



Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:

Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT: **MATHEMATICS**

COURSE: **APPLIED MATH**

Curriculum Development Timeline

School: Ocean Township High School

Course: Applied Math

Department: Mathematics

Board Approval	Supervisor	Notes
August 2025	Greg Colon	Born Date

Township of Ocean Pacing Guide

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Week	Marking Period 1	Week	Marking Period 3
1	Practical Arithmetic and Number Operations	21	Measurement and Cost Analysis
2	Practical Arithmetic and Number Operations	22	Measurement and Cost Analysis
3	Practical Arithmetic and Number Operations	23	Measurement and Cost Analysis
4	Practical Arithmetic and Number Operations	24	Practical Calculations and Conversions
5	Practical Arithmetic and Number Operations	25	Practical Calculations and Conversions
6	Practical Arithmetic and Number Operations	26	Practical Calculations and Conversions
7	Fractional and Proportional Reasoning	27	Practical Calculations and Conversions
8	Fractional and Proportional Reasoning	28	Practical Calculations and Conversions
9	Fractional and Proportional Reasoning	29	Practical Calculations and Conversions
10	Fractional and Proportional Reasoning	30	Practical Calculations and Conversions
Week	Marking Period 2	Week	Marking Period 4
11	Fractional and Proportional Reasoning	31	Practical Calculations and Conversions
12	Fractional and Proportional Reasoning	32	Practical Calculations and Conversions
13	Fractional and Proportional Reasoning	33	Advanced Measurement and Decision Analysis
14	Fractional and Proportional Reasoning	34	Advanced Measurement and Decision Analysis
15	Measurement and Cost Analysis	35	Advanced Measurement and Decision Analysis
16	Measurement and Cost Analysis	36	Advanced Measurement and Decision Analysis
17	Measurement and Cost Analysis	37	Advanced Measurement and Decision Analysis
18	Measurement and Cost Analysis	38	Advanced Measurement and Decision Analysis
19	Measurement and Cost Analysis	39	Advanced Measurement and Decision Analysis
20	Measurement and Cost Analysis	40	Advanced Measurement and Decision Analysis

Core Instructional & Supplemental Materials

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Core Instruction: McGraw-Hill Applied Mathematics ©2010

Supplemental: Tryengineering.org, Cengage Elementary Technical Mathematics (12th ed.)
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Special Education Supplemental: IXL and Geogebra for extra practice on foundational skills

Time Frame	6 weeks
Topic	
Practical Arithmetic and Number Operations	
Alignment to Standards	
● NJSLS Standard: HS.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. Students solve multi-step word problems (e.g., calculating total costs for a construction project) using basic operations, requiring them to choose appropriate units (e.g., dollars, cents) and interpret results in trade contexts, such as budgeting for materials. ● NJSLS Standard: HS.A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. Students use basic operations to solve problems that can be modeled as linear equations in trade scenarios (e.g., determining total labor costs based on hourly rates and hours worked). ● NJSLS Standard: HS.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. Converting money (e.g., dollars to cents) and time (e.g., hours to minutes or 12-hour to 24-hour formats) involves selecting and interpreting appropriate units for scheduling or budgeting in trade applications, such as creating project timelines or cost estimates. ● NJSLS Standard: HS.N-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. Students define quantities like time (e.g., minutes for task scheduling) or money (e.g., cents for precise budgeting) to model real-world trade scenarios, such as estimating labor time or material costs. ● NJSLS Standard: HS.N-RN.B.3 Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a	

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nonzero rational number and an irrational number is irrational.

Converting between fractions, decimals, and percentages involves understanding rational numbers (e.g., $1/2 = 0.5 = 50\%$) and applying these transformations in trade contexts, such as calculating discounts or material proportions.

- **NJSLS Standard: HS.A-SSE.A.1**

Interpret expressions that represent a quantity in terms of its context.

Students interpret numerical expressions (e.g., 0.75 as 75% for a discount) in trade-related problems, such as pricing materials or calculating tax rates.

- **NJSLS Standard: HS.N-NS.A.1**

Understand that rational numbers are closed under addition and subtraction, and apply these properties to solve problems.

Adding and subtracting negative numbers (e.g., calculating budget deficits or temperature differences in trade scenarios like HVAC systems) involves applying the properties of rational numbers, ensuring accurate computations in real-world contexts such as financial adjustments or environmental measurements.

- **NJSLS Standard: HS.A-REI.B.3**

Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Negative number operations are used in solving linear equations that arise in trade-related problems, such as balancing a budget with negative values (e.g., $-50 + x = 0$ to find a break-even point).

Learning Objectives and Activities

Learning Objectives:

1. Accurately solve multi-step problems using addition, subtraction, multiplication, and division in trade scenarios.
2. Convert between units of money and time with precision for financial and scheduling purposes.
3. Transform numbers between fractions, decimals, and percentages for practical applications.
4. Perform addition and subtraction with negative numbers to manage financial deficits or temperature-related calculations.

Learning Activities:

1. Solve word problems to calculate total costs for a construction project (e.g., lumber, nails, paint).
2. Convert project timelines from hours to minutes or days for scheduling tasks.
3. Practice changing numbers (e.g., 0.75 to 75% or $1/4$ to 0.25) for pricing or material estimates.
4. Use negative numbers to balance a budget with unexpected expenses or calculate temperature differences for HVAC systems.
5. Create a mock project budget, converting dollars to cents and adjusting for cost

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overruns using negative numbers.

