding</td>
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<td>Identify Student’s Mathematical Misunderstandings</td>
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<td>Interviews</td>
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<td>Role Playing</td>
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<td>Diagrams, Charts, Tables, and Graphs</td>
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<td>Anticipate Likely and Possible Student Responses</td>
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<td>Collect Different Student Approaches</td>
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<td>Multiple Response Strategies</td>
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<td>Asking Assessing and Advancing Questions</td>
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<td>Challenging</td>
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<tr>
<td>Pressing for Accuracy and Reasoning</td>
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<tr>
<td>Maintain the Cognitive Demand</td>
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</tbody>
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Educational Technology Standards


- **Technology Operations and Concepts**
  - Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
  - Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.

- **Creativity and Innovation**
  - Apply previous content knowledge by creating and piloting a digital learning game or tutorial.

- **Communication and Collaboration**
  - Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

- **Digital Citizenship**
  - Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
  - Evaluate consequences of unauthorized electronic access and disclosure, and on dissemination of personal information.
  - Compare and contrast policies on filtering and censorship both locally and globally.

- **Research and Information Literacy**
  - Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

- **Critical Thinking, Problem Solving, Decision Making**
  - Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

- **CRP1. Act as a responsible and contributing citizen and employee**
  Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

- **CRP2. Apply appropriate academic and technical skills.**
  Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

- **CRP4. Communicate clearly and effectively and with reason.**
  Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others’ time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

- **CRP6. Demonstrate creativity and innovation.**
  Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

- **CRP7. Employ valid and reliable research strategies.**
  Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
Career Ready Practices

- **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.**
  Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

- **CRP11. Use technology to enhance productivity.**
  Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks—personal and organizational—of technology applications, and they take actions to prevent or mitigate these risks.

- **CRP12. Work productively in teams while using cultural global competence.**
  Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.
## Differentiated Instruction

**Accommodate Based on Students Individual Needs: Strategies**

<table>
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<tr>
<th>Time/General</th>
<th>Processing</th>
<th>Comprehension</th>
<th>Recall</th>
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</thead>
<tbody>
<tr>
<td>Extra time for assigned tasks</td>
<td>Extra Response time</td>
<td>Precise processes for conceptual model</td>
<td>Teacher-made checklist</td>
</tr>
<tr>
<td>Adjust length of assignment</td>
<td>Have students verbalize steps</td>
<td>Short manageable tasks</td>
<td>Use visual graphic organizers</td>
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<tr>
<td>Timeline with due dates for</td>
<td>Repeat, clarify or reword</td>
<td>Brief and concrete directions</td>
<td>Reference resources to</td>
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<tr>
<td>reports and projects</td>
<td>directions</td>
<td>Provide immediate feedback</td>
<td>promote independence</td>
</tr>
<tr>
<td>Communication system</td>
<td>Mini-breaks between tasks</td>
<td>Small group instruction</td>
<td>Visual and verbal reminders</td>
</tr>
<tr>
<td>between home and school</td>
<td>Provide a warning for</td>
<td>Emphasize multi-sensory learning</td>
<td>Graphic organizers</td>
</tr>
<tr>
<td>Provide lecture notes/outline</td>
<td>transitions</td>
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<tr>
<td></td>
<td>Partnering</td>
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<thead>
<tr>
<th>Assistive Technology</th>
<th>Tests/Quizzes/Grading</th>
<th>Behavior/Attention</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer/whiteboard</td>
<td>Extended time</td>
<td>Consistent daily structured</td>
<td>Individual daily planner</td>
</tr>
<tr>
<td>Tape recorder</td>
<td>Study guides</td>
<td>routine</td>
<td>Display a written agenda</td>
</tr>
<tr>
<td>Video Tape</td>
<td>Shortened tests</td>
<td>Simple and clear classroom rules</td>
<td>Note-taking assistance</td>
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<tr>
<td></td>
<td>Read directions aloud</td>
<td>Frequent feedback</td>
<td>Color code materials</td>
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</tbody>
</table>
Interdisciplinary Connections

*Model interdisciplinary thinking to expose students to other disciplines.*

**Social Studies and Personal finance**

*Looking for the Right Fit:*

- Students will act as a senior human resources manager at a [Fortune 500](https://www.fortune.com) company. The company is growing quickly, and this month it has six positions newly open. First the student will need to research the positions to learn more. Then he/she will write a job description to post online. Finally, he/she will write a series of questions to ask during the interview process. Great employees are a company's best asset, and it is the student’s job to find them, so good luck!

