Archdiocesan Curriculum > Grade > Math 8> Length of unit 18 to 26 days

Stage 1: Desired Results

General Information

In this unit, students will use algebraic properties to solve one-variable linear equations and interpret cases with no solution or infinitely many solutions. They will apply these skills to solve real-world problems. Additionally, students will explore angle relationships in triangles, identify similar triangles based on angle measures, and find missing angles formed when parallel lines are cut by a transversal.

Mathematical Practice:
- MP4 – Model with mathematics
- MP5 – Use appropriate tools strategically
- MP7 – Look for and make use of structure

Essential Question(s)
- How can algebraic properties be used to solve one-variable linear equations effectively?

- What does it mean when a linear equation has no solution or infinitely many solutions, and how can we recognize these cases?

- How do angle relationships within triangles help us solve for missing angles?

- How can we determine whether two triangles are similar by analyzing their angle measures?

- What angle relationships occur when parallel lines are cut by a transversal, and how can these be used to find unknown angles?

Enduring Understanding/Knowledge

Students will:
- Use algebraic properties to solve one-variable linear equations.
- Recognize and interpret linear equations that have no solution or infinitely many solutions. Solve and apply linear equations in one variable.

Review/Assess
- Use angle relationships in triangles.
- Identify whether two triangles are similar based on angle measures.
- Find missing angle measures when parallel lines are cut by a transversal.

Review/Assess

Vocabulary

New	Review
- infinitely many solutions - no solution - exterior angle - Exterior Angle Theorem - remote interior angle - Triangle Sum Theorem - Angle-Angle Similarity Postulate - alternate exterior angles - alternate interior angles - corresponding angles - same-side exterior angles - same-side interior angles - transversal	- coefficient - Distributive Property - isolate the variable - least common denominator - like terms - substitute - expression - interior angle

Connections to Catholic Identity / Other Subjects	Differentiation

Religion/Catholic Identity:
- Linear functions, with their steady rate of change, reflect the reliability and constancy of God's love, which remains unwavering regardless of life's circumstances. The concept of slope, representing direction, can also serve as a metaphor for the guidance faith provides, leading us along a path with purpose. By understanding linear functions, students are reminded of the importance of direction and consistency in their spiritual and personal lives, aligning math

Other Subject Here:
- Solving linear equations represents the process of finding balance or resolving a relationship between different elements. The equation acts as a model that helps us understand how one factor affects another, whether it's the characters in a story, the elements of an artwork, the variables in a scientific experiment, or the components of an economic system.

Enrichment

- **Design Complex Linear Equations** – Challenge students to create and solve multi-step linear equations that involve conditions for no solution or infinitely many solutions.
- **Explore Triangle Similarity Proofs** – Have students use dynamic geometry software or physical manipulatives to investigate and prove triangle similarity criteria (AA, SAS, SSS).
- **Model Real-World Problems** – Assign students to write and solve complex problems involving angle relationships, similarity, and linear equations integrating algebraic and geometric reasoning.
- **Investigate Extensions** – Encourage exploration of related concepts like systems of linear equations, inequalities, and their geometric interpretations.
- **Communicate Reasoning** – Have students present detailed explanations connecting algebraic solutions to geometric concepts in written or oral formats.

Support

- **Use Visual Equation Balancing** – Provide hands-on tools such as algebra tiles or balance scales to concretely illustrate solving one-variable linear equations.
- **Step-by-Step Angle Relationships** – Scaffold learning by breaking down problems about angle measures and triangle similarity into smaller parts with guided practice.
- **Interactive Geometry Tools** – Use virtual manipulatives and graphing software to help students visualize angle relationships and triangle similarity dynamically.
- **Vocabulary and Concept Frames** – Provide key terms, sentence stems, and graphic organizers to support understanding of algebraic and geometric vocabulary and concepts.
- **Real-World Contexts** – Incorporate familiar examples, like navigation or architecture, to ground abstract concepts in meaningful scenarios.

Standards & Benchmarks
Solve Linear Equations:

8.AF.2
Generate linear equations in one variable with one solution, infinitely many solutions, or no solutions. Justify the classification given.

8.AF.1
Solve linear equations and inequalities with rational number coefficients fluently, including those whose solutions require expanding expressions using the distributive property and collecting like terms. Represent real-world problems using linear equations and inequalities in one variable and solve such problems. (E)

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).

8.EE.C.7.b
Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

CCSS.Math.Content.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).

Angle Relationships:

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. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.

CCSS.Math.Content.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.

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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.

G.M.8.23
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 (e.g., arrange three copies of the same triangle so that the sum of the three angles appears to form a line; give an argument in terms of transversals why this is so).

Math.Content.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.

Teaching Ideas/Resources
Websites/Resources:
- Problems on Equations
- Free Printable Math Worksheets for Algebra 1
- Algebra 1 Worksheets | Linear Equations Worksheets
- Solving Equation Worksheets
- Free worksheets for Linear equations with one variable
- Classification of Solutions • Activity Builder by Desmos Classroom
- Many, No, or One solution • Activity Builder by Desmos Classroom
- Linear Equations With Variables on Both Sides - Math 8 CCSS | CK-12 Foundation
- Linear Equation Games
- Games on Solving Linear Equations
- Introductory Angle Theorems • Activity Builder by Desmos Classroom
- 4-The Exterior Angle Theorem