Assessments

Formative Assessments

1. **Classwork Problem Sets:** Students solve a set of word problems using basic operations (e.g., calculating costs for construction materials) and conversions (e.g., dollars to cents or hours to minutes). Feedback is provided to address errors and reinforce concepts.
2. **Quick Checks:** Students complete short, in-class tasks, such as converting a time duration (e.g., minutes to hours) or solving a problem with negative numbers (e.g., $-10 + -5$). Used to assess understanding and adjust teaching.
3. **Group Budget Exercise:** In small groups, students create a budget for a trade-related task (e.g., landscaping project), incorporating money conversions and negative numbers for cost adjustments. Peer and teacher feedback focus on accuracy and application.
4. **Number Conversion Practice:** Students complete exercises converting numbers between fractions, decimals, and percentages (e.g., 0.25 to 25% or $1/3$ to 0.333). Graded for completion with feedback to support improvement.

Summative Assessments

1. **Project: Cost Estimate for a Trade Task:** Students develop a cost estimate for a trade job (e.g., plumbing repair), requiring basic operations, money conversions, percentage calculations, and negative number adjustments (e.g., budget deficits). Evaluated for accuracy, clarity, and practical application.

Benchmark Assessments

1. **Checkpoint Quiz:** A short quiz assessing proficiency in basic operations and conversions, such as solving a word problem for material costs or converting time units (e.g., 3 hours to seconds). Results guide reteaching and track progress.
2. **Negative Number Application Task:** Students complete a task applying negative numbers in a trade context (e.g., adjusting a budget for unexpected costs or calculating temperature changes for HVAC). Scored to evaluate readiness for advanced applications.

Alternative Assessments

1. **Oral Explanation: Practical Application:** Students explain a trade-related calculation (e.g., converting time for a project schedule or using negative numbers for budget adjustments) to the class or teacher. Assessed for accuracy and clarity.

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2. **Visual Diagram: Number Conversions:** Students create a diagram or chart showing conversions between fractions, decimals, and percentages (e.g., $\frac{2}{5}$, 0.4, 40%) with a trade example (e.g., material pricing). Graded for creativity, accuracy, and relevance.
3. **Role-Play: Trade Scenario:** In pairs, students role-play a contractor and client discussing a project budget, using money conversions and negative numbers (e.g., handling cost overruns). Evaluated for math application and communication.
4. **Reflection: Real-World Connection:** Students write a brief reflection on how they applied unit skills (e.g., conversions or negative numbers) in a trade or everyday scenario. Assessed for understanding and practical relevance.

Interdisciplinary Connections

- **Standard 9.1.12.FP.2:** *Analyze the relationship of income, expenses, and budgeting to a successful financial plan.*

Career Readiness, Life Literacies, and Key Skills

NJSLS 9.1.12.FP.2: Analyze the relationship of income, expenses, and budgeting to a successful financial plan.

NJSLS 9.2.12.CAP.4: Evaluate different careers and develop a plan to obtain the appropriate credentials and/or educational requirements.

NJSLS 9.4.12.CT.2: Explain the potential benefits of collaborating to solve workplace and community problems.

NJSLS 9.4.12.IML.8: Evaluate media sources for credibility, reliability, perspective, and relevance to workplace applications.

NJSLS 9.4.12.TL.1: Assess digital tools to determine appropriateness for completing a task or solving a problem.

Technology Integration

- **NJSLS 9.4.12.CI.1:** Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
- **NJSLS 9.4.12.CT.1:** Identify problem-solving strategies used in the development of an innovative product or practice.
- **NJSLS 9.4.12.CT.2:** Explain the potential benefits of collaborating to solve workplace and community problems.
- **NJSLS 9.4.12.IML.8:** Evaluate media sources for credibility, reliability, perspective, and relevance to workplace applications.
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Career Education

- **CRP2** (Apply appropriate academic and technical skills).
- **CRP4** (Communicate clearly and effectively and with reason).
- **CRP9** (Model integrity, ethical leadership, and effective management).
- **CRP8** (Utilize critical thinking to make sense of problems and persevere in solving them).
- **CRP11** (Use technology to enhance productivity).

Time Frame

8 weeks

Topic

Fractional and Proportional Reasoning

Alignment to Standards

- **NJSLS Standard: HS.N-RN.B.3**
Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
Adding fractions, decimals, and percents (e.g., $1/4 + 0.3 + 10\%$) involves operations with rational numbers, applied in trade contexts like calculating combined material quantities or discounts.
- **NJSLS Standard: HS.A-SSE.A.1**
Interpret expressions that represent a quantity in terms of its context.
Students interpret expressions involving fractions, decimals, and percents (e.g., 0.15 as 15% for a discount) in trade scenarios, such as pricing or budgeting.

Adding Fractions with Common Denominators

- **NJSLS Standard: HS.N-RN.B.3**
Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
Adding fractions with common denominators (e.g., $2/5 + 3/5$ for pipe lengths in plumbing) uses rational number operations, ensuring accurate measurements in trade applications.
- **NJSLS Standard: HS.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.

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Students select appropriate units (e.g., feet or inches) when adding fractions for measurements, interpreting results in construction or landscaping tasks.

- **NJSLS Standard: HS.N-RN.B.3**

Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

Multiplying mixed numbers (e.g., $2\frac{1}{2} \times 3\frac{1}{3}$ for garden bed area) involves rational number operations, applied to calculate areas or volumes in trade contexts.