**Federal Income Tax**

- Tax reform can be approached in a variety of ways. Some people worry that new tax plans may only help the rich and not the poor or the middle class. To understand proposed changes in tax plans, students must first understand our current tax plan. That is what they will discover in this project.
### Enrichment

#### What is the Purpose of Enrichment?

- The purpose of enrichment is to provide extended learning opportunities and challenges to students who have already mastered, or can quickly master, the basic curriculum. Enrichment gives the student more time to study concepts with greater depth, breadth, and complexity.
- Enrichment also provides opportunities for students to pursue learning in their own areas of interest and strengths.
- Enrichment keeps advanced students engaged and supports their accelerated academic needs.
- Enrichment provides the most appropriate answer to the question, “What do you do when the student already knows it?”

#### Enrichment is…

- Planned and purposeful
- *Different*, or differentiated, work — not just *more* work
- Responsive to students’ needs and situations
- A promotion of high-level thinking skills and making connections within content
- The ability to apply different or multiple strategies to the content
- The ability to synthesize concepts and make real world and cross-curricular connections.
- Elevated contextual complexity
- Sometimes independent activities, sometimes direct instruction
- Inquiry based or open ended assignments and projects
- Using supplementary materials in addition to the normal range of resources.
- Choices for students
- Tiered/Multi-level activities with Flexible groups (may change daily or weekly)

#### Enrichment is not…

- Just for gifted students (some gifted students may need intervention in some areas just as some other students may need frequent enrichment)
- Worksheets that are more of the same (busywork)
- Random assignments, games, or puzzles not connected to the content areas or areas of student interest
- Extra homework
- A package that is the same for everyone
- Thinking skills taught in isolation
- Unstructured free time
Assessments

*Suggested Formative/Summative Classroom Assessments*

- Describe Learning Vertically
- Identify Key Building Blocks
- Make Connections (between and among key building blocks)
- Short/Extended Constructed Response Items
- Multiple-Choice Items (where multiple answer choices may be correct)
- Drag and Drop Items
- Use of Equation Editor
- Quizzes
- Journal Entries/Reflections/Quick-Writes
- Accountable talk
- Projects
- Portfolio
- Observation
- Graphic Organizers/Concept Mapping
- Presentations
- Role Playing
- Teacher-Student and Student-Student Conferencing
- Homework
New Jersey Student Learning Standards

**N.Q.A.1:** Use units as a way to understand problems and to guide the solution of multi-step problems; Choose and interpret units consistently in formulas; Choose and interpret the scale and the origin in graphs and data displays.

**N.Q.A.2:** Define appropriate quantities for the purpose of descriptive modeling.

**N.Q.A.3:** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

**A.CED.A.1:** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions.

**A.CED.A.2:** Create equations in two or more variables to represent relationships between quantities; Graph equations on coordinate axes with labels and scales.

**A.CED.A.3:** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

**A.REI.B.4:** Solve quadratic equations in one variable.

**A.REI.B.4a:** Use the method of completing the square to transform any quadratic equation in $x$ into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

**A.REI.B.4b:** Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers $a$ and $b$.

**A.REI.C.5:** Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

**A.REI.C.6:** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

**A.REI.D.10:** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [Focus on linear equations.]
### New Jersey Student Learning Standards

**A.REI.D.12**: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

**A.SSE.A.2**: Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$, *thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$.

**A.SSE.B.3**: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

- **A.SSE.B.3a**: Factor a quadratic expression to reveal the zeros of the function it defines.
- **A.SSE.B.3b**: Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

**F.BF.A.1**: Write a function that describes a relationship between two quantities.

- **F.BF.A.1a**: Determine an explicit expression, a recursive process, or steps for calculation from a context

- **F.BF.A.1b**: Combine standard function types using arithmetic operations. *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.*

**F.IF.A.1**: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. 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 $y = f(x)$.

**F.IF.A.2**: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

**F.LE.A.1**: Distinguish between situations that can be modeled with linear functions and with exponential functions.

**F.LE.A.2**: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

**F.LE.B.5**: Interpret the parameters in a linear or exponential function in terms of a context.
9.1.12.A.1: Differentiate among the types of taxes and employee benefits.


9.1.12.A.3: Analyze the relationship between various careers and personal earning goals.

9.1.12.A.4: Identify a career goal and develop a plan and timetable for achieving it, including educational/training requirements, costs, and possible debt.

9.1.12.A.5: Analyze how the economic, social, and political conditions of a time period can affect the labor market.

9.1.12.A.7: Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income.

Mathematical Practices

1. Make sense of problems and persevere in solving them.

2. Reason abstractly and quantitatively.

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

5. Use appropriate tools strategically.

6. Attend to precision.

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.
## Unit Focus:

- Perform arithmetic operations on polynomials
- Interpret the structure of expressions
- Solve equations and inequalities in one variable
- Create equations that describe numbers or relationships
- Interpret functions that arise in applications in terms of the context
- Represent and solve equations and inequalities graphically
- Build a function that models a relationship between two quantities
- Construct & compare linear, quadratic, & exponential models
- Build new functions from existing functions
- Analyze functions using different representations
- Analyze various forms of compensation
- Prepare earning statements
- Prepare a budget sheet
- Perform bank reconciliation
- Analyze simple and compound interest rates
- Analyze cost of purchases
New Jersey Student Learning Standard(s):
N.Q.A.1: Use units as a way to understand problems and to guide the solution of multi-step problems; Choose and interpret units consistently in formulas; Choose and interpret the scale and the origin in graphs and data displays.

