Board Approved: June 4th, 2015

Intermediate Algebra

Curriculum

Francis Howell School District

Mission Statement Francis Howell School District is a learning community where all students reach their

full potential.

Vision Statement Francis Howell School District is an educational leader that builds excellence through a collaborative culture that values students, parents, employees, and the community as partners in learning.

Values Francis Howell School District is committed to:

● Providing a consistent and comprehensive education that fosters high levels of academic achievement for all

● Operating safe and wellmaintained schools

● Promoting parent, community, student, and business involvement in support of the school district

● Ensuring fiscal responsibility

● Developing character and leadership

Francis Howell School District Graduate Goals Upon completion of their academic study in the Francis Howell School District, students will be able to: 1. Gather, analyze and apply information and ideas. 2. Communicate effectively within and beyond the classroom. 3. Recognize and solve problems. 4. Make decisions and act as responsible members of society.

Mathematics Graduate Goals Upon completion of their Mathematics study in the Francis Howell School District, students will be able to master the following mathematical practices:

● Make sense of problems and persevere in solving them (MP1).

● Reason abstractly and quantitatively(MP2).

● Construct viable arguments and critique the reasoning of others(MP3).

● Model with mathematics(MP4).

● Use appropriate tools strategically (MP5).

● Attend to precision (MP6).

● Look for and make use of structure (MP7).

● Look for and express regularity in repeated reasoning (MP8) .

Mathematics Rationale for Intermediate Algebra

In order to be effective citizens in the 21 st century, students need to understand mathematics. Students often encounter problem situations that require reasoning, computation, and communication. We regularly study the most efficient methods for reaching solutions, but also realize that examining different solution methods help develop more flexible problemsolving skills. The instruction and assessment is focused on instilling students with enduring understandings of mathematics. Recognizing that basic skills taught in

Algebra I are the foundation of all subsequent mathematics courses and a variety of other courses, Intermediate Algebra is designed to reinforce and build upon those concepts. Intermediate Algebra seeks to help students become more efficient users of algorithms who can articulate their thinking and be able to apply mathematics in different contexts.

Course Description

This course is designed to reinforce algebraic concepts while enhancing the student's understanding of mathematical applications. An introduction of Algebra 2 concepts will ready the student for Algebra 2 or for a postsecondary intermediate Algebra course. Technology will be integrated throughout the course.

Curriculum Committee

Patricia Bartell Francis Howell North Linda Palmer Francis Howell Central John Miller Francis Howell

Secondary Content Leader Stephen Moorman Director of Student Learning Dr. Chris Greiner
Chief Academic Officer Dr. Mary HendricksHarris Superintendent Dr. Pam Sloan

Curriculum Notes All FHSD performance tasks and sample learning activities are

aligned not only to understandings and standards, but also the Rigor and Relevance Framework and 21st Century Skills . Information on these two things is provided below or by clicking on the hyperlinks.

Rigor and Relevance Framework

The Rigor/Relevance Framework is a tool developed by the International Center to examine curriculum, instruction, and assessment along the two dimensions of higher standards and student achievement.

The Rigor/Relevance Framework has four quadrants. Quadrant A represents simple recall and basic understanding of knowledge for its own sake. Examples of Quadrant A knowledge are knowing that the world is round and that Shakespeare wrote Hamlet.

Quadrant C represents more complex thinking but still knowledge for its own sake. Quadrant C embraces higher levels of knowledge, such as knowing how the U.S. political system works and analyzing the benefits and challenges of the cultural diversity of this nation versus other nations.

Quadrants B and D represent action or high degrees of application. Quadrant B would include knowing how to use math skills to make purchases and count change. The ability to access information in wide-area network systems and the ability to gather knowledge from a variety of sources to solve a complex problem in the workplace are types of Quadrant D knowledge .

21st Century Skills

These skills have been pared down from 18 skills to what are now called the 4Cs. The components include critical thinking, communication, collaboration, and creativity. Critical thinking is focused, careful analysis of something to better understand and includes skills such as arguing, classifying, comparing, and problem solving. Communication is the process of transferring a thought from one mind to others and receiving thoughts back and includes skills such as choosing a medium (and/or technology tool), speaking, listening, reading, writing, evaluating messages. Collaboration is working together with others to achieve a common goal and includes skills such as delegating, goal setting, resolving conflicts, team building, decisionmaking, and managing time. Creativity is expansive, openended invention and discovery of possibilities and includes skills such as brainstorming, creating, designing, imagining,

improvising, and problemsolving.

Standards

Standards aligned to this course can be found:

Missouri State Learning Standards for Math http://www.corestandards.org/Math/Content/

National Educational Technology Standards http://www.iste.org/STANDARDS

Units & Standards Overview Semester 1 Semester 2

Unit 1 Solving Equations and

Inequalities

Unit 2

Unit 3 Graphing Linear Equations

Systems of Equations and Inequalities

Unit 4 Exponents and Polynomials

ASSE.3 ASSE.1 AREI.3

ACED.1 ACED.2 FIF.2 FIF.7a

AREI.10 AREI.11 AREI.5 AREI.12

NRN.1 AAPR.1

Error Correction Cell Phone Amusement Park PE Fish Pond PE

Unit 5 Radicals and Right Triangle Trigonometry

Unit 6 Factoring

Unit 7 Quadratics and Conics
Unit 8 Rational Expressions and Equations
NRN.1 AREI.2 GSRT.8 ASSE.1 ASSE.2
ASSE.1a & b GGPE.1 AREI.4 AREI.4B HSG.GPE.A.1 HSG.GPE.A.2
AAPR.7 AREI.2
Lighthouse PE Wally's Wallpaper PE Quadratic PE Error Correction PE

Course Map *Note: This map is just a timeline to help with pacing. If remediation is necessary, you are advised to make time to make sure your students are ready to move forward and show proficiency for the unit standards.

**Technology Note: Numerous sample learning activities can be found on the Internet (i.e. Dan Meyer's 3 acts, Robert Kaplinsky, etc.). We encourage all teachers of this course to research sites to add to sample lessons.

INTERMEDIATE ALGEBRA CONCEPTS

FIRST SEMESTER

UNIT 1 SOLVING EQUATIONS/INEQUALITIES

Standards Embedded within the learning activities: ISTE 3b, 3c, 6b

Days CCSS

Order of Operations 2 **ASSE.3**

Writing Expressions and Equations 1 ASSE.1

Solving Addition, Subtraction, Multiplication and Division Equations (w/applications) 2 **AREI.3**

Solving MultiStep Equations including Rational Numbers and Proportions (w/applications) 4 **AREI.3**

Variables on Both Sides and Grouping symbols (w/applications) 2 **AREI.3**

Review and Test [3]

Solving Inequalities with Add/Sub/Mult/Div/ and MultiStep w/graphs 3 AREI.3

Solving Absolute Value Equations 3 AREI.3

Solving Inequalities Involving Absolute Value 2 AREI.3

Review and Test 3

Approximate number of total days 25

UNIT 2 GRAPHING LINES

Standards Embedded within the learning activities: ISTE 3b, 3c, 6b

Days CCSS

The Coordinate Plane 1 **FIF.2**

Relations 1 **FIF.2**

Equations as Relations 1 **FIF.2**

Functions 1 **FIF.2**

Graphing Linear Relations 1 **FIF.2**

Direct Variation 1 FIF.4

Inverse Variation 1 FIF.4

Exponential Functions 1 FLE.3

Review and Test 2

Slope 1 SID.7

Graphing Linear Equations (Intercepts) 1 FIF.7a

Graphing Linear Equations (Slope Intercept) 1 FIF.7a

Writing Equations in PointSlope Form, Writing Equations in SlopeIntercept Form 3 **ACED.1 ACED.2**

Parallel and Perpendicular Lines 1 FIF.7a

Review and Test 3

Approximate number of total days 20

UNIT 3 SYSTEMS OF EQUATIONS/INEQUALITIES

Standards Embedded within the learning activities: ISTE 1c, 3b, 3c, 6b

Days CCSS

Graphing Systems of Equations, Solutions of Systems of Equations 1 **AREI.10 AREI.11**

Substitution 2 **AREI.5**

Elimination with addition/subtraction and Multiplication 2 **AREI.5**

Three equations using elimination (optional) 3 AREI.5

Graphing Inequalities in Two Variables 1 AREI.12

Graphing Systems of Inequalities 1 AREI.12

Review and Test 3

Approximate number of total days 13

UNIT 4 EXPONENTS/ POLYNOMIALS

Standards Embedded within the learning activities: ISTE 3b, 3c, 6b

Days CCSS

Powers and Exponents 1 NRN.1

Negative Exponents, Scientific Notation 2 NRN.1

Multiplying and Dividing Powers 2 **NRN.1**

Power to Power 2 **N.RN.1**

Review and Test 3

Polynomials 1 **AAPR.1**

Adding and Subtracting Polynomials 1 **AAPR.1**

Multiplying a Polynomial by a Monomial 1 **AAPR.1**

Multiplying Binomials 2 **AAPR.1**

Special Products 1 **AAPR.1**

Dividing Polynomials (and synthetic division if time allows) 2 AAPR.1

Review and Test 3

Approximate number of total days 21

SEMESTER ONE TOTAL DAYS 79

INTERMEDIATE ALGEBRA CONCEPTS

SEMESTER TWO

UNIT 5 RADICALS/ RIGHT TRIANGLE TRIGONOMETRY

Standards Embedded within the learning activities :ISTE 3b, 3c, 6b

Days CCSS

Simplifying Radical Expressions 2 NRN.1 NRN.2

Adding and Subtracting Radical Expressions 2 NRN.1 NRN.2

The Distance Formula 2 GSRT.8

Solving Radical Equations 3 AREI.2

Review and Test 3

Pythagorean Theorem 2 GSRT.8

Sine, Cosine and Tangent relationships 2 **GSRT.6**

Applications 2 **GSRT.8**

Review and Test 3

Approximate number of total days 21

UNIT 6 FACTORING

Standards Embedded within the learning activities: ISTE 3b, 3c, 6b

Days CCSS

Factors 1 **ASSE.a ASSE.b**

Factoring Using the Distributive Property 1 ASSE.a ASSE.b

Factoring Trinomials: $x2 + bx + c$ 2 ASSE.a ASSE.b

Factoring Trinomials: $ax^2 + bx + c$ 3 ASSE.a ASSE.b

Special Factors (Sum and Difference of Cubes if time allows) 2 ASSE.a ASSE.b

Review and Test 4

Approximate number of total days 13

UNIT 7 QUADRATICS/ CONIC SECTIONS

Standards Embedded within the learning activities: ISTE 1c, 3b, 3c, 6b

Days CCSS

Graphing Quadratic Functions 2 **F.IF.7**

Families of Quadratic Functions 1 F.BF.3

Solving Quadratic Equations by Graphing 2 **F.IF.7**

Solving Quadratic Equations by Factoring 2 A.REI.4b

Solving Quadratic Equations by Completing the Square 3 A.REI.4b

The Quadratic Formula 2 A.REI.4b

Review and Test 3

Graphing a Parabola 3 **HSG.GPEA.2**

Graphing a Circle 3 HSG.GPEA.1

Write the equation of a circle given various information 2 HSG.GPEA.1

Complete the square on a circle 2 HSG.GPEA.1

Review and Test 3

Approximate number of total days 28

UNIT 8 RATIONAL EXPRESSIONS/EQUATIONS

Standards Embedded within the learning activities: ISTE 3b, 3c, 6b

Days CCSS

Simplifying Rational Expressions 1 **A.APR.7**

Multiplying and Dividing Rational Expressions 1 **A.APR.7**

Combining Rational Expressions with Like Denominators 1 **A.APR.7**

Combining Rational Expressions with Unlike Denominators 2 **A.APR.7**

Solving Rational Equations 2 **A.REI.2**

Review and Test 3

Approximate number of total days 10

SEMESTER TWO TOTAL DAYS 72

Content Area: Math Course: Intermediate Algebra UNIT 1: Solving Equations and Inequalities

variety of methods, including variables on both sides and proportions.