- **NJSLS Standard: HS.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.

Students convert mixed numbers to improper fractions for multiplication, revealing properties like area in construction or cooking calculations.

- **NJSLS Standard: HS.N-Q.A.2**

Define appropriate quantities for the purpose of descriptive modeling.

Students define quantities like average cost per unit, labor-to-material ratios, or rates (e.g., cost per hour) to model trade scenarios, such as budgeting or recipe scaling.

- **NJSLS Standard: HS.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.

Calculating proportions and rates (e.g., scaling a recipe or labor rates) involves creating relationships between quantities, which can be modeled as equations in trade applications.

- **NJSLS Standard: HS.A-REI.B.3**

Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Students solve one- or two-step problems (e.g., adding and multiplying to calculate total costs) that can be modeled as linear equations in trade scenarios, like budgeting or material estimation.

- **NJSLS Standard: HS.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.

Solving problems requires selecting appropriate units (e.g., dollars or hours) and interpreting results in trade contexts, such as cost calculations.

- **NJSLS Standard: HS.MP.1**

Make sense of problems and persevere in solving them.

Organizing information logically (e.g., sequencing steps for a construction project) requires students to analyze trade problems and structure solutions systematically, ensuring clarity and efficiency.

- **NJSLS Standard: HS.MP.4**

Model with mathematics.

Students model trade processes by organizing calculations and steps (e.g., timelines

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or budgets) in a logical sequence, applying mathematical reasoning to real-world tasks.

- **NJSLS Standard: HS.N-NS.A.1**

Understand that rational numbers are closed under addition and subtraction, and apply these properties to solve problems.

Multiplying negative numbers (e.g., $(-\$50) \times 3$ for repeated cost overruns) uses properties of rational numbers, applied to financial or technical trade calculations like budget adjustments.

- **NJSLS Standard: HS.A-REI.B.3**

Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Negative number multiplication is used in solving linear equations for trade problems, such as calculating repeated deficits or temperature changes in HVAC systems.

Learning Objectives and Activities

Learning Objectives:

1. Accurately add fractions, decimals, and percents to solve trade-related problems, such as calculating material quantities or discounts.
2. Add fractions with common denominators to determine combined measurements in trade applications.
3. Multiply mixed numbers to compute areas or volumes in construction or cooking contexts.
4. Calculate averages, ratios, proportions, and rates to analyze data for trade tasks, such as material efficiency or labor costs.
5. Solve problems using one or two mathematical operations to address practical trade scenarios.
6. Organize information logically to create clear plans or schedules for trade projects.
7. Multiply negative numbers to manage financial calculations, such as cost adjustments or temperature changes.

Learning Activities:

1. Practice adding fractions, decimals, and percents through word problems (e.g., combining $\frac{1}{4}$ and 0.3 of a material or applying a 15% discount).
2. Solve problems adding fractions with common denominators (e.g., combining $\frac{2}{5}$ and $\frac{3}{5}$ of a pipe length for plumbing).
3. Calculate areas by multiplying mixed numbers (e.g., $2\frac{1}{2} \times 3\frac{1}{3}$ feet for a garden bed).
4. Compute averages, ratios, proportions, and rates (e.g., average cost per unit of materials, labor-to-material ratio, or scaling a recipe proportionally).
5. Solve one- or two-step problems (e.g., calculate total cost using addition and

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multiplication for a landscaping job).

6. Organize project steps in sequence (e.g., create a timeline for a construction task, ordering steps like measuring, cutting, and assembling).
7. Practice multiplying negative numbers in financial contexts (e.g., $(-\$50) \times 3$ for repeated cost overruns or temperature drops).

Assessments

Formative Assessments

1. **Classwork Problem Sets:** Students complete sets of problems involving adding fractions, decimals, and percents (e.g., combining $\frac{1}{3}$ and 0.25 for material quantities), multiplying mixed numbers, and calculating ratios or rates (e.g., labor-to-material ratio). Feedback is provided to correct errors and reinforce concepts.
2. **Exit Tickets:** Students solve short tasks at the end of class, such as adding fractions with common denominators (e.g., $\frac{2}{5} + \frac{1}{5}$) or multiplying negative numbers (e.g., -3×-4). Used to check understanding and inform future lessons.
3. **Group Sequencing Activity:** In small groups, students organize steps for a trade task (e.g., assembling a plumbing system) in logical order, incorporating calculations like proportions or averages. Peer and teacher feedback focus on clarity and accuracy.
4. **Ratio and Proportion Practice:** Students complete exercises scaling proportions (e.g., adjusting a recipe for 20 people) or calculating rates (e.g., cost per hour). Graded for completion with feedback to support improvement.

Summative Assessments

1. **Project: Trade Task Plan:** Students create a plan for a trade job (e.g., landscaping a garden), requiring calculations of fractions/percents (e.g., material quantities), proportions (e.g., scaling designs), averages (e.g., cost per unit), and negative numbers (e.g., budget adjustments), with steps organized logically. Evaluated for accuracy, organization, and application.

Benchmark Assessments

1. **Checkpoint Quiz:** A short quiz assessing proficiency in adding fractions/decimals/percents and calculating ratios/proportions (e.g., scale a recipe or compute a material ratio). Results guide reteaching and track progress toward unit goals.
2. **Negative Number and Mixed Number Task:** Students complete a task multiplying mixed numbers and negative numbers in a trade context (e.g., calculating repeated cost overruns or area for a construction project). Scored to evaluate readiness for

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advanced applications.