N.Q.A.2: Define appropriate quantities for the purpose of descriptive modeling.

N.Q.A.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

9.1.12.A.3: Analyze the relationship between various careers and personal earning goals.

9.1.12.A.4: Identify a career goal and develop a plan and timetable for achieving it, including educational/training requirements, costs, and possible debt.

**Student Learning Objective 1:** Analyze various forms of compensation including straight time pay, overtime, weekly time card, piece work, salary, commission and graduated commission.

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<th>MPs</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/ Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
</table>
| MP 2 MP 7 MP 6 | Use units as a way to understand problem and solve them.  
Define appropriate quantities for a model.  
Use rounding and estimates when reporting quantities.  
Analyze various payment methods for different career options. | Are there methods to determine the compensation for work?  
What are the appropriate forms of compensation for different careers? | How Much Did We Sell?  
Calculate My Income  
Looking For The Right Fit |
New Jersey Student Learning Standard(s):

A.CED.A.2: Create equations in two or more variables to represent relationships between quantities; Graph equations on coordinate axes with labels and scales.

A.REI.D.10: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [Focus on linear equations.]

F.LE.A.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

F.LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context.

A.REI.C.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

F.BF.A.1: Write a function that describes a relationship between two quantities.
  F.BF.A.1a: Determine an explicit expression, a recursive process, or steps for calculation from a context
  F.BF.A.1b: Combine standard function types using arithmetic operations. 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.

9.1.12.A.1: Differentiate among the types of taxes and employee benefits.


Student Learning Objective 2: Prepare statement of earnings after calculating net income given all federal, state, local, Social security, and Medicare rates, along with health insurance contribution, and other deductions

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<tr>
<td>MP 1</td>
<td>Calculate payroll deductions.</td>
<td>Why is the concept of net pay important to personal financial planning?</td>
<td>The IRS and My Paycheck</td>
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<tr>
<td>MP 3</td>
<td>Calculate flat federal taxes.</td>
<td>Is our tax system fair? Explain.</td>
<td>My Net Income</td>
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<tr>
<td>MP 5</td>
<td>Calculate flat state taxes.</td>
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<td>Taxes</td>
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<td>MP 7</td>
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<td>Calculate graduated state taxes.</td>
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<tr>
<td>Calculate social security tax.</td>
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<td>Calculate Medicare tax.</td>
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<tr>
<td>Calculate pay period health insurance.</td>
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<tr>
<td>Analyze total deductions in the statement of earnings.</td>
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<tr>
<td>Calculate net pay.</td>
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<td></td>
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</tr>
<tr>
<td>Follow multistep procedures to calculate pay.</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
New Jersey Student Learning Standard(s):

F.LE.A.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

F.LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context.

F.BF.A.1: Write a function that describes a relationship between two quantities.

   F.BF.A.1a: Determine an explicit expression, a recursive process, or steps for calculation from a context.

   F.BF.A.1b: Combine standard function types using arithmetic operations. 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.

9.1.12.A.5: Analyze how the economic, social, and political conditions of a time period can affect the labor market.

9.1.12.A.7: Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income.


9.1.12.B.6: Design and utilize a simulated budget to monitor progress of financial plans.

Student Learning Objective 3: Prepare a budget sheet to reflect the analysis of personal cost and average expenditure.

<table>
<thead>
<tr>
<th>MPs</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 1 MP 3 MP 5 MP 7</td>
<td>Calculate average monthly expenditures. Prepare a budget. Calculate the percent of income spent on expenses.</td>
<td>Why is a budget important? How do fixed and variable costs differ?</td>
<td>Create a Personal Budget Creating Budget Expense Tracking My Expenditures and Budget</td>
</tr>
</tbody>
</table>
New Jersey Student Learning Standard(s):

A.CED.A.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

A.REI.C.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

A.REI.C.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.


**Student Learning Objective 4:** Perform bank reconciliation after creating and maintaining a check register.

<table>
<thead>
<tr>
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</tr>
</thead>
</table>
Differentiate between a passbook and a statement savings account.

New Jersey Student Learning Standard(s):
A.REI.B.4: Solve quadratic equations in one variable.

A.CED.A.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions.

APR.A.1: Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

A.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. For example, see \( x^4 - y^4 \) as \((x^2)^2 - (y^2)^2\), thus recognizing it as a difference of squares that can be factored as \((x^2 - y^2)(x^2 + y^2)\).