Unit Timeline: Approximately 25 days.

Unit Description: Students will write and solve multistep equations and inequalities using a

DESIRED Results

Transfer Goal Students will be able to independently use their learning of the Standard Mathematical Practices (MPs) to...... (This will be consistent throughout the entire curriculum)

● Make sense of problems and persevere in solving them (MP1).

● Reason abstractly and quantitatively (MP2).

● Construct viable arguments and critique the reasoning of others (MP3).

● Model with mathematics (MP4).

● Use appropriate tools strategically (MP5).

● Attend to precision (MP6).

● Look for and make use of structure (MP7).

● Look for and express regularity in repeated reasoning (MP8).

Understandings – Students will understand that... (Big Ideas)

1. Translating between words and mathematical symbols are essential skills to solve realworld problems. 2. Order of operations are essential to simplifying expressions. 3. Evaluating an equation means substituting for the variable and then simplifying the expression. 4. Equations and inequalities can be solved using inverse operations. 5. Solving equations and inequalities requires the use of appropriate properties of equality.

Essential Questions : Students will keep considering...

● How can I translate words to math?

● Why is it necessary to follow the order of operations when simplifying expressions?

● How do I solve an equation or inequality?

● How do the order of operations relate to solving an equation or inequality?

● How do I write and graph an inequality from a given situation?

Students will know..... Standard Students Will Be Able to..... Standard

● That an equation is a mathematical statement where two expressions are set equal.

● That an inequality is a mathematical statement where two expressions are set greater than, less than, greater or equal, or less than or equal.

● That the distributive property is indicating a special way in which multiplication is applied to addition of two or more numbers in which each term inside a set of parentheses can be multiplied by a factor outside the parentheses, such as $a(b + c) = ab + ac$

● That like terms are terms whose variables (and their exponents such as the 2 in $x2$) are the same

● That a solution is the value of the variable that makes the statement true.

● That nosolution, inconsistent, means no value for the variable will make the statement try.

● That an Infinite Number of Solutions, consistent, means all values for the variable will make the statement true

● That using inverse operations reverses the effect of another operation

● That a variable is a symbol for an unknown value

● Translate between words and mathematical symbols to solve realworld problems.

● Perform order of operations to simplify expressions.

● Evaluate an equation by substituting for the variable and then simplifying the expression.

● Solve equations and inequalities using inverse operations.

● Apply digital tools to gather, evaluate and use information

● Demonstrate a sound understanding of technology concepts, systems and operations

A.SSE.1 A.SSE.1

A.SSE.3

A.REI.3

A.REI.3

A.REI.3

ISTE 3b,3c

ISTE 6b

A.REI.3

A.SSE.1

A.REI.3

A.REI.3

A.SSE.3

A.REI.3

EVIDENCE of LEARNING

R/R Understanding

Standards

Unit Performance Assessment : Error Correction Solving Equations

Quadrant:

Description of Assessment Performance Task(s):

B

2, 4, 5

A.REI.3 A.SSE.3

Correcting Equations and Why Students will be able to identify and evaluate the mistake in a completed problem. Then,

21st Century

they will make corrections and write a comment stating how the error was corrected or what needs to be remembered so the error is not repeated. These skills will help students master

Critical Thinking

MP 18

the standards, further develop their skill to identify their own errors in their work and life, along with being better problem solvers. Teacher will have the opportunity follow this

Creativity

Assessment where students can use their creativity to come up with ways in reallife situations solving equations will help prevent errors and provide useful data. Finally,

Communication

students can share out their creativity in class discussion

Teacher will assess: Students ability to identify the mistake in the problem and to work the problem accurately. Teachers will assess the explanation given by the student on the mistake that was made and the correct terminology used in the correction of the mistake.

Performance:

Mastery: Students will show that they really understand when they are able to explain the process and perform the operations accurately.

Scoring Guide:

See Appendix 1B/1C Scoring guide

SAMPLE LEARNING PLAN

Preassessment: 1E Unit 1 PreAssessment
Solving Equations and Inequalities

calculator.

● Objective: Students will be able to analyze a real world situation to write and solve inequalities. Appendix Documents: 1E

Understanding Standards Major Learning Activities: Instructional

Strategy:

R/R Quadrant & 21st Century:

1, 2, 3, 4, 5 A.REI.3 A.SSE.1 ASSE.3 ISTE 3b,3c ISTE 6b

1. Activity: 1F Modeling Inequalities Elevator Problem Students will create and model inequalities based on the weight restrictions on an elevator in a college dormitory. Students will model their inequalities on the graphing

Homework and Practice
Homework and Practice
D
D
D

Creativity Critical Thinking
Creativity Critical Thinking

2, 4, 5 A.REI.3

ISTE 3b,3c ISTE 6b

2. Activity: 1G Solving Equations (Rally Coach) Students will partner together to solve equations. Partner A will solve an equation while Partner B coaches and praises. If Partner A makes a mistake Partner B will coach them to the correct answer. Partner A and Partner B switch roles on the next equations. Students will use calculators to assist in this activity and model their work to each other. Students will have to make claims regarding their solutions, justify and defend them.

Feedback

Feedback

Reinforcing Effort

Reinforcing Effort

Cues and Questions

B

B

B

Communication and Collaboration

Communication and Collaboration

Communication and Collaboration

● Objective: Students will be able to collaboratively solve equations in one variable.

Appendix Documents: 1F

Cooperative Learning

3, 4, 5 AREI.3 3. Activity: 1H Solving Equations Sage and Scribe

Students are paired together to solve equations. Assign one student as the 'sage' and the other student the 'scribe'. The sage will tell the scribe how to solve the equation and the scribe will write the process on the paper. Allow students to discuss the problem. Sages cannot write anything for the scribes and the scribes can only write what the sages describe. Students can take this further by justify solution and defend to peers.

● Objective: Students will be able to collaboratively solve multistep

Cooperative Learning

B

B

Collaboration and Communication

equations.

Appendix Documents: 1H

2, 3, 4, 5 ASSE.3 ASSE.1 AREI.3 ISTE.3

4. Activity: 1I Jeopardy Order of Operations and Solving Equations

Cues and Divide the class into groups. Groups will compete to answer questions in the

Questions style of the Jeopardy game show with modifications so students have to opportunity to understand the correct answer and possible mistakes made.

Cooperative Learning

● Objective: Students will understand by working in collaborative groups and play the game Jeopardy to review how to solve equations

Feedback and evaluate order of operations.

Appendix Documents: 1I

C

<div align="center">Communication and Collaboration</div>

1, 2 ASSE.1 ASSE.3

5. Activity: 1J Integer Card Game Tracker Pair students together to create their own integer operation worksheet. Students will divide a deck of cards, face down, between each other. Then each student will turn up a card to create an addition, subtraction, or multiplication expression. Students will then evaluate the expression they created and get feedback on outcome when needed.

● Objective: Students will collaboratively be able to to synthesize their own integer operations worksheet using a deck of cards.

Appendix Documents: 1J

Homework and Practice

Nonlinguistic Representations

Cooperative Learning

A

<div align="center">Creativity and Collaboration</div>

4, 5 AREI.3 ISTE.3

6. Activity: 1K Brain Pop Absolute Value Tutorial and Word Find Teacher will have students view the Brain Pop tutorial on absolute values and then have students complete the Word Find activity associated with the tutorial. Students will then have an opportunity to ask any questions related to the short video and activity.

● Objective: Students will know order of operations by analyzing the Brain Pop tutorial on the order of operations and complete the followup quiz.

Appendix Documents: 1K

Summarizing and Note Taking

A

<div align="center">Critical Thinking</div>

3, 4 AREI.3 ISTE.3

7. Activity: 1L Brain Pop Solving Proportions Tutorial Teacher will have students view the Brain Pop tutorial on proportions and then have students complete the definitions activity associated with the

Summarizing and Note Taking

A

Critical

tutorial.

● Objective: Students will know order of

operations by analyzing the Brain Pop tutorial on the order of operations and complete the followup quiz.s

Appendix Documents: 1L

Thinking

1 ASSE.3

ISTE.3

8. Activity: 1M Brain Pop Order of Operations Tutorial and Quiz Teacher will have students view the Brain Pop tutorial on the order of operations and then have students complete tutorialbased quiz. Students will go through the quiz to self evaluate understanding and have the opportunity to ask questions to address any misunderstanding.

Summarizing and Note Taking

Summarizing and Note Taking

Summarizing and Note Taking

Feedback

A

A

A

Critical Thinking

Critical Thinking

● Objective: Students will know order of operations by analyzing the Brain Pop tutorial on the order of operations and complete the followup quiz.

Appendix Documents: 1M

1 ASSE.3 9. Activity: 1N Sage and Scribe Order of Operations

Students are paired together to evaluate

expression using the order of operations. Assign one student as the 'sage' and the other student the 'scribe'. The sage will tell the scribe how to solve the equation and the scribe will write the process on the paper. Allow students make claims on their solutions then justify through peer feedback and class discussion. Sages cannot write anything for the scribes and the scribes can only write what the sages describe.

● Objective: Students will work collaboratively together to be able to evaluate order of operations expressions.

Appendix Documents: 1N

Cooperative Learning

Feedback

B

B

Communication and Collaboration

Communication and Collaboration

1 ASSE.3

ISTE.3

10. Activity: 1O Sage and Scribe Order of Operations (2) If further practice is needed, teachers can use this activity too. Students are paired together to evaluate expression using the order of operations. Assign one student as the 'sage' and the other student the 'scribe'. The sage will tell the scribe how to solve the equation and the scribe will write the process on the paper. Allow students to discuss the problem. Sages cannot write anything for the scribes and the scribes can

Cooperative Learning   B
Cooperative Learning   B
Cooperative Learning

Communication and Collaboration

Feedback   Communication and Collaboration
B

only write what the sages describe. Calculators can be used to peer evaluate the work.