Alternative Assessments

1. **Oral Presentation: Trade Calculation:** Students explain a calculation process (e.g., scaling a recipe using proportions or multiplying negative numbers for budget deficits) to the class. Assessed for clarity, accuracy, and application.
2. **Visual Diagram: Proportional Model:** Students create a diagram illustrating a trade task (e.g., a scaled garden layout) with calculations for fractions, proportions, or averages. Graded for creativity, accuracy, and relevance.
3. **Role-Play: Project Planning:** In pairs, students role-play a contractor and client discussing a project plan, using fractions/percents (e.g., discounts) and organized steps. Evaluated for math application and communication.
4. **Reflection: Real-World Application:** Students write a brief reflection on how they used unit skills (e.g., ratios or negative numbers) in a trade or everyday scenario. Assessed for understanding and practical relevance.

Interdisciplinary Connections

- **Standard 9.3.12.AG-FD.2:** *Apply principles of food purchasing, preparation, and merchandising in food production and service settings.*

Career Readiness, Life Literacies, and Key Skills

NJSLS Standard: 9.2.12.CAP.1: Act as a responsible and contributing citizen and employee.

NJSLS Standard: 9.2.12.CAP.2: Apply appropriate academic and technical skills.

NJSLS Standard: 9.2.12.CAP.3: Attend to personal health and financial well-being.

NJSLS Standard: 9.2.12.CAP.4: Communicate clearly and effectively and with reason.

NJSLS Standard: 9.2.12.CAP.5: Consider the environmental, social, and economic impacts of decisions.

NJSLS Standard: 9.2.12.CAP.6: Demonstrate creativity and innovation.

NJSLS Standard: 9.2.12.CAP.7: Employ valid and reliable research strategies.

NJSLS Standard: 9.2.12.CAP.8: Utilize critical thinking to make sense of problems and persevere in solving them.

NJSLS Standard: 9.2.12.CAP.9: Apply knowledge and understanding of diverse cultures and

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global issues to workplace contexts and interactions.

NJSLS Standard: 9.2.12.CAP.10: Plan education and career paths aligned to personal and professional goals.

NJSLS Standard: 9.2.12.CAP.11: Use technology to enhance productivity.

NJSLS Standard: 9.2.12.CAP.12: Work productively in teams while using cultural global competence.

Technology Integration

- **NJSLS Standard:** 9.4.12.TL.1: Demonstrate an understanding of technology's impact on the advancement of processes and systems and apply digital tools to solve problems and make informed decisions.
- **NJSLS Standard:** 9.4.12.TL.2: Collaborate in online learning communities or social networks to develop and share innovative solutions to real-world problems.
- **NJSLS Standard:** 9.4.12.TL.3: Apply principles of digital citizenship to the use of technology and media, including the ethical use of information.
- **NJSLS Standard:** 9.4.12.TL.4: Leverage technology to explore, plan, and navigate career pathways and engage in lifelong learning.
- **NJSLS Standard:** 9.4.12.TL.5: Apply critical thinking and problem-solving skills to evaluate and use technology systems to complete complex tasks.
- **NJSLS Standard:** 9.4.12.TL.6: Use technology to collect, analyze, and interpret data to make evidence-based decisions and solve real-world problems.

Career Education

- **CRP1:** Act as a responsible and contributing citizen and employee.
- **CRP2:** Apply appropriate academic and technical skills.
- **CRP4:** Communicate clearly and effectively and with reason.
- **CRP6:** Demonstrate creativity and innovation.
- **CRP8:** Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP11:** Use technology to enhance productivity.

Time Frame

9 weeks

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Topic
Measurement and Cost Analysis
Alignment to Standards
● NJSLS Standard: HS.N-Q.A.1 <i>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.</i> ● NJSLS Standard: HS.N-Q.A.3 <i>Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</i> ● NJSLS Standard: HS.G-GMD.A.1 <i>Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.</i> ● NJSLS Standard: HS.G-MG.A.1 <i>Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a machine part).</i> ● NJSLS Standard: HS.MP.1 <i>Make sense of problems and persevere in solving them.</i> ● NJSLS Standard: HS.MP.2 <i>Reason abstractly and quantitatively.</i> ● NJSLS Standard: HS.N-Q.A.1 <i>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.</i> ● NJSLS Standard: HS.N-Q.A.2 <i>Define appropriate quantities for the purpose of descriptive modeling.</i> ● NJSLS Standard: HS.A-CED.A.1 <i>Create equations and inequalities in one variable and use them to solve problems.</i> ● NJSLS Standard: HS.MP.4 <i>Model with mathematics.</i> ● NJSLS Standard: HS.A-SSE.A.1 <i>Interpret expressions that represent a quantity in terms of its context.</i> ● NJSLS Standard: HS.A-CED.A.2 <i>Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.</i> ● NJSLS Standard: HS.N-NS.A.1 <i>Understand that rational numbers are closed under addition and subtraction, and apply these properties to solve problems.</i> ● NJSLS Standard: HS.A-REI.B.3 <i>Solve linear equations and inequalities in one variable, including equations with</i>

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coefficients represented by letters.

