STUDY SKILLS - MATHEMATICS

Grade 7

Credits: 2.5 of 5*

ABSTRACT

Study Skills 7: Mathematics provides reinforcement of the skills needed to apply mathematics to real-world situations. Students will work towards mastery in computational, algebraic, and geometric skills, laying a solid foundation for study in the Mathematics 7 course in which they are enrolled concurrently. Developing these skills will allow students to easily navigate through new lessons and concepts because they will have the foundational skills needed to succeed. Instructional time will focus on building fluency in operations with decimals; operations with fractions; comparing and ordering rational numbers; order of operations to simplify expressions; operations with integers; percents; solving proportions; writing and solving one-step and two-step equations; plotting points on the coordinate plane; and using a protractor.
Study Skills 7, a five-credit course, is divided into two half-year studies in Mathematics and English Language Arts.

<table>
<thead>
<tr>
<th>UNIT: Unit Title</th>
<th>Unit 1: Multiply and Divide Fractions</th>
<th>Unit 2: Multiply and Divide Decimals</th>
<th>Unit 3: Percents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Days</td>
<td>8 days</td>
<td>12 days</td>
<td>15 days</td>
</tr>
</tbody>
</table>

**STAGE 1: DESIRED RESULTS**

*What will students understand as a result of the unit? What are the BIG ideas?*

<table>
<thead>
<tr>
<th>ESTABLISHED GOALS: (NJSI)</th>
<th>ENDURING UNDERSTANDINGS: (Students will Understand that . . .)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJSI Standards</td>
<td>Multiplies the dividend by the reciprocal of the divisor.</td>
</tr>
<tr>
<td>Technology</td>
<td>You use the GCF to simplify fractions when you find products of fractions.</td>
</tr>
<tr>
<td>21st Life &amp; Careers</td>
<td>Understand a fraction is a part of a whole.</td>
</tr>
<tr>
<td></td>
<td>A fraction describes the division of a whole into equal parts, and it can be interpreted.</td>
</tr>
<tr>
<td>NJSI Standards</td>
<td>Patterns can be used to mentally multiply decimals by 10, 100, and 1,000.</td>
</tr>
<tr>
<td>Technology</td>
<td>The standard multiplication algorithm involving decimals is an extension of the standard algorithm for multiplying whole.</td>
</tr>
<tr>
<td>21st Life &amp; Careers</td>
<td>Find a percent of a quantity as a rate per 100; solve problems involving finding the whole, given a part and the percent.</td>
</tr>
<tr>
<td></td>
<td>Percents are used in real world problems.</td>
</tr>
<tr>
<td></td>
<td>Fractions, decimals, and percents can be used interchangeably.</td>
</tr>
</tbody>
</table>
in more than one way depending on the whole to be divided.

- Place-value patterns can be used to mentally divide decimals by 10, 100, or 1,000.
- The location of decimal points in decimal division calculations can sometimes be decided by reasoning about the relative size of the given numbers.

ESSENTIAL QUESTIONS:
(What provocative questions will foster inquiry, understanding, and transfer of learning?)

- How do you use the GCF when multiplying fractions?
- How do we multiply fractions if the denominator is different?
- What are the standard procedures for estimating and finding products and quotients of fractions and mixed numbers?
- What are the standard procedures for estimating and finding products involving decimals?
- What are the standard procedures for estimating and finding quotients involving decimals?
- How does percent relate to the whole?
- How are fractions, decimals and percents related?
- How can you write a percent greater than 100 as a fraction and as a decimal?
- How can you use fractions to estimate percents?

STAGE 2: ASSESSMENT EVIDENCE
What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skills attained, and the state standards met? [Anchor the work in performance tasks that involve application, supplemented as needed by prompted work, quizzes, observations, etc.]

PERFORMANCE TASKS:
Mathematical Practices:
1. Make sense of problems and

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**OTHER EVIDENCE:**

(Through what other evidence (e.g. quizzes, tests, academic prompts, observations, homework, journals) will students demonstrate achievement of the desired results?)