● Objective: Students will work collaboratively together to be able evaluate order of operations expressions.
Appendix Documents: 1O

1 ASSE.3 11. Activity: 1P Order of Operations Review (Independently or

Collaboratively) Students will apply the order of operations to properly simplify numerical expressions

● Objective: Students will be able to evaluate expressions following the order of operations.
Appendix Documents: 1P
Homework and Practice
B
B

Collaboration Critical Thinking

1, 2 ASSE.1 ASSE.3 AREI.3 ISTE.3 12. Activity: 1Q SelfQuiz Review (Independently or Collaboratively) Students will apply the order of operations, write expressions and equations, and solve equations in one

variable. Students will selfevaluate their work with calculators. They will have an opportunity to formally evaluated each other's work if time allows and defend claims/solutions.

● Objective: Students will be able to demonstrate their understanding of the order of operations, writing equations and expressions, and solving equations in one variable.
Homework and Practice
Homework and Practice
C
C
C

Critical Thinking
Critical Thinking

Appendix Documents: 1Q
Collaboration

4, 5 AREI.3 13. Activity: 1R Inequality Review (Independently or Collaboratively)
Students will solve multistep inequalities in one

variable. They will have an opportunity to formally evaluated each other's work if time allows.

Homework and Practice

B

B

Critical Thinking

● Objective: Students will demonstrate their

understanding of solving multistep inequalities in one variable.

Appendix Documents: 1R

Collaboration

UNIT RESOURCES

Teacher Resources: http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ http://robertkaplinsky.com http://www.livebinders.com/play/play_or_edit?id=330579 (Dan Meyer's 3 Act) BrainPOP Schoology Socrative Study Island Khan Academy

Student Resources : http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ BrainPOP Schoology Socrative Study Island Khan Academy

Vocabulary:

● Equation A mathematical statement where two expressions are set equal.

● Inequality A mathematical statement where two expressions are set greater than, less than, greater or equal, or less than or equal.

● Distributive property – property indicating a special way in which multiplication is applied to addition of two or more numbers in which each term inside a set of parentheses can be multiplied by a factor outside the parentheses, such as a(b + c) = ab + ac

● Like terms – terms whose variables (and their exponents such as the 2 in x2) are the same

● Solution – The value of the variable that makes the statement true.

● NoSolution inconsistent no value for the variable will make the statement try.

● Infinite Number of Solutionsconsistentall values for the variable will make the statement true

● Inverse operations – the operation that reverses the effect of another operation

● Variable – a symbol for an unknown value

Content Area: Math Course: Intermediate Algebra UNIT 2: Graphing Lines

Unit Description: Students will know the coordinate plane, relations, domain and range, and functions. They will be able to graph and write linear equations including direct variation, and other functions to include inverse and exponential functions.

Unit Timeline: Approximately 20 days.

DESIRED Results

Transfer Goal Students will be able to independently use their learning to......

● Make sense of problems and persevere in solving them.

● Reason abstractly and quantitatively.

● Construct viable arguments and critique the reasoning of others.

● Model with mathematics.

● Use appropriate tools strategically.

● Attend to precision.

● Look for and make use of structure.

● Look for and express regularity in repeated reasoning.

Understandings – Students will understand that... (Big Ideas)

1. An ordered pair is used to locate any point on the coordinate plane. 2. Relations can be represented as ordered pairs, tables, mappings, graphs, and equations. 3. Lines in the coordinate plane may represent realworld situations. 4. Functions and relations are used to represent relationships between reallife quantities. 5. The vertical line test will determine whether a relation is a function. 6. Direct and inverse variation can be used to solve rate problems. 7. Exponential functions can be used to represent reallife growth and decay situations. 8. Slope represents a rate of change. 9. Lines can be graphed by using x and yintercepts, using slope and yintercept, and using slope and a point. 10. An equation of a line can be written given the slope and the yintercept, slope and a point, or two points on the graph. 11. Lines can be identified as parallel or perpendicular by comparing slopes and yintercepts.

Essential Questions : Students will keep considering...

● What are some examples of real world problems that can be represented with linear equations?

● What does the origin in the coordinate plane represent?

● How many points are needed to make a line?

● How can a mapping be represented as a set of ordered pairs and vice versa?

● Can you determine if a slope is positive or negative by looking at the line?

● Can you graph a line if you know a point on the line and its slope?

● Can you write the equation of a line given a point on the line and the slope of the line?

● Can you write the equation of a line given two points?

● Can you solve problems involving direct and inverse variation?

● Can you identify an exponential equation from its graph and its equation?

● What are some examples of real world problems that can be represented with exponential equations?

Students will know..... Standard Students Will Be Able to..... Standard

● That slope is a number that describes the "steepness" or "slant" of a line. It is the constant rate of change.

● That line, if the (x slope $_1$,y $_1$) and of a (x line $_2$, y is $_2$) known are any as two m points and is on the

represented by the equation m = (y $_2$ y $_1$)/(x $_2$ x $_1$).

● That the yintercept is the second number in an ordered pair, which indicates the vertical distance of a point from the origin on the coordinate plane.

● That the slopeintercept form is y = mx+b when m is the slope and b is the yintercept

● That the coordinate grid is a plane that is divided into four regions by a horizontal line called the xaxis and a vertical line called the yaxis.

● That an independent variable is the input of a function.

● That a dependent variable is the output of a function.

● That the xintercept is the first number in an ordered

● **Write an ordered pair and locate any point on the coordinate plane.**

● **Draw lines in the coordinate plane to represent realworld situations.**

● **Show relations as ordered pairs, tables, mappings, graphs, and equations. Use the vertical line test to determine whether a relation is a function.**

● **Graph lines by using x and yintercepts, using slope and yintercept, and using slope and a point.**

● **Use functions and relations to represent relationships between reallife quantities.**

● **Write an equation of a line given the slope and the yintercept, slope and a point, or two points on the graph.**

● Use direct and inverse variation to solve rate problems.

● Represent real life growth and decay situations using exponential functions

● Use the slope as a rate of change.

● Identify lines as parallel or perpendicular by comparing slopes and yintercepts.

● Apply digital tools to gather, evaluate and use information

FIF.2 SID.7

SID.7

ACED.1

SID.7

ACED.2

SID.7

FIF.4

FIF.7A

FLE.3

SID.7 FIF.7A FIF.2

ISTE 3b,3c FIF.2

● pair, which indicates the horizontal distance of a point

Demonstrate a sound understanding of technology from the origin on the coordinate plane.

concepts, systems and operations

● That the unit rate is a rate in which the second quantity

● reasoning

in the comparison is one unit.

● That a linear relationship is where a constant rate of change exists between two variables.

● That the rate of change is a ratio that compares the amount of change in a dependent variable to the amount of change in an independent variable

● That the origin is the intersection point (0,0) of the xaxis and the yaxis

ISTE 6b

FIF.7A

FIF.4

FLE.3

ACED.1

ACED.2

EVIDENCE of LEARNING

Understanding

1, 2, 3, 4, 5, 8, 10

Standards

Unit Performance Assessment : Cell Phone

Description of Assessment Performance Task(s): ACED.1&2

Cell Phone Performance Assessment **F.IF.2**

Students will analyze a real world problem related to using a cell phone and cost for texting F.IF.7

then write equations to represent the situation. They will also graph the equations and AREI.10

explain the solution from the equations and the graphs. AREI.11 MP 18

This will provide an opportunity (time permitting) for students to make claims on how they ISTE 3b,3c

can use equations to determine how they would make a decision on a new cell then defend ISTE 6b

their claim to their peers. Students could also use creativity to come up and discuss other applications of these standards other than just cell phones

Teacher will assess: The ability of the students to accurately write equations given written information, the ability to graph the equations, and evaluate graphically solutions and explain what a reasonable solution is for this given situation. **Performance:**

Mastery: Students will show that they really understand when they are able to write equations, graph the equations and evaluate/explain what a reasonable solution will be.

Scoring Guide:

See Appendix 2B/2C Scoring Guide

R/R Quadrant

D

21st Century

Critical Thinking

Creativity

Communication

SAMPLE LEARNING PLAN

Preassessment: 2G Unit 2 PreAssessment
Graphing Lines

Understanding Standards Major Learning Activities: Instructional

Strategy:

 R/R Quadrant & 21st Century:

8, 10 SID.7

 ACED.1 ACED.2 ISTE 3b,3c ISTE 6b
1. Activity: 2E Equations of a Line Chart Students will be given a table that shows different characteristics of lines and their equations. Students will use the given information to find the missing characteristics of each line and its equation. Students will use graphing calculators. Students will have an opportunity to formally evaluate each other's work and defend solutions.

● Objective: Students will be able to work collaboratively to create equations of lines given different characteristics.

 Advance Organizer
 Advance Organizer
 Advance Organizer

 Feedback

Feedback

 Cooperative Learning
 C Critical Thinking
 C Critical Thinking
 C Critical Thinking
 C Critical Thinking

 Cooperative learning
 Cooperative learning
 Cooperative learning

Appendix Documents: 2E

8, 9, 10, 11 FIF.7a

 ISTE 3b,3c ISTE 6b
2. Activity: 2F Parallel/Perpendicular Activity Students will graph a line and then find an equation of another line that is parallel and/or perpendicular to the original line. Students will use calculators to accomplish task and evaluate work.

● Objective: Students will be able to work collaboratively to graph and write equations of parallel and perpendicular lines while understanding the differences between real world objects being parallel or perpendicular

 Homework and Practice
 Homework and Practice
 Homework and Practice

Similarities and Differences

C Collaboration and Communication
C Collaboration and Communication

C Collaboration and Communication
C Collaboration and Communication
C Collaboration and Communication

Appendix Documents: 2F

B Collaboration and Critical Thinking
B Collaboration and Critical Thinking
B Collaboration and Critical Thinking

4, 7 FIF.2 FIF.4 FLE.3 ISTE.3

3. Activity: 2H Exponential Functions Students will create a table of values for, and graph, exponential functions. Students will evaluate exponential equations through Rally Table strategy and use of graphing calculators.

● Students will understand by working collaboratively how to graph and evaluate exponential functions. Appendix Documents: 2H

1, 2, 3, 5, 8, 9 FIF.2 FIF.4

4. Activity: 2I Functions Students will express relations as graphs, ordered pairs, mapping diagrams, and

Homework and Practice
Homework and Practice

Homework and Practice
Homework and Practice

Cooperative Learning
Cooperative Learning
B Collaboration and Critical Thinking

B Collaboration
B Collaboration
B Collaboration

tables. FIF.7a

Students will evaluate functions. Students can use Numbered heads ACED.1

Together, students will use strategies to help evaluate each other's solutions while ACED.2 defending solutions. SID.7

● Objectives: Students will be able to label coordinates and quadrant for ordered pairs and express relations using ordered pairs, tables, or mapping diagrams. Students will be able to identify domain and range, and evaluate functions in order to use these mathematical problems when necessary in life situations.