Learning Objectives and Activities

Learning Objectives:

1. Accurately calculate with mixed units to determine measurements for trade-related tasks, such as combining feet and inches for construction.
2. Compute perimeter and area of common shapes to estimate material needs in trade applications like landscaping or flooring.
3. Select relevant information from given data to solve trade-related problems efficiently, such as choosing appropriate material prices.
4. Convert measurements within and across systems (e.g., inches to feet, liters to gallons) for precise trade calculations.
5. Compare options to find the best deal when purchasing materials or services for trade projects.
6. Calculate prices with discounts or markups to determine final costs or selling prices in trade scenarios.
7. Divide negative numbers to manage financial calculations, such as splitting deficits or losses in trade budgets.

Learning Activities:

1. Practice calculations with mixed units (e.g., combining 3 feet 6 inches with 2 feet 9 inches for a construction project).
2. Calculate perimeter and area for trade tasks (e.g., determine the fencing needed for a rectangular garden or flooring for a room).
3. Analyze a set of data (e.g., supplier quotes) to choose relevant information for a cost estimate, justifying selections in a group discussion.
4. Convert measurements within and across systems (e.g., convert 24 inches to feet or 5 liters to gallons for plumbing or landscaping).
5. Compare prices from multiple suppliers (e.g., calculate unit prices for lumber) to identify the best deal for a trade project.
6. Calculate final prices with discounts or markups (e.g., apply a 15% discount to a \$200 material cost or a 20% markup for a plumbing service).
7. Practice dividing negative numbers in financial contexts (e.g., divide a -\$120 deficit by 3 projects to allocate losses).

Assessments

Formative Assessments

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1. **Classwork Problem Sets:** Students solve problems involving mixed unit calculations (e.g., combining 5 feet 3 inches with 2 feet 6 inches), perimeter/area computations (e.g., area of a garden bed), and measurement conversions (e.g., inches to feet). Feedback is provided to address errors and reinforce concepts.
2. **Exit Tickets:** Students complete short tasks at the end of class, such as converting 3 liters to gallons or dividing negative numbers (e.g., $-24 \div 3$). Used to check understanding and inform future lessons.
3. **Group Information Selection Activity:** In small groups, students analyze a dataset (e.g., supplier prices) to choose relevant information for a trade task (e.g., material purchasing), discussing their rationale. Peer and teacher feedback focus on accuracy and decision-making.
4. **Best Deal Practice:** Students compare unit prices (e.g., \$50 for 10 units vs. \$80 for 18 units) to identify the best deal, with feedback provided on calculation accuracy and reasoning.

Summative Assessments

1. **Project: Trade Cost Analysis Plan:** Students create a cost analysis for a trade job (e.g., installing flooring), requiring mixed unit calculations, perimeter/area, measurement conversions, best deal selection, and discount/markup pricing, with negative number division for budget adjustments. Evaluated for accuracy, clarity, and application.

Benchmark Assessments

1. **Checkpoint Quiz:** A short quiz assessing proficiency in mixed unit calculations, measurement conversions, and perimeter/area computations (e.g., convert 36 inches to feet or calculate area of a 12x8 ft room). Results guide reteaching and track progress.
2. **Best Deal and Negative Number Task:** Students complete a task comparing supplier deals (e.g., unit pricing) and dividing negative numbers (e.g., allocating a -\$100 loss across 5 projects). Scored to evaluate readiness for advanced cost analysis.

Alternative Assessments

1. **Oral Presentation: Cost Justification:** Students explain their process for selecting the best deal or calculating a discounted price for a trade task to the class. Assessed for clarity, accuracy, and application.
2. **Visual Diagram: Measurement Model:** Students create a diagram of a trade project (e.g., a fenced yard) with calculations for perimeter, area, and converted measurements. Graded for creativity, accuracy, and relevance.
3. **Role-Play: Supplier Negotiation:** In pairs, students role-play a contractor and

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supplier discussing material prices, incorporating discounts/markups and unit conversions. Evaluated for math application and communication.

4. **Reflection: Real-World Application:** Students write a brief reflection on how they used unit skills (e.g., measurement conversions or negative number division) in a trade or everyday scenario. Assessed for understanding and practical relevance.

Interdisciplinary Connections

- **Standard 9.3.12.AC-CST.6:** *Apply mathematical concepts to the design and construction of projects, including cost estimation and measurement.*

Career Readiness, Life Literacies, and Key Skills

NJSLS 9.1.12.FP.2: Analyze the relationship of income, expenses, and budgeting to a successful financial plan.

NJSLS 9.1.12.FP.3: Develop a personal financial plan that includes a budget, savings, goal setting, investing, and retirement planning, including the impact of inflation and taxes.

NJSLS 9.2.12.CAP.4: Evaluate different careers and develop a plan to obtain the appropriate credentials and/or educational requirements.

NJSLS 9.2.12.CAP.6: Identify transferable skills acquired through part-time employment, volunteer activities, and school activities that can be used within various careers.

NJSLS 9.2.12.CAP.9: Analyze how personal strengths, interests, values, and preferences influence career choices.

Technology Integration

- **NJSLS 9.4.12.CI.1:** Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
- **NJSLS 9.4.12.CT.1:** Identify problem-solving strategies used in the development of an innovative product or practice.
- **NJSLS 9.4.12.CT.2:** Explain the potential benefits of collaborating to solve workplace and community problems.
- **NJSLS 9.4.12.IML.8:** Evaluate media sources for credibility, reliability, perspective, and relevance to workplace applications.
- **NJSLS 9.4.12.TL.1:** Assess digital tools to determine appropriateness for completing a task or solving a problem.