(How will students self-assess their learning?)

- Teacher observations
- Rubrics
- Bulletin Boards of exemplars
- Tests
- Quizzes
- Peer and Self evaluations
- Presentations
- Daily notes
- Long-Term projects
- Interviews between student and peer
- Interviews between student and teacher
- Group projects
- Homework
- Self-generated problems and solutions
- Journals
- Papers showing students’

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ELMWOOD PARK PUBLIC SCHOOLS
<table>
<thead>
<tr>
<th>corrections of errors and misconceptions</th>
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<tr>
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<tr>
<td>• Personal Math Trainer</td>
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**RESOURCES:**

- Notebook/binder
- Agenda
- “Explore” activities
- Differentiated workbooks
- Differentiated grouping
- Textbook’s assessment resources
- Chromebooks
- *PARCC Coach* workbooks
- IXL.com
- My.hrw.com
- Graphic organizers
- Manipulatives
- Study Island website
- Renaissance
- Personal Math Trainer
  - [www.aaamath.com](http://www.aaamath.com)
  - [www.mathplayground.com](http://www.mathplayground.com)
  - [www.funbrain.com](http://www.funbrain.com)
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**STAGE 3: LEARNING PLAN**

*What learning experiences and instruction will enable students to achieve the desired results? Utilize the WHERETO*\(^*\) acronym to consider key design elements.*

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### SKILLS AND TOPICS:
(What specific activities will students do and what skills will students know as a result of the unit?)

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<tr>
<th>6.NS.1</th>
<th>Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for ((2/3) \div (3/4)) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that ((2/3) \div (3/4) = 8/9) because (3/4) of (8/9) is (2/3). (In general, ((a/b) \div (c/d) = ad/bc).) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many (3/4)-cup servings are in (2/3) of a cup of yogurt? How wide is a rectangular strip of land with length (3/4) mi and area (1/2) square mi?</th>
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<td>Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</td>
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- Positive reinforcement
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**English Language Learners:**
- Use cooperative grouping.
- Provide written and oral instructions.
- Encourage support from native language speakers who are more proficient in English.
- Extended time for completing assessments.
- Utilize text’s Spanish resources for assessments and assignments.
- Modify instruction as needed, based on language proficiency.
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**Gifted and Talented:**
- Advanced Problem Solving
- Above grade-level math placement option for qualified students

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- Flexible skill grouping within a class or across grade level for rigor
- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Multi-disciplinary unit and/or project
- Applied and integrated skills for the 21st Century learner

### At-Risk Students
- Develop tiered groups and tiered assignments.
- Implement small-group instruction, one-to-one instruction, and additional online resources.
- Tiered assignments will be provided by the text series and differ based on number and/or complexity of problems and degree of scaffolding.

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*WHERETO*

W = Help the students know **WHERE** the unit is going and **WHAT** is expected. Help the teacher know **WHERE** the students are coming from (prior knowledge, interests).

H = **HOOK** all students and **HOLD** their interest.

E = **EQUIP** students, help them **EXPERIENCE** the key ideas and **EXPLORE** the issue.

R = Provide opportunities to **RETHINK** and **REVISE** their understandings and work.

E = Allow students to **EVALUATE** their work and its implications.

T = **TAILORED** to the different needs, interests, and abilities of learners.

O = **ORGANIZE** to maximize initial and sustained engagement as well as effective learning.