Appendix Documents: 2I

Cooperative Learning

Critical Thinking

6 FIF.4 ISTE.3

5. Activity: 2J Direct and Inverse Variation Students will solve problems modeling direct and inverse variation. Students will analyze situations involving direct and inverse variation in a Showdown or Pairs

Compare strategies. Real world examples are provide after students work through procedural models in which they apply the practice along with their creativity on how they believe the correct way is to solve the real world problem. Students could take this activity further to research other real life use for this standard.

● Objective: Students will work collaboratively to evaluate and solve direct and inverse variation equations. Appendix Documents: 2J

<div align="center">

Homework and Practice

Cooperative Learning

C Communication Collaboration and Critical Thinking Creativity

</div>

8, 10 SID.7

ACED.1 ACED.2 ISTE.3

6. Activity: 2K Graphing Linear Equations (Simultaneous Roundtable) Students will be placed in groups of four. The first student will solve the given equation for y. The second student will identify the slope and yintercept. The third student will plot the yintercept and the slope. The fourth student will graph the line and identify two points that lie on the line. Graphing calculators can be used to evaluate work. Collectively they will discuss the relevance of being able to graph linear equations in the real world and justify their claims.

● Objective: Students will work collaboratively to graph linear equations.

Appendix Documents: 2K

<div align="center">

Cooperative Learning

</div>

Feedback

<div align="center">

Reinforcing Effort

B Communication and Collaboration

</div>

UNIT RESOURCES

Teacher Resources:

http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ http://robertkaplinsky.com http://www.livebinders.com/play/play_or_edit?id=330579 (Dan Meyer's 3 Act) BrainPOP Schoology Socrative Study Island Khan Academy

Student Resources : http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ BrainPOP Schoology Socrative Study Island Khan Academy

Vocabulary:

● Slope – a number that describes the "steepness" or "slant" of a line. It is the constant rate of change

● Slope A measure to find the steepness of a line. If (x_1, y_1) and (x_2, y_2) are any two points on the line, the slope of a line is known as m, is represented by the equation $m = (y_2 y_1)/(x_2 x_1)$

● yintercept The second number in an ordered pair, which indicates the vertical distance of a point from the origin on the coordinate plane.

● Coordinate Grid A plane that is divided into four regions by a horizontal line called the xaxis and a vertical line called the yaxis.

● Independent Variable The input of a function.

● Dependent Variable The output of a function

● xintercept the first number in an ordered pair, which indicates the horizontal distance of a point from

the origin on the coordinate plane

● SlopeIntercept Form : $y = mx + b$ when m is the slope and b is the yintercept

● Unit rate A rate in which the second quantity in the comparison is one unit

● Linear – A relationship where a constant rate of change exists between two variables.

● Rate of change A ratio that compares the amount of change in a dependent variable to the amount of change in an independent variable

● Origin the intersection point (0,0) of the xaxis and the yaxis

Content Area: Math Course: Intermediate Algebra UNIT 3: Systems of Equations and Inequalities

Unit Description: Students will be able to graph and solve systems of equations using a variety of methods, and they will write systems of equations to solve real world application problems

Unit Timeline: Approximately 13 days.

DESIRED Results

Transfer Goal Students will be able to independently use their learning to......

● Make sense of problems and persevere in solving them.

● Reason abstractly and quantitatively.

● Construct viable arguments and critique the reasoning of others.

● Model with mathematics.

● Use appropriate tools strategically.

● Attend to precision.

● Look for and make use of structure.

● Look for and express regularity in repeated reasoning.

Understandings – Students will understand that... (Big Ideas)

1. The solution to a system of equations is an ordered pair or a set of ordered pairs. 2. Systems of equations and inequalities may represent realworld situations. 3. There is a visual and algebraic relationship. 4. There is more than one way to solve a system of equations. 5. The solution to an inequality or a system of inequalities is a bounded or unbounded region containing an infinite set of ordered pairs. 6. A system of equations can have zero, one, or infinitely many solutions.

Essential Questions : Students will keep considering... An Essential Question is meant to:

● How do you know an ordered pair is a solution to a system of equations or inequalities?

● What are some real world problems that can be solved using systems of equations and inequalities?

● How do you know if a system of equations has zero, one, or infinitely many solutions (graphically or algebraically)?

● How do you know where the shaded region is located on a linear inequality?

● How do you know if a point on the boundary line is a solution to the inequality?

● When is it better to use the substitution method or elimination method to solve a system of equations?

Students will know..... Standard Students Will Be Able to..... Standard

● That a System of linear equations is a set of two or more linear equations containing two or more variables. Impacts both standards

AREI.5

● That a Solution of a system of linear equations with two variables is an ordered pair that satisfies each equation in the system. So, if an ordered pair is a solution, it will make both equations true.

AREI.12

AREI.12

● That a Solution of a system of linear inequalities will be all of the ordered pairs that satisfy all the linear inequalities in the system.

● That a Consistent system is when lines intersect in at least one point

● That an Inconsistent system is when lines never cross and gives us no solution

AREI.10 & 11   AREI.5

● Recognize when a system of equations will have zero, one, or infinitely many solutions.
● Recognize when a system of equations will have zero, one, or infinitely many solutions.
● Solve and write the solution(s) to a system of equations as an ordered pair or as a set of ordered pairs.
● Solve and write the solution(s) to a system of equations as an ordered pair or as a set of ordered pairs.

● **Write systems of equations and inequalities to represent realworld situations.**

● **Use more than one way to solve a system of equations.**

● **Use more than one way to solve a system of equations.**

● Recognize that there is a visual and algebraic relationship.

● Show that the solution to an inequality or a system of inequalities is a bounded or unbounded region containing an infinite set of ordered pairs.

● Show that the solution to an inequality or a system of inequalities is a bounded or unbounded region containing an infinite set of ordered pairs.

● Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

● Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

AREI.10
AREI.10
AREI.10

AREI.11
AREI.11
AREI.11

AREI.5
AREI.5

AREI.12
AREI.12

ISTE 1c
ISTE 1c

● That an Independent System has exactly one solution

● That a Dependent System has infinitely many solutions
AREI.12

AREI.12
● Apply digital tools to gather, evaluate and use information
● Apply digital tools to gather, evaluate and use information
● Demonstrate a sound understanding of technology concepts, systems and operations
ISTE 3b,3c
ISTE 3b,3c

ISTE 6b
ISTE 6b

EVIDENCE of LEARNING
Understanding
1, 2, 3, 4
Standards

Unit Performance Assessment : Amusement park
Description of Assessment Performance Task(s): ACED.2
Amusement Park Performance Task F.IF.2
Students will analyze a real world problem involving going to an amusement park. F.IF.7
where they will write a system of equations to represent the situation. They will graph the **AREI.5**
equations, evaluate the graphs and explain the solution from the equations and the graphs a it **AREI.10**
relates to spending at the amusement park. There will be an opportunity to spiral standards **AREI.11**
already taught in this activity. MP 18 ISTE 1c
An extension opportunity would allow student creativity to use the information that gained ISTE 3b,3c
from the assessment and develop other realworld evenst where graphing and solutions could ISTE 6b
benefit them in spending money, making important decisions on how to spend a dollar, etc.
Teacher will assess:
The ability of the students to accurately write equations given written information, the ability to graph the
equations, and evaluate graphically solutions and explain what a reasonable solution is for this given
situation. **Performance:**
Mastery: Students will show that they really understand when they are able to write equations, graph the
equations and evaluate/explain what a reasonable solution will be.
Scoring Guide:
See Appendix 3B/3C Scoring Guide
R/R Quadrant
D
21st Century
Critical Thinking
Creativity
Comunication

SAMPLE LEARNING PLAN

1, 2, 3, 4, 6 AREI.10 AREI.11 AREI.5 AREI.12

Preassessment: 3E Unit 3 PreAssessment
Solving Systems of Equations and Inequalities

ISTE 1c ISTE 3b,3c ISTE 6b

1. Activity: 3F Three Methods to Solve Systems of Equations (Simultaneous Round table)
Students will be put into groups of three. Each student is given their own worksheet with a different system of equations in two variables. First, each student will solve their system graphically. Then, students will pass their worksheet to the person to their left and they will solve their new system by using the method of substitution. Next, students will pass their worksheets to the left again and solve the new system using the method of elimination. When

Understanding Standards Major Learning
Activities: Some standards in the activities are not from this
unit, but spiral from previous units.

    Instructional Strategy:
    R/R Quadrant & 21 Century:
    R/R Quadrant & 21 Century:
    R/R Quadrant & 21 Century:

finished, each worksheet will have the same answer for all three methods of solving systems. Students will use graphing calculators as needed to verify solutions.

● Objective: Students will know that solving a system of equation using different methods will yield the same solutions.

> C Critical Thinking
> C Critical Thinking

Collaboration
Collaboration
Cues and Questions
Cues and Questions
Cues and Questions

Practice and Homework
Practice and Homework

Cooperative
Cooperative

Learning

Appendix Documents: 3E

5 AREI.12
ISTE.3

2. Activity: 3G Graphing Systems of Linear Inequalities Students will graph linear inequalities and systems of linear inequalities through strategies such as Find Someone Who, Rally Table, Rally Coach, etc.. Students will have an opportunity to work with peers on this assignment and see the different approaches individual students take in mastering the task. Graphing calculators can used to allow for selfevaluation.

> Homework and Practice
> Homework and Practice
> Homework and Practice

> Cooperative Learning
> A Collaboration
> A Collaboration
> A Collaboration
> A Collaboration

Critical Thinking
Critical Thinking

Creativity

● Objective: Students will work collaboratively to know how to graph linear inequalities and systems of linear inequalities.

Appendix Documents: 3F

> Generating and testing hypothesis

2 ACED.1 3. Activity: 3H Writing equations and systems of equations (Sage and Scribe) Cooperative C

Learning ACED.2
Students will be put into groups of two. Each pair of students will be given AREI 5
four problems. The students solve one problem at a time together. One student will write exactly what the

other tells them to write for the solution to the

Feedback problem, then the students switch roles. After the solution of each problem is presented, they can evaluate and discuss the solution method and make any

Reinforcing Effort changes through a roundtable consensus format. This provides students the opportunity to justify and defend their solutions.

● Objective: Students will work collaboratively to be able to write and solve equations. They will be able to hone their listening/explaining skills; leading to a greater understanding of the process.