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Career Education

- **CRP2** (Apply appropriate academic and technical skills).
- **CRP4** (Communicate clearly and effectively and with reason).
- **CRP8** (Utilize critical thinking to make sense of problems and persevere in solving them).
- **CRP11** (Use technology to enhance productivity).

Time Frame

9 weeks

Topic

Practical Calculations and Conversions

Alignment to Standards

- **NJSLS Standard: HS.A-CED.A.1**
Create equations and inequalities in one variable and use them to solve problems.
- **NJSLS Standard: HS.MP.4**
Model with mathematics.
- **NJSLS Standard: HS.N-RN.B.3**
Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
- **NJSLS Standard: HS.A-SSE.A.1**
Interpret expressions that represent a quantity in terms of its context.
- **NJSLS Standard: HS.G-GMD.A.3**
Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
- **NJSLS Standard: HS.G-MG.A.1**
Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a machine part).
- **NJSLS Standard: HS.A-CED.A.4**
Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
- **NJSLS Standard: HS.A-REI.B.3**
Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- **NJSLS Standard: HS.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.
- **NJSLS Standard: HS.N-Q.A.2**

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Define appropriate quantities for the purpose of descriptive modeling.

- **NJSLS Standard: HS.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.

- **NJSLS Standard: HS.N-Q.A.3**

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

- **NJSLS Standard: HS.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.

- **NJSLS Standard: HS.N-Q.A.2**

Define appropriate quantities for the purpose of descriptive modeling.

- **NJSLS Standard: HS.A-CED.A.4**

Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

- **NJSLS Standard: HS.G-MG.A.3**

Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; use of volume formulas to determine the amount of material needed for a project).

Learning Objectives and Activities

Learning Objectives:

1. Identify and apply the best deal among purchasing options to optimize costs in trade-related scenarios.
2. Perform calculations with numbers in various forms (e.g., fractions, decimals, percentages) to solve trade problems like budgeting or pricing.
3. Calculate the volume of rectangular solids to determine material quantities for trade applications such as construction or storage.
4. Rearrange formulas to solve for specific variables in trade contexts, such as determining dimensions or costs.
5. Convert measurements within the same system (e.g., inches to feet) for accurate trade calculations.
6. Convert measurements between different systems (e.g., meters to feet) to support trade tasks with international or diverse standards.
7. Calculate multiple rates (e.g., labor and material costs) to model and analyze trade project expenses.
8. Apply formula rearrangements and unit conversions to calculate area for trade projects like flooring or landscaping.

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Learning Activities:

1. Compare supplier quotes (e.g., \$100 for 20 units vs. \$150 for 35 units) to find the best deal for a trade project, justifying the choice in a short written explanation.
2. Practice calculations with numbers in various forms (e.g., add $\frac{1}{3}$, 0.25, and 15% for material estimates or apply a 10% markup to a cost).
3. Calculate the volume of rectangular solids (e.g., determine cubic feet of concrete needed for a 10x5x2 ft foundation).
4. Rearrange formulas to solve for unknowns (e.g., find the length in $A = l \times w$ given area and width for a construction task).
5. Convert measurements within a system (e.g., change 36 inches to feet or 5 pounds to ounces for material orders).
6. Convert measurements between systems (e.g., convert 2 meters to feet or 3 liters to gallons for plumbing or landscaping).
7. Calculate multiple rates (e.g., \$20/hour labor and \$5/unit material) to estimate total costs for a trade project.
8. Apply formula rearrangements and unit conversions to calculate area (e.g., convert square inches to square feet to determine flooring needs for a room).

Assessments

Formative Assessments

1. **Classwork Problem Sets:** Students solve problems involving calculations with various number forms (e.g., adding $\frac{1}{4} + 0.2 + 10\%$), unit conversions (e.g., 24 inches to feet), and rate calculations (e.g., \$15/hour for 6 hours). Feedback is provided to correct errors and reinforce concepts.
2. **Exit Tickets:** Students complete short tasks at the end of class, such as converting 2 liters to gallons or rearranging $A = l \times w$ to solve for l . Used to check understanding and inform future lessons.
3. **Group Best Deal Activity:** In small groups, students compare supplier quotes (e.g., \$50 for 10 units vs. \$90 for 20 units) to select the best deal, discussing their reasoning. Peer and teacher feedback focus on accuracy and decision-making.
4. **Formula Rearrangement Practice:** Students rearrange formulas (e.g., solve for w in $A = l \times w$) and apply unit conversions (e.g., square inches to square feet) in trade scenarios. Graded for completion with feedback to support improvement.

Summative Assessments

1. **Project: Trade Project Cost and Design Plan:** Students develop a plan for a trade task (e.g., building a storage shed), requiring volume calculations, unit conversions, best deal selection, rate calculations, and formula rearrangements for area. Evaluated

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for accuracy, clarity, and practical application.

Benchmark Assessments

1. **Checkpoint Quiz:** A short quiz assessing proficiency in unit conversions (e.g., 100 cm to meters, 1 gallon to liters), volume calculations (e.g., rectangular solid), and best deal comparisons (e.g., unit rates). Results guide reteaching and track progress.
2. **Rate and Formula Task:** Students complete a task calculating multiple rates (e.g., \$25/hour labor and \$10/unit material) and rearranging a formula (e.g., solve for h in $V = l \times w \times h$) in a trade context. Scored to evaluate readiness for advanced applications.

