Unit 02: Basic Concepts and Proofs

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 4**
Length: **3 Weeks**
Status: **Published**

Unit Overview

In this unit, students will begin to study how geometric and logical proofs are constructed. Throughout this unit, they will build their knowledge of definitions, theorems, and postulates. Students will learn what can and cannot be assumed from a diagram. Finally, they will use properties of equality and the laws of logic to prove basic theorems about congruency, supplementary angles, complementary angles, and vertical angles.

Standards

MA.G-CO.A.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
MA.G-CO.C.9	Prove theorems about lines and angles.

Essential Questions

1) Why is proof necessary?

2) How does writing proofs allow us to support claims that we believe to be true?

3) How is proof connected to the process of solving an equation?

4) How does the understanding of writing mathematical proofs aid us in other areas of life?

Application of Knowledge and Skills...

Students will know that...

- 1) perpendicularity cannot be assumed.
- 2) complementary angles are two angles whose sum is 90° and supplementary angles are two angles whose sum is 180°.

- 3) building connections between key words in given information and known theorems and definitions is necessary when drawing conclusions.
- 4) if angles are complements/supplements to congruent angles, then they are congruent.
- 5) the addition, subtraction, multiplication, and division properties can be applied to segments and angles.
- 6) the transitive and substitution properties can be used when proving congruency.
- 7) vertical angles are congruent.

Students will be able to...

- a) write proofs and solve problems involving perpendicularity.
- b) apply the properties of complementary and supplementary angles to solve problems.
- c) provide conclusions and reasons using given information and prior knowledge.
- d) prove angle congruency using given information regarding congruent complements and supplements.
- e) apply the addition, subtraction, multiplication, and division properties to segments and angles.
- f) use the transitive and substitution properties to find missing measurements and as reasons within proofs.
- g) use the congruency of vertical angles when writing proofs.

Assessments

- Daily Formative Assessments Formative: Other written assessments Formative assessments, such as Do-Now assignments, homework assignments, Tickets-to-Leave, and SmartPal response board practice problems, will provide daily data for teachers.
- Pre-Assessment Diagnostic: Other written assessments Students will be assessed on their prior knowledge of perpendicularity, complementary angles, supplementary angles, and vertical angles.
- Unit Quiz Formative: Written Test Students will be assessed on their understanding of finding missing measurements and writing proofs involving perpendicularity, complementary angles, supplementary angles, and interpretting diagrams.
- Unit Test Summative: Written Test Students will be assessed on their understanding of finding missing measurements and writing proofs involving perpendicularity, complementary angles, supplementary angles, interpretting diagrams, addition property, subtraction property, multiplication property, division property, transitive property, substitution property, and vertical angles.

Activities

Communicator Practice

Students will complete differentiated practice problems on SmartPal response boards.

Cooperative Problem-Solving

Students will work cooperatively on challenge problems. This work may be presented by students, discussed

as a class, or turned in for grading and comments.

Congruent Complements and Supplements Investigation

Students will measure provided complementary and supplementary angles in order to discover that complements of congruent angles are congruent and supplements of congruent angles are congruent.

Activities to Differentiate Instruction

Interactive Smartboard Activities will be utilized.

Students will work in mixed-level groups.

Students will be assigned optional and mandatory challenge problems on homework assignments.

Enrichment worksheets will be available for classwork and/or homework.

Guided notes and study guides will be provided accordingly.

Appropriately-leveled problems for students to complete. Proofs can range from having few steps to requiring multiple steps using multiple geometric figures.

Integrated/Cross-Disciplinary Instruction

- Students will understand that writing geometry proofs is similar to writing persuasive essays. They must take given information, build supporting details, and draw a conclusion.

Resources

McDougal Littell *Geometry for Enjoyment and Challenge* textbook and resources

Smartboard

Smart Exchange

McDougal Littell *Activity Generator* CD-ROM

Protractors

Rulers

Smart Exchange

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.