Appendix Documents: 3H

<div align="center">Communication and Collaboration</div>

1, 3, 6 AREI.12

ISTE.3

4. Activity: 3I Graphing a system of equations (Simultaneous Roundtable) Students will be put into groups of two or four. Each group is given one problem to complete using graphing calculators. The first student will solve the first equation for y and the second student will solve the second equation for y. The third student will graph the system and the fourth will identify the solution. Different equations can be added to this activity and the students can take turns completing different parts of the activity. All students will check each others work and provide an opportunity for students to defend their claims.

● Objective: Students will work collaboratively to be able to graph a system of equations and identify the solution to the system.

Appendix Documents: 3I

<div align="center">Cooperative Learning</div>

Feedback

Reinforcing Effort

<div align="center">B Communication and Collaboration</div>

UNIT RESOURCES

Teacher Resources:

http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/
http://robertkaplinsky.com http://www.livebinders.com/play/play_or_edit?id=330579 (Dan Meyer's 3 Act) BrainPOP Schoology Socrative Study Island Khan Academy

Student Resources : http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/
BrainPOP Schoology Socrative Study Island Khan Academy

Vocabulary:

● System of linear equations – a set of two or more linear equations containing two or more variables.

● System of linear inequalities A set of two or more linear inequalities containing two or more variables.

● Solution of a system of linear equations with two variables – an ordered pair that satisfies each equation in the system. So, if an ordered pair is a solution, it will make both equations true.

● Solution of a system of linear inequalities All of the ordered pairs that satisfy all the linear inequalities

in the system.

Special systems of linear equations:

● Consistent – when lines intersect in at least one point

● Inconsistent – when lines never cross and gives us no solution

● Independent System – has exactly one solution

● Dependent System – has infinitely many solutions

Content Area: Math Course: Intermediate Algebra UNIT 4: Exponents and Polynomials

them, and they will know how to perform the operations on polynomials.
Unit Timeline: Approximately 21 days.

Unit Description: Students will know the properties of exponents and be able to apply

DESIRED Results

Transfer Goal Students will be able to independently use their learning to......

● Make sense of problems and persevere in solving them.

● Reason abstractly and quantitatively.

● Construct viable arguments and critique the reasoning of others.

● Model with mathematics.

● Use appropriate tools strategically.

● Attend to precision.

● Look for and make use of structure.

● Look for and express regularity in repeated reasoning.

Understandings – Students will understand that... (Big Ideas)

1. An exponent represents repeated multiplication. 2. Properties of rational exponents follow from the definition of an integer when simplifying.. 3. Adding and subtracting polynomials is combining like terms. 4. Multiplying polynomials is the distributive property used more than once. 5. When dividing polynomials the dividend is equal to the product of the quotient and the divisor.

Essential Questions : Students will keep considering... An Essential Question is meant to:

● Can you identify the coefficient, base and exponent on a monomial?

● How do you know if an exponential expression is simplified?

● How do you determine which of the properties of exponents should be used to simplify expressions?

● How do you recognize like terms?

● How do you recognize which operation to perform when simplifying polynomials?

● Can you perform operations on polynomial expressions?

Students will know..... Standard Students Will Be Able to..... Standard

● That an exponent is a number or a variable in an expression that represents how many times another number is used in repeated multiplication.

● That the Standard form of a polynomial is written with the terms in order from greatest degree to least degree

● That a monomial is a polynomial with one term that is a number, a variable or a product of a number and variables with whole number exponents.

● That a Binomial is a polynomial with two terms

● That a trinomial is a polynomial with three terms

● That a Polynomial is a monomial or a sum or difference of monomials
NRN.1

AAPR.1

NRN.1

AAPR.1

AAPR.1 ISTE 3b,3c
AAPR.1 ISTE 3b,3c
AAPR.1 AAPR.1 AAPR.1

AAPR.1 ISTE 3b,3c
AAPR.1 ISTE 3b,3c

● **Recognize that exponents represent repeated multiplication.**

● **Recognize that exponents represent repeated multiplication.**

ISTE 6b
ISTE 6b
ISTE 6b

● **Simplify monomials using exponent properties.**

● **Add, subtract, multiply, and divide polynomials.**

● **Add, subtract, multiply, and divide polynomials.**

● Apply digital tools to gather, evaluate and use information

● Apply digital tools to gather, evaluate and use information

● Demonstrate a sound understanding of technology concepts, systems and operations

● Demonstrate a sound understanding of technology concepts, systems and operations

NRN.1
NRN.1

EVIDENCE of LEARNING

Unit Understanding
Standards

Performance Assessment : Polynomial PE (Fish Pond) 1, 3, 4, 5

AAPR.1 NRN.1

Description of Assessment Performance Task(s): MP 18

Fish Pond Performance Task ISTE 3b,3c

Students will analyze a given scenario of designing and putting in a fish pond in their ISTE 6b backyard then write and simplify expressions to find perimeter and area of different regions represented in a real world problem. Students will also solve and evaluate the mathematical problems found in this scenario.

As a follow up (but not required), have students use this experience to go home and measure/design a fish pond in their own yard where they can share, make claims and defend their decision.

Teacher will assess:

Student's ability to write a polynomial expression from given information and write expressions for perimeter and area while connecting this information to an authentic, real world possibility.

Performance:

Mastery: Students will show that they really understand when they...

complete the performance task with a score of 75% or better.

Scoring Guide:

See Appendix 4B, 4C Polynomial PE Scoring Guide

R/R Quadrant

D

21st Century

Critical Thinking

Creativity

Communication

SAMPLE LEARNING PLAN

Preassessment: 4E Unit 4 PreAssessment Exponents and Polynomials

Understanding Standards Major Learning Activities: Instructional Strategy:

R/R Quadrant & 21st Century:

1, 2 NRN.1

ISTE 3b,3c ISTE 6b

1. Activity: Exponent Hunt Index cards with exponential expressions printed on them will be located throughout the classroom. Students will start at the expression of their choosing and if they simplify the expressions correctly they will end up where they started (see appendix document for more detailed instructions) as they learn how to use exponents to simplify. Students will use graphing calculators as needed. Students will need to think critically and be creative in order to master the scavenger hunt.

● Objective: Students will work collaboratively to apply rules of exponents to complete a scavenger hunt by simplifying exponential

expressions.

Cooperative Learning

Cooperative Learning

Cooperative Learning

Homework and Practice

Homework and Practice

C Collaboration

C Collaboration

C Collaboration

C Collaboration

Critical Thinking

Critical Thinking

Critical Thinking

Creativity

Appendix Documents: 4E

3, 4, 5 AAPR.1 2. Activity: Polynomials (Sage and Scribe)

Students are paired together to simplify polynomials. Assign one student as the 'sage' and the other student the 'scribe'. The sage will tell the scribe how to simplify the expression

and the scribe will write the process on the paper. Allow students to evaluate and discuss the problem. Sages cannot write anything for the scribes and the scribes can only write what the sages describe. Students will take turns in each role. Students will justify and defend claims with other groups.

● Objective: Students will work collaboratively to be able to simplify polynomial equations.

Appendix Documents: 4F

Cooperative Learning

Feedback

C Collaboration
C Collaboration
C Collaboration

Communication
Communication

ISTE.3 ISTE.6

3. Activity: Polynomial Operations Students will simplify various polynomial expressions then go over to check and address any remaining questions and/or misconceptions. This would be an opportunity to flip the classroom so students can gather information on Polynomial

Homework and Practice
Homework and Practice
Homework and Practice
A Critical Thinking
A Critical Thinking
A Critical Thinking
A Critical Thinking

3, 4, 5 AAPR.1

Operations, try the activity, and come to class the following day to discuss the assignment and address any misconceptions.

● Objective: Students will be able to add, subtract, multiply, and divide polynomials.

Appendix Documents: 4H

3, 4, 5 AAPR.1 4. Activity: Polynomials (Rally Coach)

Students are paired together to simplify polynomials. Partners take turns where one solves a problem and the other coaches. Pairs evaluate the solution then switch roles for each following question. Following up the activity,

each group will have the opportunity to discuss how they see this skill useful in the real world. Finally, the class will come together to address any remaining question and discuss the importance of this skill in the real world while justifying claims.

● Objective: Students will work collaboratively to simplify polynomial equations and understand the relevance of this skill to the real world..

Appendix Documents: 4I

Cooperative Learning

Feedback

    B Collaboration
    B Collaboration
    B Collaboration

Communication
Communication

Creativity

UNIT RESOURCES

Teacher Resources: http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ http://robertkaplinsky.com http://www.livebinders.com/play/play_or_edit?id=330579 (Dan Meyer's 3 Act) BrainPOP Schoology Socrative Study Island Khan Academy

Student Resources : http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ BrainPOP Schoology Socrative Study Island Khan Academy

Vocabulary:

● Exponent An exponent is a number or a variable in an expression that represents how many times another number (or expression) is used in repeated multiplication.

● Standard form of a polynomial with one variable the form is written with the terms in order from greatest degree to least degree

● Prime factorization The factored form of a number in which al factors are prime numbers

● Greatest common factor the greatest of the factors shared by two or more whole numbers

● Monomial A polynomial with one term that is a number, a variable or a product of a number and variables with whole number exponents.

● Binomial A polynomial with two terms

● Trinomial A polynomial with three terms

● Polynomial A monomial or a sum or difference of monomials

Content Area: Math Course: Intermediate Algebra UNIT 5: Radicals and Right Triangle Trigonometry

Unit Description: Students will know how to perform the operations on radicals and solve radical equations. Students will know how to set up proportions with basic right triangle trigonometry. Also, they will be able to extend this knowledge to realworld applications.

Unit Timeline: Approximately 21 days.

DESIRED Results

Transfer Goal Students will be able to independently use their learning to......

- Make sense of problems and persevere in solving them.

- Reason abstractly and quantitatively.

- Construct viable arguments and critique the reasoning of others.

- Model with mathematics.

- Use appropriate tools strategically.

- Attend to precision.

- Look for and make use of structure.

- Look for and express regularity in repeated reasoning.

Understandings – Students will understand that... (Big Ideas)

1. Exponential and radical expressions use the same properties. 2. Radicals can be expressed as exact values or as estimations. 3. Radical equations may have extraneous roots. 4. The distance formula is the Pythagorean Theorem on the coordinate plane. 5. The Pythagorean Theorem shows the relationship between the sides of a right triangle. 6. The trigonometric ratios show the relationship between the sides and the acute angles of a right triangle. 7. Trigonometric ratios can be applied to realworld situations. 8. Angles of elevation and depression are always drawn with the horizontal.

Essential Questions : Students will keep considering... An Essential Question is meant to:

- How do you know when a radical expression is simplified?

- When is it better to use an exact value as opposed to an estimation?

- How do you identify the legs and hypotenuse of a right triangle?

- How do you know when to use the Pythagorean Theorem?

- How do you know which trigonometric ratio to use when solving for a missing side or angle of a right triangle?

- How do you know if you are using an angle of elevation or depression when drawing a right triangle?

- What are some realworld applications solved using trigonometric ratios?