Alternative Assessments

1. **Oral Presentation: Deal and Design Explanation:** Students explain their process for selecting the best deal or calculating volume for a trade task (e.g., material purchasing or storage design) to the class. Assessed for clarity, accuracy, and application.
2. **Visual Diagram: Trade Model:** Students create a diagram of a trade project (e.g., a floor plan) with calculations for area, volume, and converted units. Graded for creativity, accuracy, and relevance.
3. **Role-Play: Supplier Discussion:** In pairs, students role-play a contractor and supplier discussing material costs, incorporating best deals, unit conversions, and rate calculations. Evaluated for math application and communication.
4. **Reflection: Real-World Application:** Students write a brief reflection on how they used unit skills (e.g., conversions or formula rearrangements) in a trade or everyday scenario. Assessed for understanding and practical relevance.

Interdisciplinary Connections

- **Standard 9.3.12.MN.2:** *Apply mathematical concepts and skills, such as estimation, measurement, and data analysis, to solve problems in manufacturing processes.*

Career Readiness, Life Literacies, and Key Skills

- **NJSLS 9.1.12.FP.2:** Analyze the relationship of income, expenses, and budgeting to a successful financial plan.
- **NJSLS 9.1.12.FP.3:** Develop a personal financial plan that includes a budget, savings, goal setting, investing, and retirement planning, including the impact of inflation and taxes.
- **NJSLS 9.2.12.CAP.4:** Evaluate different careers and develop a plan to obtain the appropriate credentials and/or educational requirements.

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- **NJSLS 9.2.12.CAP.6:** Identify transferable skills acquired through part-time employment, volunteer activities, and school activities that can be used within various careers.
- **NJSLS 9.2.12.CAP.9:** Analyze how personal strengths, interests, values, and preferences influence career choices.

Technology Integration

- **NJSLS 9.4.12.TL.1:** Assess digital tools to determine appropriateness for completing a task or solving a problem.
- **NJSLS 9.4.12.TL.2:** Use a range of digital tools to create and share knowledge and to solve problems.
- **NJSLS 9.4.12.CT.2:** Explain the potential benefits of collaborating to solve workplace and community problems.
- **NJSLS 9.4.12.IML.8:** Evaluate media sources for credibility, reliability, perspective, and relevance to workplace applications.
- **NJSLS 9.4.12.TL.4:** Demonstrate the ability to critically evaluate technology tools for accuracy, appropriateness, and efficiency in workplace applications.

Career Education

- **CRP2** (Apply appropriate academic and technical skills).
- **CRP4** (Communicate clearly and effectively and with reason).
- **CRP8** (Utilize critical thinking to make sense of problems and persevere in solving them).
- **CRP9** (Model integrity, ethical leadership, and effective management).
- **CRP11** (Use technology to enhance productivity).

Time Frame	8 weeks
Topic	
Advanced Measurement and Decision Analysis	
Alignment to Standards	
• NJSLS Standard: HS.S-ID.B.6 <i>Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.</i> • NJSLS Standard: HS.MP.4	

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COURSE: **APPLIED MATH**

Model with mathematics.

- **NJSLS Standard: HS.N-RN.B.3**

Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

- **NJSLS Standard: HS.A-SSE.A.1**

Interpret expressions that represent a quantity in terms of its context.

- **NJSLS Standard: HS.G-GMD.A.3**

Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

- **NJSLS Standard: HS.G-MG.A.1**

Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a machine part).

- **NJSLS Standard: HS.A-CED.A.1**

Create equations and inequalities in one variable and use them to solve problems.

- **NJSLS Standard: HS.A-SSE.A.1**

Interpret expressions that represent a quantity in terms of its context.

- **NJSLS Standard: HS.F-IF.B.6**

Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval.

- **NJSLS Standard: HS.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.

- **NJSLS Standard: HS.F-IF.C.7**

Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

- **NJSLS Standard: HS.S-ID.C.7**

Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

- **NJSLS Standard: HS.S-CP.A.2**

Understand 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.

- **NJSLS Standard: HS.S-MD.B.7**

Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

Learning Objectives and Activities

Learning Objectives:

1. Create and interpret graphs to represent trade-related data, such as cost trends or material quantities, to support decision-making.

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2. Perform calculations with numbers in any form (e.g., fractions, decimals, percentages, exponents) to solve complex trade problems like financial projections.
3. Calculate the volume of various shapes (e.g., cylinders, cones, spheres) to determine material needs for trade applications.
4. Compute costs and profits to analyze financial outcomes in trade scenarios, such as pricing services or materials.
5. Determine rates of change to evaluate trends in trade contexts, like cost increases or labor efficiency.
6. Solve trade-related problems using graphs, such as identifying break-even points or optimizing resources.
7. Calculate probabilities to assess risks and make informed decisions in trade project management.

Learning Activities:

1. Create a scatter plot or bar graph to represent trade data (e.g., material costs vs. quantity purchased) and analyze trends to recommend purchasing decisions.
2. Practice calculations with numbers in various forms (e.g., compute $\frac{1}{3} + 0.25 + 15\%$ for cost estimates or use exponents for compound interest in a trade business).
3. Calculate volumes for different shapes (e.g., determine the volume of a cylindrical water tank or a conical material pile for construction).
4. Compute costs and profits for a trade project (e.g., calculate profit margins for a plumbing job based on labor and material costs).
5. Analyze rates of change (e.g., calculate the rate of cost increase per hour for a project) and interpret findings in a trade context.
6. Solve problems using graphs (e.g., graph cost and revenue functions to find the break-even point for a landscaping business).
7. Calculate probabilities for trade scenarios (e.g., estimate the likelihood of project delays due to material shortages) and discuss risk mitigation strategies.