<table>
<thead>
<tr>
<th>UNIT:</th>
<th>Unit Title</th>
<th>Number of Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Operations of Integers</td>
<td>15 days</td>
</tr>
</tbody>
</table>

| Unit 5: | Write and solve one-step and two-step equations | 15 days |

| Unit 6: | Solving Proportions Using a Protractor | 10 days |

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<tr>
<th>ESTABLISHED GOALS:</th>
<th>NJSL Standards</th>
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</thead>
<tbody>
<tr>
<td>(NJSL)</td>
<td>● 7.NS.1.c</td>
<td>● 7.EE.1</td>
<td>● 7.RP.1</td>
</tr>
<tr>
<td></td>
<td>● 7.NS.1.b</td>
<td>● 7.EE.2</td>
<td>● 7.RP.3</td>
</tr>
<tr>
<td></td>
<td>● 7.NS.1.a</td>
<td>● 7.EE.4.a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● 7.NS.2.a</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● 7.NS.2.b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>● 8.1, 8.2</td>
<td>Technology</td>
<td></td>
</tr>
</tbody>
</table>

| ENDURING UNDERSTANDINGS: | ● You can represent real-world quantities with integers, and then solve the problems by finding the sums or differences of the integers.  
| (Students will Understand that . . .) | ● Add the absolute values of the integers and use the sign of the integers for the sum.  
|                                           | ● Find the difference between the absolute values of the two addends and then use the sign of the integer with the greater absolute value as the sign for the sum.  
|                                           | ● Because addition and  
|                                           | ● Choose a variable for the unknown value you are trying to find. Use important words from the problem to identify the correct operations and numbers to use.  
|                                           | ● You can use models or algorithms to solve two-step equations. For both methods, isolate the variable by performing the same operation on both sides of the equation.  
|                                           | ● Write a statement that links two expressions with an equals sign. Substitute a  
|                                           | ● A proportion is a relationship of equally between two ratios. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change.  
|                                           | ● If one quantity in a ratio is multiplied or divided by a particular factor, then the other quantity must be multiplied or divided by the same factor to maintain the proportional relationship.  

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**ESSENTIAL QUESTIONS:**
(What provocative questions will foster inquiry, understanding, and transfer of learning?)

<table>
<thead>
<tr>
<th>Question</th>
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</tr>
</thead>
<tbody>
<tr>
<td>How do you multiply integers?</td>
<td>How do you write a two-step equation?</td>
<td>What is a proportion?</td>
</tr>
<tr>
<td>How do you add integers with like signs?</td>
<td>How do you solve a two-step equation?</td>
<td>What are the key aspects of proportional reasoning?</td>
</tr>
<tr>
<td>How do you add integers with unlike signs?</td>
<td>How do you write a one-step equation?</td>
<td>Why do we use protractors?</td>
</tr>
<tr>
<td>How do you subtract integers?</td>
<td>How do you solve a one-step equation?</td>
<td></td>
</tr>
<tr>
<td>How do you divide integers?</td>
<td>How do you determine whether a number is a solution of an equation?</td>
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<tr>
<td>How can you use integer operations to solve real-world problems?</td>
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</tbody>
</table>

Subtraction are inverse operations, you can subtract an integer by adding its opposite. Think: $n - 1 = n + (-1)$.

- Use a problem-solving plan to identify important information, develop a plan to answer the question, find the answer, and check your answer for reasonableness.
- You can represent real-world quantities with integers, and then solve the problems by finding the products or quotients of the integers.
- Multiply the absolute values of the integers. If both integers have the same sign, the product is positive. If they have different signs, the product is negative.

Number for the variable and simplify. If the final statement is true, the number is a solution.
**STAGE 2: ASSESSMENT EVIDENCE**

What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skills attained, and the state standards met? [Anchor the work in performance tasks that involve application, supplemented as needed by prompted work, quizzes, observations, etc.]

<table>
<thead>
<tr>
<th>PERFORMANCE TASKS: (Through what authentic performance tasks will students demonstrate the desired understandings?) (By what criteria will performances of understanding be judged?)</th>
<th>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.</th>
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**NOTE:**
- Teacher observations
- Rubrics
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- Tests
- Quizzes
students demonstrate achievement of the desired results?)
(How will students self-assess their learning?)