A.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

F.IF.A.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. 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 \( y = f(x) \).

F.IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

F.LE.A.1: Distinguish between situations that can be modeled with linear functions and with exponential functions.

F.BF.A.1: Write a function that describes a relationship between two quantities.

9.1.12.B.2 Compare strategies for saving and investing and the factors that influence how much should be saved or invested to meet financial goals.

9.1.12.B.8 Describe and calculate interest and fees that are applied to various forms of spending, debt, and saving.
# Student Learning Objective 5:
Analyze simple and compound interest rates for saving accounts and calculate their earnings and balances. Calculate earnings for $t=2$ and expand the analysis for longer periods of investments.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>MP 4</td>
<td>Differentiate between simple and compounded interest.</td>
<td>Is saving important to our financial well being?</td>
<td>Interest Rates and My Goal</td>
</tr>
<tr>
<td>MP 6</td>
<td>Differentiate between types of compounding calculate simple interest on a savings account.</td>
<td>How can I identify the benefit of saving accounts?</td>
<td>Compounded Interest and Annuities</td>
</tr>
<tr>
<td></td>
<td>Apply tables of compound interest with a savings account on various time periods.</td>
<td></td>
<td>Savings and Retirement Funds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Savings and Interest</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>College Savings</td>
</tr>
</tbody>
</table>

## New Jersey Student Learning Standard(s):

**N.Q.A.1:** Use units as a way to understand problems and to guide the solution of multi-step problems; Choose and interpret units consistently in formulas; Choose and interpret the scale and the origin in graphs and data displays.

**N.Q.A.2:** Define appropriate quantities for the purpose of descriptive modeling.

**N.Q.A.3:** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

**A.CED.A.2:** Create equations in two or more variables to represent relationships between quantities; Graph equations on coordinate axes with labels and scales.

**A.REI.D.10:** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [Focus on linear equations.]
A.REI.D.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

**Student Learning Objective 6:** Analyze sales tax, markups and markdowns to calculate the final cost of cash purchases.

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>MP 1 MP 2 MP 4 MP 7</td>
<td>Calculate markup and markdowns. Calculate sales tax and final cost. Compare unit prices of various commodities and make decisions to decrease cost.</td>
<td>How can I find the cheapest price for goods and services? Why do you think merchants put goods on sale? What are some ways merchants mark sale prices on goods?</td>
<td>Eureka Markups and Markdowns Markups and Markdowns How Much Does It Cost?</td>
</tr>
</tbody>
</table>
# Unit 1 Vocabulary

- Account Statement
- Annual Expenses
- Annual Interest Rate
- Annuity
- Annuity Due
- Automated Teller Machine
- Balance
- Bank statement
- Budget
- Budget Sheet
- Calculate
- Candidate
- Check
- Check Register
- Checking Account
- Claim
- Commission
- Commission Rate
- Community
- Comparison Shopping
- Compound Interest
- Compound Interest Table
- Compute
- Coupons
- Daily Compounding
- Deposit
- Direct Deposit

- Double Time
- Emergency Fund
- Exemption
- Expenditures
- Expense Summary
- Federal Income Tax
- Fixed
- Fixed Expenses
- Graduated Commission
- Graduated Income Tax
- Gross Income
- Group Insurance
- Hourly Rate
- Incentive
- Income
- Interest
- Living Expenses
- Markdown
- Markdown Rate
- Medical
- Medicare
- Net Pay
- Online Banking
- Ordinary Annuity
- Overtime Pay
- Percent
- Personal Identification Number

- Piecework
- Principal
- Rate
- Rebates
- Reconcile
- Recordkeeping
- Require
- Salary
- Sale Price
- Sales Receipt
- Sales Tax
- Saving account
- Service
- Service charge
- Simple Interest
- Social Security
- Straight Commission
- Straight Time Pay
- Total Purchase Price
- Unit Pricing
- Weekly Time Card
- Withdrawal
- Withholding Allowance
Field Trip Ideas

**MUSEUM OF AMERICAN FINANCE** (New York, NY) – For more than 20 years, educators from around the country have been bringing students to the Museum to help them understand how finance impacts their daily lives. The Museum offers discounted admission for pre-booked groups of eight or more, as well as a variety of classes for students in middle school through college.

http://www.moaf.org/index

**MUSEUM of MATHEMATICS** (New York) Mathematics illuminates the patterns that abound in our world. The National Museum of Mathematics strives to enhance public understanding and perception of mathematics. Its dynamic exhibits and programs stimulate inquiry, spark curiosity, and reveal the wonders of mathematics. The Museum’s activities lead a broad and diverse audience to understand the evolving, creative, human, and aesthetic nature of mathematics.

www.momath.org


https://www.newyorkfed.org/aboutthefed/visiting.html