Assessments

Formative Assessments

1. **Classwork Problem Sets:** Students solve problems involving calculations with various number forms (e.g., $\frac{1}{4} + 0.3 + 15\%$), volume computations for shapes (e.g., cylindrical tank), and probability calculations (e.g., likelihood of material defects). Feedback is provided to correct errors and reinforce concepts.
2. **Exit Tickets:** Students complete short tasks at the end of class, such as creating a quick graph of cost data or calculating the rate of change for a labor cost trend. Used to check understanding and inform future lessons.
3. **Group Graphing Activity:** In small groups, students create and interpret a scatter

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plot or bar graph (e.g., material costs vs. quantity) for a trade scenario, discussing insights. Peer and teacher feedback focus on accuracy and interpretation.

4. **Probability Practice:** Students calculate probabilities for trade risks (e.g., chance of project delays) and explain their reasoning. Graded for completion with feedback to support improvement.

Summative Assessments

1. **Project: Trade Decision Analysis Plan:** Students develop a plan for a trade project (e.g., constructing a storage facility), requiring volume calculations, cost/profit analysis, rate of change trends, graphing data, and probability-based risk assessment. Evaluated for accuracy, clarity, and practical application.

Benchmark Assessments

1. **Checkpoint Quiz:** A short quiz assessing proficiency in graphing data (e.g., plotting cost trends), calculating volumes (e.g., sphere), and computing rates of change (e.g., material usage rate). Results guide reteaching and track progress.
2. **Cost and Probability Task:** Students complete a task calculating cost/profit (e.g., for a plumbing job) and probability (e.g., supplier reliability) in a trade context. Scored to evaluate readiness for advanced decision-making.

Alternative Assessments

1. **Oral Presentation: Data Analysis:** Students explain a graph (e.g., cost vs. time) or probability calculation (e.g., project risk) for a trade scenario to the class. Assessed for clarity, accuracy, and application.
2. **Visual Diagram: Trade Model:** Students create a diagram of a trade project (e.g., a cylindrical tank) with calculations for volume, cost, and rates of change, annotated with graphs. Graded for creativity, accuracy, and relevance.
3. **Role-Play: Project Pitch:** In pairs, students role-play a contractor pitching a project plan to a client, incorporating cost/profit, graphs, and probability-based risk analysis. Evaluated for math application and communication.
4. **Reflection: Real-World Application:** Students write a brief reflection on how they used unit skills (e.g., graphing or probability) in a trade or everyday scenario. Assessed for understanding and practical relevance.

Interdisciplinary Connections

- **Standard 9.3.12.BM.3:** *Apply mathematical concepts to business activities, including budgeting, cost analysis, and risk assessment.*





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Career Readiness, Life Literacies, and Key Skills

- **NJSLS 9.1.12.FP.2:** Analyze the relationship of income, expenses, and budgeting to a successful financial plan.
- **NJSLS 9.1.12.FP.3:** Develop a personal financial plan that includes a budget, savings, goal setting, investing, and retirement planning, including the impact of inflation and taxes.
- **NJSLS 9.2.12.CAP.4:** Evaluate different careers and develop a plan to obtain the appropriate credentials and/or educational requirements.
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- **NJSLS 9.2.12.CAP.9:** Analyze how personal strengths, interests, values, and preferences influence career choices.

Technology Integration

- **NJSLS 9.4.12.TL.1:** Assess digital tools to determine appropriateness for completing a task or solving a problem.
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- **NJSLS 9.4.12.CT.2:** Explain the potential benefits of collaborating to solve workplace and community problems.
- **NJSLS 9.4.12.IML.8:** Evaluate media sources for credibility, reliability, perspective, and relevance to workplace applications.
- **NJSLS 9.4.12.TL.4:** Demonstrate the ability to critically evaluate technology tools for accuracy, appropriateness, and efficiency in workplace applications.

Career Education

- **CRP2** (Apply appropriate academic and technical skills).
- **CRP4** (Communicate clearly and effectively and with reason).
- **CRP8** (Utilize critical thinking to make sense of problems and persevere in solving them).
- **CRP9** (Model integrity, ethical leadership, and effective management).
- **CRP11** (Use technology to enhance productivity).

Modifications (ELL, Special Education, At-Risk Students, Gifted & Talented, & 504 Plans)

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ELL:

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

Supports for Students With IEPs:

- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

At-Risk Students:

- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson
- Work in a small group
- Lesson taught again using a differentiated approach
- Allow answers to be given orally or dictated
- Use visuals / Anchor Charts
- Leveled texts according to ability

Gifted and Talented:

- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Expose students to beyond level texts.

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Supports for Students With 504 Plans:

- Follow all the 504 plan modifications
- Text to speech/audio recorded selections
- Amplification system as needed
- Leveled texts according to ability
- Fine motor skill stations embedded in rotation as needed
- Modified or constrained spelling word lists
- Provide anchor charts with high frequency words and phonemic patterns

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