Students will know..... Standard Students Will Be Able to..... Standard

- The square root of x is the number that, when multiplied by itself, gives the number, x.	- A radical is a symbol that is used to indicate square roots - The radical sign is a symbol used in expressions when a root is to be taken.

● A perfect square is the product of an integer and itself. Perfect squares are nonnegative and can be written as x^2 when x is an integer.

● Cube root is a number that when cubed (taken to the power of 3) gives the original number.

● To write radical expressions in simplest form.

● To solve radical equations

● The Distance Formula is an application of the Pythagorean Theorem based on the distance between two points.

● The hypotenuse is the side of a right triangle that is directly across from the right angle

● The leg of a Triangle is either of the two shorter sides of a right triangle. These two sides together form the right angle in the right triangle.

● That the pythagorean Theorem is a theorem that states

NRN.1

NRN.1

NRN.1

NRN.1

NRN.1

NRN.1 AREI.1&2 GSRT.8

GSRT.8

GSRT.8

GSRT.8
● Simplify exponential and radical expressions using the same properties.
● Simplify exponential and radical expressions

using the same properties.

● Express radicals as exact values or as estimations.

● Express radicals as exact values or as estimations.

● Check for extraneous solutions when solving radical equations.

● Check for extraneous solutions when solving radical equations.

● Check for extraneous solutions when solving radical equations.

● **Use the distance formula in the coordinate plane.**

● **Use the Pythagorean Theorem on a right triangle.**

● **Use the Pythagorean Theorem on a right triangle.**

● **Draw angles of elevation and depression**

● **Use the trigonometric ratios to show the relationship between the sides and the acute angles of a right triangle.**

● **Use the trigonometric ratios to show the relationship between the sides and the acute angles of a right triangle.**

● **Use the trigonometric ratios to show the relationship between the sides and the acute angles of a right triangle.**

● Apply digital tools to gather, evaluate and use information

● Apply digital tools to gather, evaluate and use information

● Apply digital tools to gather, evaluate and use information

● Demonstrate a sound understanding of technology concepts, systems and operations

● Demonstrate a sound understanding of technology concepts, systems and operations

NRN.1
NRN.1
NRN.1

AREI.1&2
AREI.1&2

ISTE 3b,3c
ISTE 3b,3c
ISTE 3b,3c

GSRT.8
GSRT.8

ISTE 6b

GSRT.6
GSRT.6

that in a right triangle, the square of the length of the hypotenuse equals the sum of the squares of the lengths of the legs.

● A right triangle is triangle with exactly one right angle.

● That by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

● Trigonometric ratios are often used in realworld situations.

GSRT.8
GSRT.6
GSRT.6

EVIDENCE of LEARNING

Understanding 4, 5, 6, 7, 8

Standards

Unit Performance Assessment : Trigonometry PE (Lighthouse) NRN.1

Description of Assessment Performance Task(s): GSRT.6

Light House Performance Task **GSRT.8**

Students will solve for a missing leg or missing angle of a right triangle. Students will MP 18
also use acquired knowledge to solve realworld problems involving distance. In this ISTE 3b,3c
instance, students will have to be able to apply their knowledge to determine distance a ISTE 6b
ladder is from a wall along with how angles from the Matagorda Lighthouse Island provides assistance in
determining a boat adrift, which could make the difference of the level of safety at the distressed boat.
There will be an opportunity to go over the performance task in which the class can discuss the
importance of using trigonometry in this scenario for safety reasons and if students can think of other
ways trigonometry can be important for safety (i.e. structure of a bridge). **Teacher will assess:**

Student's understanding of the trigonometric functions when solving for a leg, hypotenuse, or angle. Also, evaluate the student's ability to correctly draw a right triangle to demonstrate a realworld problem and correctly solve the problem. **Performance:**

Mastery: Students will show that they really understand when they...

complete the performance task with a score of 75% or better. **Scoring Guide:**

See Appendix 5B, 5C Lighthouse PE Scoring Guide

R/R Quadrant

B

<div align="center">

21st Century Critical Thinking

</div>

Communication

SAMPLE LEARNING PLAN

Preassessment: 5E Unit 5 PreAssessment Radicals and Trigonometry

<div align="center">

Understandin g

</div>

Standards Major Learning Activities:
Instructional

Strategy:

    R/R Quadran & 21st Century:
    R/R Quadran & 21st Century:
    R/R Quadran & 21st Century:

1, 2 NRN.1 MP 18 ISTE 3b,3c ISTE 6b
1. Activity: 5F Simplifying Radicals (Independently or Collaboratively) Students will be able to simplify radical expressions. Once completed, questions and/or any remaining misconceptions will be addressed. There is an opportunity to do this activity as a flipped classroom activity with a little frontloading.

● Objective: Students will understand the methods for properly simplifying radical expressions.

        Homework & Practice
        Homework & Practice
        A Critical Thinking
        A Critical Thinking
        A Critical Thinking

Appendix Documents: 5F

1, 2, 3 AREI.2

        NRN.1 MP 18

2. Activity: 5G Radicals and Radical Equations Simultaneous Roundtable Students will each write a response on their own paper. Students pass their paper clockwise so each teammate can check, coach and praise each other's work. Students have the opportunity to justify and defend claims.

    Cooperative Learning Providing Practice Feedback
    Cooperative Learning Providing Practice Feedback
    Cooperative Learning Providing Practice Feedback
    B Communication Collaboration
    B Communication Collaboration
    B Communication Collaboration
    B Communication Collaboration

● Objective: Students will demonstrate their

understanding of radicals and radical equations.
Appendix Documents: 5G

Feedback
D
D
D

6, 7, 8 GSRT.6 GSRT.8 MP 18 ISTE 3b,3c
ISTE 6b

Critical Thinking
Critical Thinking
Critical Thinking

3. Activity: 5H Millennium Falcon Trigonometry (Independently or Collaboratively): Students will solve for missing sides of a right triangle to solve the puzzle with Star Wars' Millenium Falcon as the item of focus. As a conclusion, students will discuss as a class how using trigonometry can be applied to solving real world problems on a regular basis as it relates to solving the Millenium Falcon Problem

● Objective: Students will analyze a situation and apply the Pythagorean Theorem and use right triangle trigonometry to solve for missing sides of a

Cooperative Learning

Graphic Organizer
Graphic Organizer

Collaboration

Creativity

Feedback

triangle. Students will know how to apply this strategy to real life problems
Appendix Documents: 5H
4, 5 GSRT.8
MP 18
4. Activity: 5I Pythagorean Theorem (Independently or Collaboratively):
Homework & Students will use the Pythagorean Theorem to solve for the missing length in a right
Practice triangle
● Objective:. Students will be able to analyze a real world situation and apply the Pythagorean Theorem.
Appendix Documents: 5I
A Critical Thinking

6, 7, 8 GSRT.6 GSRT.8 MP 18

5. Activity: 5J Trigonometry Problem Simultaneous Roundtable In teams, students are given a multistep trigonometry problem. Students will each write a response on their own paper. Students pass their papers clockwise so each teammate can answer the next question. Students may need to explain their work when passing work on allowing them to justify and defend their work.
● Objective: Students will collaborate to answer a multistep trigonometry problem while synthesizing and evaluating other student work.

Cooperative Learning Providing Practice

Feedback

C Critical Thinking Communication Collaboration

4, 5 GSRT.8

MP 18 ISTE.3

6. Activity: 5K Pythagorean Theorem Jeopardy Game In teams, students practice real world problems involving the Pythagorean Theorem using an online Jeopardy game.

● Objective: Students will demonstrate their understanding of the Pythagorean Theorem and its applications using a Jeopardy game.

Feedback

<center>Reinforcing Effort</center>

Generating and testing Hypotheiss

<center>B Collaboration Communication</center>

UNIT RESOURCES

Teacher Resources: http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ http://robertkaplinsky.com http://www.livebinders.com/play/play_or_edit?id=330579 (Dan Meyer's 3 Act) BrainPOP Schoology Socrative Study Island Khan Academy

Student Resources : http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ BrainPOP Schoology Socrative Study Island Khan Academy Vocabulary:

● Square root The square root of x is the number that, when multiplied by itself, gives the number, x.

● Radical Sign – The radical sign is a symbol used in expressions when a root is to be taken.

● Perfect square – A perfect square is the product of an integer and itself. Perfect squares are nonnegative and can be written as x^2 when x is an integer.

● Cube root A number that when cubed (taken to the power of 3) gives the original number.

● Simplify – to solve a given problem and reduce to its simplest term.

● Extraneous root Incorrect values of the variable, such as those that are introduced as a result of the squaring process.

● Distance Formula: An application of the Pythagorean Theorem based on the distance between two points.

● Hypotenuse: The hypotenuse is the side of a right triangle that is directly across from the right angle

● Leg of a Triangle: Either of the two shorter sides of a right triangle. These two sides together form the right angle in the right triangle.

● Pythagorean Theorem: A theorem that states that in a right triangle, the square of the length of the hypotenuse equals the sum of the squares of the lengths of the legs.

● Square Root: The square root of a number is a special value that, when multiplied by itself, gives the number.

● Radical: A symbol that is used to indicate square roots.

● Right Triangle: A triangle with exactly one right angle.

Content Area: Math Course: Intermediate Algebra UNIT 6: Factoring

Unit Description: Students will be able to factor and solve quadratics and understand equivalent forms. Factoring will include GCF, difference of two squares and trinomials along with sum and difference of cubes.

Unit Timeline: Approximately 13 days.

DESIRED Results

Transfer Goal Students will be able to independently use their learning to......

● Make sense of problems and persevere in solving them.

● Reason abstractly and quantitatively.

● Construct viable arguments and critique the reasoning of others.

● Model with mathematics.

● Use appropriate tools strategically.

● Attend to precision.

● Look for and make use of structure.

● Look for and express regularity in repeated reasoning.

Understandings – Students will understand that... (Big Ideas)

1. A quadratic is a second degree equation. 2. A quadratic expression may be written as a product of monomial or binomial factors. 3. A quadratic can be factored by multiple methods. 4. A quadratic expression that is not factorable is prime.

Essential Questions : Students will keep considering... An Essential Question is meant to:

● How do you know if a quadratic is factored completely?

● How do you determine which method to use when factoring?

● How do you know if a quadratic is factored correctly?

● How do you know if a quadratic is prime?

Students will know..... Standard Students Will Be Able to..... Standard

● That the standard form of a polynomial is with one variable, the polynomial is written with the terms in order from greatest degree to least degree

● That the Prime factorization is the factored form of a number in which all factors are prime numbers

● That the Greatest common factor is the greatest of the factors shared by two or more whole numbers

● That a Monomial is a polynomial with one term that is a number, a variable or the product of a number and variables with whole number exponents.

