

Unit 02: Equations and Angle Relationships

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **6 weeks**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

MATH.8.EE	Expressions and Equations
MATH.8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.
MATH.8.EE.B	Understand the connections between proportional relationships, lines, and linear equations
MATH.8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
MATH.8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .
MATH.8.EE.C	Analyze and solve linear equations and pairs of simultaneous linear equations
MATH.8.EE.C.7	Solve linear equations in one variable.
MATH.8.EE.C.7.a	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
MA.8.G.A	Understand congruence and similarity using physical models, transparencies, or geometry software.
MA.8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.

CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

CS.6-8.8.1.8.AP.2	Create clearly named variables that represent different data types and perform operations on their values.
CS.6-8.8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.

Interdisciplinary Connections: NJSLs for ELA, Social Studies, Science and/or Math Section

Capacities of the Literate Individual

Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language

ELA.L.VL.8.3	Determine or clarify the meaning of unknown and multiple-meaning words or phrases based on grade 8 reading and content, including technical meanings, choosing flexibly from a range of strategies.
ELA.SL.PE.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
ELA.SL.PE.8.1.A	Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
ELA.SL.PE.8.1.B	Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.
ELA.SL.PE.8.1.C	Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.
ELA.SL.PE.8.1.D	Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy

see Crosswalks

21st Century Life and Careers

CAEP.9.2.12.C.1

Review career goals and determine steps necessary for attainment.

CAEP.9.2.12.C.2

Modify Personalized Student Learning Plans to support declared career goals.

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit...

The purpose of this unit is to provide students with the necessary skills to represent and analyze mathematical situations in order to solve real-world problems and predict unknown quantities in situations that can be represented with one variable. Learning how to apply the skills of writing and solving equations will help students to find missing measures in given geometric situations involving angles and sides of geometric figures.

Meaning

Essential Questions

Essential Questions

- How can we use inductive reasoning to discover rules in mathematics?
- How can we use mathematical properties to reduce an expression to its simplest form?
- Why is it important to create a variety of equations to solve real-world problems?
- How can understanding angle relationships help us to find missing measures?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

- Understand that by analyzing, creating, and testing a rule you can solve a variety of problems
- Reducing an expression to its simplest terms eases the process of solving an equation
- Real-world problems can be solved by identifying solutions to multi-step equations
- Solving for missing angles created by parallel lines cut by a transversal or inside polygons can be used to solve a variety of problems

Acquisition (Student Learning Objectives)

Knowledge

Knowledge
Students will know...

-Properties of equality

-Understanding of all types of operations with rational numbers

-A variety of methods to solve multi-step equations including combining like terms and using the distributive property

-Equations with one variable have either one solution, no solution, or infinitely many solutions

-Special angle relationships are created when parallel lines are cut by a transversal

-Interior angle sum for triangles and quadrilaterals

-Definitions of complementary, supplementary, and vertical angles

Skills

Skills

Student will be skilled at ...

-Write, solve, and manipulate multi-step equations including combining like terms, using the distributive property, and those with variables on both sides

-Identify the number of solutions for a given one-variable equation

-Translate real-world problems into algebraic equations

-Assess angle relationships in order to solve for missing values given parallel lines cut by a transversal or

interior and exterior angles created by polygons

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

[Unit 2 activities.docx](#)

[Unit 2- Cycle 2-3 partner practice.docx](#)

[Unit 2-Cycle 2-3 scavenger hunt answer sheet.docx](#)

[Unit 2-Cycle 2-3 scavenger hunt teacher instructions.docx](#)

[Unit 2-Cycle 4-5 scavenger hunt answer sheet.docx](#)

[Unit 2-Cycle 4-5 scavenger hunt teacher instructions.docx](#)

[Unit 2-Cycle 8 scavenger hunt answer sheet.docx](#)

[Unit 2-Cycle 8 scavenger hunt teacher instructions.docx](#)

[Unit 2- 4-5 partner musical chairs.doc](#)

[Unit 2- 4-5 Barbie Bungee Worksheet.doc](#)

[Unit 2 - 4-5 Barbie Bungee Lesson Plan.doc](#)

[Unit 2 - PARCC practice.docx](#)

Formative Assessment Strategies

Formative Assessment Strategies

- ixl.com scores
- tenmarks.com scores
- teacher center observation
- STEM projects

Learning Activities/Unit of Study

Learning Activities/Unit of Study

Equations and Angle Relationships: Approximately 8 Cycles

Cycle 1: Topics Covered

- Like terms
- Distributive property
- Simplifying expressions

- Activities/Centers
 - IXL.com centers
 - T.2 Distributive property
 - S.10 Add and subtract like terms
 - Hands-On/Creative Centers
 - Simplifying expressions activity
file:///C:/Users/KKemeny/Downloads/SimplifyingAlgebraicExpressionsTaskCardActivitySCOOT.pdf
 - Online games
 - <https://www.quia.com/quiz/1200540.html>
 - Xtramath: review flashcards
 - Teacher Directed Stations
 - Bellringers: Week 34—page 123-124
 - Bellringers: Week 34—page 121-122
 - Teacher created problems on white boards: simplify expressions
- STEM activity:
 - Create a discovery jar. Have students brainstorm all of the questions or ideas he/she is curious about related to science, technology, engineering, art, or math. Maybe it is why grass is green or how space travel started. Or how many varieties of leaves exist on the trees in the yard. Then put all of the questions into a mason jar. Each group chooses out of the jar at a center and will research and explore the topic. (This activity can be repeated throughout the year and questions can be added as well).*