- Peer and Self evaluations
- Presentations
- Daily notes
- Long-Term projects
- Interviews between student and peer
- Interviews between student and teacher
- Group projects
- Homework
- Self-generated problems and solutions
- Journals
- Papers showing students’ corrections of errors and misconceptions
- Portfolios
- Personal Math Trainer

SKILLS AND TOPICS:
(What specific activities will students do and what skills will students know as a result of the unit?)

7.NS.1.c: Understand subtraction of rational numbers as adding the additive inverse, \( p - q = p + (-q) \). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

7.NS.1.b: Understand \( p + q \) as the number located a distance \(|q|\) from \( p \), in the positive or negative direction depending on whether \( q \) is positive or negative. Show that a number and its

7.EE.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

7.EE.2: Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, \( a + 0.05a = 1.05a \) means that “increase by 5%” is the same as “multiply by 1.05.”

7.RP.1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction \( 1/2 / 1/4 \) miles per hour, equivalently 2 miles per hour.

7.RP.3: Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax,
opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

7.NS.1.a: Describe situations in which opposite quantities combine to make 0. For example, In the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?

7.NS.2.a: Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as \((-1)(-1) = 1\) and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

7.NS.2.b: Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If \(p\) and \(q\) are integers, then \(-\frac{p}{q} = \frac{-p}{q} = \frac{p}{-q}\). Interpret quotients of rational numbers by describing real-world contexts.

7.EE.4.a: Solve word problems leading to equations of the form \(px + q = r\) and \(p(x + q) = r\), where \(p, q,\) and \(r\) are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

- Warm-up activities
- Exploratory activities
- Class discussions
- Student participation
- Formative and/or summative assessments
- Projects

markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.
### CROSS-CURRICULAR:
(What cross-curricular (e.g. writing, literacy, math, science, history, 21st century life and careers, technology) learning activities are included in this unit that will help achieve the desired results?)

<table>
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### Differentiation:

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- Implement small-group instruction, one-to-one instruction, and additional online resources.
- Tiered assignments will be provided by the text series and differ based on number and/or complexity of problems and degree of scaffolding.

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<table>
<thead>
<tr>
<th>UNIT: Unit Title</th>
<th>Number of Days</th>
<th>Unit 7: Comparing and Ordering Rational Numbers</th>
<th>Unit 8: Order of Operations</th>
<th>Unit 9: Plotting Points on the Coordinate Plane</th>
</tr>
</thead>
<tbody>
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</table>

**STAGE 1: DESIRED RESULTS**

_What will students understand as a result of the unit? What are the BIG ideas?_
### ESTABLISHED GOALS:
*(NJ CCCS and/or CCS)*

<table>
<thead>
<tr>
<th>NJSLS Standards</th>
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<tbody>
<tr>
<td>● 7.NS.2.d</td>
<td>● 6.EE.1</td>
<td>● 6.NS.8</td>
</tr>
<tr>
<td>● 6.NS.7.a</td>
<td>● 6.NS.7.b</td>
<td>● 6.NS.6.c</td>
</tr>
<tr>
<td></td>
<td>Technology</td>
<td></td>
</tr>
<tr>
<td>● 8.1, 8.2</td>
<td>● 8.1, 8.2</td>
<td></td>
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</tbody>
</table>

### ENDURING UNDERSTANDINGS:
*(Students will Understand that . . .)*

- Write the numbers so they are all in the same form, such as equivalent decimals or fractions, and then compare or order them.
- To compare fractions with unlike denominators you must find a common denominator.
- Find the value of any expressions within parentheses first. Then evaluate all powers. Then multiply or divide in order from left to right, and finally, add or subtract in order from left to right.
- Points in the coordinate plane are located and named by positions to the left or right of the origin first, then above or below the origin.
- The order of the coordinates is important.
- Find and position integers and other rational numbers on a horizontal or vertical number line diagram.

### ESSENTIAL QUESTIONS:
*(What provocative questions will foster inquiry, understanding, and transfer of learning?)*

- How do you compare and order rational numbers?
- How do you use the order of operations to simplify expressions with exponents?
- How do you locate and name points in the coordinate plane?
**STAGE 2: ASSESSMENT EVIDENCE**
What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skills attained, and the state standards met? [Anchor the work in performance tasks that involve application, supplemented as needed by prompted work, quizzes, observations, etc.]