● That a Binomial is a polynomial with two terms

● That a Trinomial is a polynomial with three terms

● That a Polynomial is a monomial or a sum or difference of monomials

● That the Degree of a polynomial is the degree of the term with the greatest degree

● That a Quadratic is a polynomial with degree 2

A.SSE.1a A.SSE.1b

● **Factor a quadratic with a greatest common factor**

● **Factor a quadratic with a greatest common factor**

● **Factor polynomials using multiple methods.**

● **Factor polynomials using multiple methods.**

● **Know when a quadratic expression is not factorable**

● Apply digital tools to gather, evaluate and use information

● Demonstrate a sound understanding of technology concepts, systems and operations

A.SSE.1a
A.SSE.1a
A.SSE.1a

A.SSE.1b
A.SSE.1b

ISTE 3b,3c
ISTE 3b,3c

ISTE 6b
ISTE 6b

EVIDENCE of LEARNING

<center>Understanding 1, 2, 3, 4</center>

Standards

Unit Performance Assessment : 6A Factoring (Wally's Wallpaper) **A.SSE.1a**

Description of Assessment Performance Task(s): A.SSE.1b

Wallpaper Performance Task A.REI.3

Students will help Wally find the length and width of each room of his house so he can put MP 18 up wallpaper by factoring the given areas (quadratic expressions). Using this information along with spiraling in prior standards, students will answer realworld problems related to area, perimeter, and evaluation of expressions. There may be an opportunity for students to discuss how they would use the performance task for other real life situations at task completion. Students could go home and use this experience to figure out what would be required to wall paper one or two rooms within own home.

Teacher will assess:

Student's ability to factor quadratic expressions and answer questions related to area, perimeter, and evaluating expressions.

Performance:

Mastery: Students will show that they really understand when they...

show they can accurately write expressions for perimeter and area, and calculate the cost of wallpaper

needed to cover the family room.

Scoring Guide:

See Appendix 6B, 6C Factoring Scoring Guide

R/R Quadrant

D

21st Century Critical Thinking

Communication

SAMPLE LEARNING PLAN   Graphic Organizer

Preassessment: 6E Unit 6 PreAssessment   Cooperative Learning
Factoring   Cooperative Learning
                                                          B Creativity Collaboration & Critical Thinking
                                                          B Creativity Collaboration & Critical Thinking
                                                          B Creativity Collaboration & Critical Thinking
Understanding Standards Major Learning   B Creativity Collaboration & Critical Thinking
Activities: Instructional   B Creativity Collaboration & Critical Thinking
Strategy: B Creativity Collaboration & Critical Thinking
         R/R Quadrant: & 21st Century

1, 2, 3, 4 A.SSE.1aA.   Appendix Documents: 6F

  A.SSE.1b AREI 3 MP 18 ISTE 3b,3c ISTE 6b
1. Activity: 6F Factoring Puzzle: 1, 2, 3, 4 A.SSE.1a A..SSE.1b AREI.3 MP 18
Students will cut out the pieces of a puzzle and   2. Activity: 6G Factoring Polynomials
use factoring to match the edges so that   Numbered Heads Together: After writing their
equivalent expressions meet. The pieces will   own answer to a factoring question, teammates
form a rectangle. The outer edges of the   put their "heads together" to ensure all members
rectangle formed will have no expressions on   can answer. The teacher then calls a number and
them. Students will need to use technology to   students with that number share their answers.
develop and check solutions of their quadratic   Cooperative Learning, Feedback, Providing
equations.   Practice
                                                             Cooperative Learning, Feedback, Providing
● Objective: Students will work collaboratively   Practice
so they are able to factor quadratic expressions.   C Collaboration Communication
                  Graphic Organizer   C Collaboration Communication
                  Graphic Organizer   C Collaboration Communication
                  Graphic Organizer

● Objective: Students will work collaboratively so they are able to factor quadratic expressions.

Appendix: 6G

1, 2, 3, 4 A.SSE.1a A.SSE.1b ISTE.3 ISTE.6
3. Activity: 6H Factoring Flowchart Graphic Organizer: Students will use the flowchart to to identify the correct factoring method. Another opportunity to try this in a flipped class format.

● Objective: Students will analyze a polynomial expression and utilize the flowchart to factor

properly. Appendix: 6H
Summarizing and Notetaking Identify Similarities and Differences
Summarizing and Notetaking Identify Similarities and Differences
A Critical Thinking
A Critical Thinking
A Critical Thinking

UNIT RESOURCES

Teacher Resources: http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ BrainPOP Schoology Socrative Study Island Khan Academy

Student Resources : http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ BrainPOP Schoology Socrative Study Island Khan Academy

Vocabulary:
● Standard form of a polynomial with one variable the form is written with the terms in order from greatest degree to least degree
● Prime factorization The factored form of a number in which all factors are prime numbers
● Greatest common factor the greatest of the factors shared by two or more whole numbers
● Monomial A polynomial with one term that is a number, a variable or a product of a number and variables with whole number exponents.
● Binomial A polynomial with two terms
● Trinomial A polynomial with three terms
● Polynomial A monomial or a sum or difference of monomials
● Degree of a polynomial The degree of the term with the greatest degree
● Quadratic A polynomial with degree 2

Content Area: Math Course: Intermediate Algebra UNIT 7: Quadratics and Conics

and know their attributes and apply applications for each of them.

Unit Timeline: Approximately 28 days.

Unit Description: Students will be able to graph quadratic functions, parabolas and circles

DESIRED Results

Transfer Goal Students will be able to independently use their learning to......

● Make sense of problems and persevere in solving them.

● Reason abstractly and quantitatively.

● Construct viable arguments and critique the reasoning of others.

● Model with mathematics.

● Use appropriate tools strategically.

● Attend to precision.

● Look for and make use of structure.

● Look for and express regularity in repeated reasoning.

Understandings – Students will understand that... (Big Ideas)

1. The solutions of a quadratic equation are the xintercepts on the graph. 2. The graph of a quadratic equation has certain attributes (axis of symmetry, vertex, yintercept). 3. Families of parabolas share the same shape. 4. Quadratic functions are used to solve realworld problems. 5. Quadratic equations can be solved using various methods (graphing, factoring, square root method, completing the square, or quadratic

formula). 6. A parabola is a quadratic equation with additional attributes (focus, directrix, latus rectum). 7. A circle can be graphed using its center and radius. 8. Writing equations of conic sections in standard

form allows you to identify the center of a circle or the vertex of a parabola.

Essential Questions : Students will keep considering... An Essential Question is meant to:
● How do you find the vertex of a quadratic equation/parabola?
● How do you find the xintercepts of a quadratic equation/parabola, if they exist?
● How do you find the yintercept of a quadratic equation/parabola?
● How do you find the axis of symmetry of a quadratic equation/parabola?
● How do you find the maximum or minimum to solve a realworld problem?
● How do you know which method is best to solve a quadratic equation?
● How do you transform a the equation of a parabola/circle equation into standard form?
● How do you write the equation of a circle given various pieces of information?
● How do you write an equation of a parabola that has been translated?

Students will know..... Standard Students Will Be Able to..... Standard

equation are the xintercepts on the graph.

● Use the graph of a quadratic equation to identify its attributes (axis of symmetry, vertex, yintercept).

● Use the graph of a quadratic equation to identify its attributes (axis of symmetry, vertex, yintercept).

● Use the graph of a quadratic equation to identify its attributes (axis of symmetry, vertex, yintercept).

● A Quadratic equation is an equation that can be written in the standard form $ax2 + bx+ c = 0$, where a, b and c are real numbers and $a \neq 0$.

● A quadratic function is any function that can be written in the form $y = ax2 + bx + c$, where a, b and c are real numbers and $a \neq 0$.

● A vertex is the highest or lowest point on a parabola.

● A zero of a function is the xvalue that makes the function $= 0$.

● The axis of symmetry is the vertical line that divides a parabola into two symmetrical halves.

● That Completing the Square is adding a term to $x2 + bx$ to form a trinomial that is a perfect square.

● The Maximum is the yvalue of the vertex if a < 0

● The Minumum is the yvalue of the vertex if a > 0

AREI.4

AREI.4

F.IF.7

F.IF.7

F.IF.7

HSG.GPE.A.1

F.IF.7 F.IF.7

● Recognize that the solutions of a quadratic equation are the xintercepts on the graph.
● Recognize that the solutions of a quadratic

● Use quadratic functions to solve realworld problems.

● Use quadratic functions to solve realworld problems.

● Use quadratic functions to solve realworld problems.

● Solve quadratic equations using various methods (graphing, factoring, square root method or completing the square, quadratic formula).

● Solve quadratic equations using various methods (graphing, factoring, square root method or completing the square, quadratic formula).

● Solve quadratic equations using various methods (graphing, factoring, square root method or completing the square, quadratic formula).

● Solve quadratic equations using various methods (graphing, factoring, square root method or completing the square, quadratic formula).

● Graph a circle using its center and radius.

● Write equations of circles in standard form to identify the center and radius.

● Write equations of circles in standard form to identify the center and radius.

● Write equations of parabolas in standard form to identify the vertex.

● **Write equations of parabolas in standard form to identify the vertex.**

● **A parabola is a quadratic equation with additional attributes (focus, directrix, latus rectum).**

F.IF.7

F.IF.7

F.IF.7

A.REI.4b

A.REI.4b

HSG.GPE.A.1

HSG.GPE.A.1

HSG.GPE.A.2

HSG.GPE.A.2

HSG.GPE.A.2

● Recognize families of parabolas.

● Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

● Apply digital tools to gather, evaluate and use information

● Demonstrate a sound understanding of technology concepts, systems and operations

F.BF.3 ISTE.1c

ISTE 3b,3c

ISTE 6b

EVIDENCE of LEARNING

Understanding 1, 2, 4, 5,6, 8

Standards

Unit Performance Assessment : 7A Quadratics **HSG.GPE. A.2**

Description of Assessment Performance Task(s): A.REI.4b

Quadratic Performance Task **F.IF.7**

Students will demonstrate their understanding by correctly answering questions about the MP 18 characteristics of quadratic equations and their graphs. Students will be assessed on maximum and minimum values, x and yintercepts, vertex, and axis of symmetry as well as domain and range. When

assignment is complete we will review the skills in this task and the relevance for understanding Quadratics as it relates to solving problems that students may face in life.

Teacher will assess: Student's ability to show correct work, understanding characteristics of quadratic equations, and the student's ability to use acquired knowledge to solve problems.

Performance:

Mastery: Students will show that they really understand when they...

complete the assessment with a score of 75% or better.

Scoring Guide:

See Appendix 7B, 7C Quadratics Scoring Guide

R/R Quadrant

B

21 Century

Critical Thinking

SAMPLE LEARNING PLAN

Preassessment: 7E Unit 7 PreAssessment Quadratics and Conics

Understanding Standards Major Learning Activities: Instructional Strategy:

R/R Quadrant & 21st Century:

3 F.BF.3 MP 18 ISTE 1c ISTE 3b,3c ISTE 6b
1. Activity: 7F Families of Quadratic Equations
Students will use a graphing calculator to graph a set of equations in the same window. Students will describe the similarities and differences between the parent graph $y = x^2$ and the new equation then defend their claim.