Cycle 2/3: Topics Covered

- Multi-step equations (one-step, two-step, multi-step)

- Activities/Centers
 - IXL.com centers
 - U.1 Which x satisfies an equation?
 - U.2 Write an equation from words
 - U.5 Solve one-step equations
 - U.6 Solve two-step equations
 - U.7 Solve multi-step equations
 - U.8 Solve equations involving like terms
 - Hands-On/Creative Centers
 - Scavenger hunt: Solve multi-step equations*
 - Work with a partner. One person solves the multi-step equation and the other checks with substitution. Then, the partners switch. *

- Online games
 - Whole group game: <https://jeopardylabs.com/play/solving-multi-step-equations1>
 - <http://www.shodor.org/interactivate/activities/AlgebraFour/>
- Xtramath: review flashcards
- Teacher Directed Stations
 - Bellringers: Week 33—page 119-120
 - Bellringers: Week 33—page 117-118
 - Bellringers: Week 33—page 115-116
 - Bellringers: Week 33—page 113-114
 - Teacher created problems on white boards: multi-step equations

Cycle 4/5: Topics Covered

- Equations with variables on both sides
- Activities/Centers
 - IXL.com centers
 - U.9 Solve equations with variables on both sides
 - U.10 Solve equations: mixed review
 - U.11 Solve equations: word problems
 - U.12 Find the number of solutions
 - U.13 Create equations with no solutions or infinitely many solutions
 - Tenmarks centers
 - 8.EE.7b Solving Linear Equations with Fraction Coefficients
 - 8.EE.7b Solving Linear Equations with Decimal Coefficients
 - 8.EE.7b Solving Linear Equations with Percents as Coefficients
 - 8.EE.7b Finding Linear Equations
 - 8.EE.7b Solving Linear Equations Involving Integers
 - Hands-On/Creative Centers
 - Each group is a team to solve the following problems:
file:///C:/Users/KKemeny/Downloads/MultiStepEquationsRelayRaceActivity.pdf
 - Scavenger hunt (solve for x)*
 - Partner musical chairs*
 - Online games
 - <https://www.quia.com/rr/168572.html>
 - <https://jeopardylabs.com/play/solving-equations-with-variables-on-both-sides3>
 - Xtramath: review flashcards
 - Teacher Directed Stations
 - Bellringers: Week 32—page 111-112
 - Bellringers: Week 32—page 109-110
 - Bellringers: Week 32—page 107-108
 - Bellringers: Week 32—page 105-106
 - Teacher created problems on white boards: Solving multi-step equations with variables on both sides
- STEM activity: Bungee jump experiment <https://www.teachingchannel.org/videos/stem-lesson-ideas-bungee-jump> *

Cycle 6: Topics Covered

- Vertical angles
- Complementary angles
- Supplementary angles
- Using equations to find missing angles

- Activities/Centers
 - IXL.com centers
 - N.1 Identify complementary, supplementary, vertical, adjacent, and congruent angles
 - N.2 Find measures of complementary, supplementary, vertical, and adjacent angles
 - Hands-On/Creative Centers
 - Work with a partner to find the missing angles. Check with a protractor
<http://mccullough.conroeisd.net/Teachers/amarksberry/25664741-00870B2F.1/Comp%20and%20Supp%20HW.pdf>
 - Online games
 - <http://www.mathgames.com/skill/8.85-complementary-supplementary-vertical-and-adjacent-angles>
 - Xtramath: review flashcards
 - Teacher Directed Stations
 - Bellringers: Week 31—page 103-104
 - Bellringers: Week 31—page 101-102
 - Teacher created problems on white boards: solving for x given types of angles.

Cycle 7: Topics Covered

- Transversals and angles created
- Using equations to find missing angles

- Activities/Centers
 - IXL.com centers
 - N.3 Transversal of parallel lines
 - Tenmarks centers
 - 8.G.5 Understanding Triangles Using Angles
 - Hands-On/Creative Centers
 - Folding activity
<http://lessonplanspage.com/mathanglerelationshipsandparallellinespaperfoldingactivity810.htm/>
 - Online games
 - <http://www.shodor.org/interactivate/activities/Angles/>
 - Xtramath: review flashcards
 - Teacher Directed Stations
 - Bellringers: Week 31—page 99-100
 - Bellringers: Week 31—page 97-98
 - Teacher created problems on white boards: find the missing angles
- STEM activity: Take parts of the following extensive lesson on transversals and parallel lines
http://www.radford.edu/rumath-smpdc/Units/src/Batalias_CivilEng.pdf

Cycle 8: Topics Covered

- Finding angles of missing interior and exterior angles of triangles
- Activities/Centers
 - IXL.com centers
 - N.6 Find missing angles in triangles and quadrilaterals
 - N.7 Exterior Angle Theorem

- Tenmarks centers
 - 8.G.5 Triangles and Angle Properties
- Hands-On/Creative Centers
 - Scavenger hunt *
- Online games
 - Angles in a triangle <http://www.what2learn.com/home/examgames/maths/angles1/>
- Xtramath: review flashcards
- Teacher Directed Stations
 - Bellringers: Week 30—page 95-96
 - Bellringers: Week 30—page 93-94
 - Teacher created problems on white boards: find the missing angle
 - PARCC practice*

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature

circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.