<table>
<thead>
<tr>
<th>PERFORMANCE TASKS:</th>
<th>Mathematical Practices:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Through what authentic performance tasks will students demonstrate the desired understandings?)</td>
<td>1. Make sense of problems and persevere in solving them.</td>
</tr>
<tr>
<td>(By what criteria will performances of understanding be judged?)</td>
<td>2. Reason abstractly and quantitatively.</td>
</tr>
<tr>
<td></td>
<td>3. Construct viable arguments and critique the reasoning of others.</td>
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<tr>
<td></td>
<td>4. Model with mathematics.</td>
</tr>
<tr>
<td></td>
<td>5. Use appropriate tools strategically.</td>
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<tr>
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<td>6. Attend to precision.</td>
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<tr>
<td></td>
<td>7. Look for and make use of structure.</td>
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<td></td>
<td>8. Look for and express regularity in repeated reasoning.</td>
</tr>
</tbody>
</table>

**OTHER EVIDENCE:**
(Through what other evidence (e.g. quizzes, tests, academic prompts, observations, homework, journals) will students demonstrate achievement of the desired results?)
(How will students self-assess their learning?)

- Teacher observations
- Rubrics
- Bulletin Boards of exemplars
- Tests
- Quizzes
- Peer and Self evaluations
- Presentations
- Daily notes
- Long-Term projects
- Interviews between student and peer
- Interviews between student and teacher

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<td>● Agenda</td>
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<tr>
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<td>● Differentiated workbooks</td>
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<td>● Manipulatives</td>
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<tr>
<td>● Renaissance</td>
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## STAGE 3: LEARNING PLAN

What learning experiences and instruction will enable students to achieve the desired results?

Utilize the WHERETO* acronym to consider key design elements.

### SKILLS AND TOPICS:

*(What specific activities will students do and what skills will students know as a result of the unit?)*

| 7.NS.2.d: Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. | 6.EE.1: Write and evaluate numerical expressions involving whole-number exponents. | 6.NS.8: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. |
| 6.NS.7.b: Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3 degrees C > –7 | M.P.5 Use appropriate tools strategically. |
| ● Warm-up activities |
| ● Exploratory activities |
| ● Class discussions |
| 6.NS.6.c: Find and position integers and rational numbers on the number line. |
degrees C to express the fact that \(-3\) degrees C is warmer than \(-7\) degrees C.

6.NS.7.a: Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret \(-3 > -7\) as a statement that \(-3\) is located to the right of \(-7\) on a number line oriented from left to right.

- Warm-up activities
- Exploratory activities
- Class discussions
- Student participation
- Formative and/or summative assessments
- Projects

Other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

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- Exploratory activities
- Class discussions
- Student participation
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**CROSS-CURRICULAR:**

(What cross-curricular (e.g. writing, literacy, math, science, history, 21st century life and careers, technology) learning activities are included in this unit that will help achieve the desired results?)

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<tr>
<th>Centers</th>
<th>Tiered Lessons</th>
<th>Open-Ended Responses</th>
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- Modifications as indicated in the student's IEP
- Collaboration with resource

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**English Language Learners:**
- Use cooperative grouping.
- Provide written and oral instructions.
- Encourage support from native language speakers who are more proficient in English.
- Extended time for completing assessments.
- Utilize text’s Spanish resources for assessments and assignments.
- Modify instruction as needed, based on language proficiency.
- Use Google docs translate tool.

**Gifted and Talented:**
- Advanced Problem Solving
- Above grade-level math placement option for qualified students
- Higher-order, critical and creative thinking skills
- Cluster grouping
- Flexible skill grouping within a class or across grade level for rigor

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- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Multi-disciplinary unit and/or project
- Applied and integrated skills for the 21st Century learner

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