● Objective: Students will understand how to analyze the transformations of graphs of quadratic equations using a graphing utility.

Models & Manipulatives, Similarities and Differences

Models & Manipulatives, Similarities and Differences

C Creativity Critical thinking
C Creativity Critical thinking
C Creativity Critical thinking

Appendix Documents: 7F

1, 2, 4, 5 HSG.GPE.A.2
   AREI.4b F.IF.7 MP 18 ISTE 1c ISTE 3b,3c ISTE 6b
2. Activity: 7G Simultaneous Roundtable Solve Quadratic Equations Using Different Methods

Students will be put into groups of four. Each student is given their own worksheet with a different quadratic equation. First, each student will solve their equation graphically. Then, students will pass their worksheet to their left and they will solve their new equation by factoring. Students may need to justify their claims when passing work on. Next, students will pass their worksheets to the left and solve the new equation by completing the square. Students will pass their worksheet one more time and solve the new equation using the quadratic formula. When finished, each

worksheet will have the same answer for all four methods of solving. Students will use graphing calculators to verify solutions.

Cues and Questions, Nonlinguistic Representations, Summarizing, Practice and Homework, Similarities and Differences, Cooperative Learning

Cues and Questions, Nonlinguistic Representations, Summarizing, Practice and Homework, Similarities and Differences, Cooperative Learning

Cues and Questions, Nonlinguistic Representations, Summarizing, Practice and Homework, Similarities and Differences, Cooperative Learning

Cues and Questions, Nonlinguistic

Representations, Summarizing, Practice and Homework, Similarities and Differences, Cooperative Learning

C
C
C

Critical Thinking
Critical Thinking
Critical Thinking

Collaboration Communication
Collaboration Communication
Collaboration Communication

● Objective: Students will be able to solve quadratic equations by graphing, factoring, completing the square, and using the quadratic formula.

Appendix Documents: 7G

Feedback, 6,7,8 HSG.GPE.A.1 3. Activity: 7H Rally Coach Circles
Students take turns, one solving a problem while the other coaches.
Cooperative Learning Problems involve graphing a circle given its center and radius, writing the equation of a circle given its center and radius, and using the process of completing the square to write the equation of a circle in standard form.
● Objective: Students will be able to write an equation of a circle in standard form in order to identify the center and radius and then graph the circle.
Appendix Documents: 7H

B Collaboration Communication

1, 2, 3, 4 AREI.4

F.IF.7 ISTE.1c ISTE 3b,3c

4. Activity: 7I Sage and Scribe Real World Quadratic Word Problems

● Students are paired together to graph and answer related questions. Assign one student as the 'sage' and the other student the 'scribe'. The sage will tell the scribe how to graph the quadratic and find the answers to the related questions. The scribe will write the process on the paper. Allow students to discuss the problem. Sage cannot write anything for the scribe and the scribe can only write what the sage describes. The students will switch roles and complete a second problem. Students will justify and defend their claims to their peers when there are differences.

● Objective: to be able to analyze a real world application and write and graph a quadratic function, find the maximum value, and zero as they relate to the situation..

Appendix Documents: 7I

Cooperative Learning D

Critical Thinking

Collaboration

Communication

Creativity

1, 2, 3 AREI.4

F.IF.7 ISTE.1c ISTE 3b,3c

5. Activity: 7J Simultaneous Roundtable graphing a quadratic

● Students take a turns performing tasks to completely graph a quadratic with its axis of symmetry, vertex, yintercept and reflected point along with the zeros of the function. Students will have an opportunity to selfreflect on the activity.

● Objective: Students will know how to collaborate to completely graph a quadratic function.

Appendix Document: 7J

 Cues and Questions, Nonlinguistic Representations, Summarizing, Practice and Homework, Similarities and Differences, Cooperative Learning

C

Critical Thinking

Collaboration Communication

UNIT RESOURCES

Teacher Resources: http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ http://robertkaplinsky.com http://www.livebinders.com/play/play_or_edit?id=330579 (Dan Meyer's 3 Act) BrainPOP Schoology Socrative Study Island Khan Academy

Student Resources : http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ BrainPOP Schoology Socrative Study Island Khan Academy

Vocabulary:

● Quadratic equation an equation that can be written in the standard form $ax^2 + bx + c = 0$, where a, b and

c are real numbers and a ≠ 0.

- Quadratic function any function that can be written in the form $y = ax^2 + bx + c$, where a, b and c are real numbers and a ≠ 0.

- Vertex the highest or lowest point on a parabola.

- Zero of a function An xvalue that makes the function = 0.

- Axis of Symmetry The vertical line that divides a parabola into two symmetrical halves.

- Completing the Square Adding a term to $x^2 + bx$ to form a perfect square trinomial.

- Maximum The yvalue of the vertex if a < 0

- Minimum The yvalue of the vertex if a > 0

Content Area: Math Course: Intermediate Algebra UNIT 8: Rational Expressions and Equations

and be able to solve rational equations to include the equation's domain.

Unit Timeline: Approximately 10 days.

Unit Description: Students will know how to perform the operations on rational expressions

DESIRED Results

Transfer Goal Students will be able to independently use their learning to......

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Understandings – Students will understand that... (Big Ideas)

1. A rational expression is a fraction in which the numerator and denominator are polynomials and the denominator contains a variable. 2. Simplifying rational expressions is similar to simplifying fractions. 3. Rational equations will have excluded values because the denominator cannot equal zero.

Essential Questions : Students will keep considering... An Essential Question is meant to:

● How will you know when to add or subtract rational expressions?

● How do you know a rational expression is completely simplified?

● How do you find the excluded values of a rational equation?

● How do you find the solution(s) to a rational equation?

Students will know..... Standard Students Will Be Able to..... Standard

● That a Rational Expression is an algebraic expression whose numerator and denominator are polynomials.

● That a Rational Equation is Two Rational expressions set equal to each other.

● That an Excluded value is any value for the variable that would cause the denominator = 0
A.APR.7

A.REI.2

A.REI.2
● **Identify that a rational expression is a fraction in which the numerator and denominator are polynomials and the denominator contains a variable.**
● **Identify that a rational expression is a fraction in which the numerator and denominator are polynomials and the denominator contains a variable.**

● **Identify that a rational expression is a fraction in which the numerator and denominator are polynomials and the denominator contains a variable.**
● **Identify that a rational expression is a fraction in which the numerator and denominator are polynomials and the denominator contains a variable.**

● **Simplify rational expressions using methods similar to simplifying fractions.**
● **Simplify rational expressions using methods similar to simplifying fractions.**

● **Identify the excluded values of rational equations.**

● Apply digital tools to gather, evaluate and use information
A.APR.7
A.APR.7
A.APR.7

A.REI.2 ISTE 3b,3c ISTE 6b

● Demonstrate a sound understanding of technology concepts, systems and operations.

EVIDENCE of LEARNING
Understanding
1, 2, 3
Standards
Unit Performance Assessment : Error Correction: Simplifying Rational Expressions
Description of Assessment Performance Task(s): A.REI.2
Rational Expression Performance Task **A.APR.7**
Students will use their prior knowledge to evaluate the mistake in a completed problem MP 18
involving rational expressions. Students will then describe the mistake that was made and ISTE 3b,3c
make corrections. Students will then use this process to answer questions on these skills ISTE 6b
along with rational expressions apply to real world situations. These skills will help students master the
standards, further develop their skill to identify their own errors is their work and life, along with being
better problem solvers.
Teacher will assess: Students' ability to identify the mistake in the problem and to work the problem

accurately. Teachers will assess the explanation given by the student on the mistake that was made and the correct terminology used in the correction of the mistake.

Performance:

Mastery: Students will show that they really understand when they are able to explain the process and perform the operations accurately.

Key and Scoring Guide:

See Appendix 8B/8C Scoring Guide

R/R Quadrant:

B

21Century

Communication

<div align="center">

Critical Thinking

</div>

SAMPLE LEARNING PLAN

B Collaboration Communication
B Collaboration Communication
B Collaboration Communication
B Collaboration Communication

Preassessment: 8E PreAssessment Rational Expressions and Equations

Understanding Standards Major Learning Activities: Instructional Strategy:

R/R Quadrant & 21st Century:

1 A.APR.7

MP 18

1. Activity: 8F Rally Coach Rational Expressions

● Partners take turns, one simplifying rational expressions while the other coaches. Students will work cooperatively to become proficient in this standard. This activity is to prepare students for the performance assessment.

● Objective:. Students will be able to identify excluded values and simplify rational expressions. Appendix Documents: 8F

       Feedback, Cooperative Learning
       Feedback, Cooperative Learning
       Feedback, Cooperative Learning
       Feedback, Cooperative Learning
       B Collaboration Communication

2 A.APR.7

ISTE.3

ISTE 6b

2. Activity: 8G Simplify Rational Expressions

Students will work collaboratively or independently to implement the methods of simplifying fractions to add, subtract, multiply, and divide rational expressions. Students will use graphic calculators to selfevaluate solutions. Students will also have an opportunity to defend claims to peers.

● Objective: Students will understand how to add, subtract, multiply, and divide rational expressions.

       Homework & Practice
       Homework & Practice
       Homework & Practice
       Homework & Practice

A

A

A

Critical Thinking

Critical Thinking

Appendix Documents: 8G

3 A.REI.2

3. Activity: 8H Simultaneous Round Table

      Practice, Cooperative Learning

      Practice, Cooperative Learning

          B Collaboration

          B Collaboration

ISTE.3

MP 18

● In teams, students each solve a problem on their own paper in how he or she thinks is correct. Students then pass their papers to the left so teammates can check, coach and praise. Solve and pass again. Students can use graphic calculators to check solutions. In conclusion, the class will reflect on the results and discuss how to apply this concept to real world situations.

● Objective: Students will be able to solve rational equations.

      Practice, Cooperative Learning

      Practice, Cooperative Learning

      Practice, Cooperative Learning

          B Collaboration

          B Collaboration

          B Collaboration

Creativity

Appendix Documents: 8H

UNIT RESOURCES

Teacher Resources: http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ http://robertkaplinsky.com http://www.livebinders.com/play/play_or_edit?id=330579 (Dan Meyer's 3 Act) BrainPOP Schoology Socrative Study Island Khan Academy

Student Resources : http://www.glencoe.com/ose/ Access code: A7CBCFDA86 http://my.hrw.com/ BrainPOP Schoology Socrative Study Island Khan Academy

Vocabulary:

● Rational ExpressionAlgebraic expression whose numerator and denominator are polynomials

● Rational EquationTwo Rational expressions set equal to each other.

● Excluded value any value for the variable that would cause the denominator = 0