Angles and Lines

UCSMP Geometry
Chapter 3

7 Days

The Geometer’s Sketchpad software used

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Objectives

- Use algebra to represent and find measures of angles.
- Determine measures of angles formed by parallel lines, perpendicular lines, and transversals.
- Determine the slopes of a line from its equation or given two points on it.
- Determine the slope of a line parallel or perpendicular to a given line.

NCTM standards: Algebra, Geometry, and Communication

NYS standards: 3A, 4A, 5G, 7A, and 7B
Resources:


Materials & Equipment:

*UCSMP Geometry* with lesson masters.

Computer Lab with *The Geometer’s Sketchpad* software

Overhead
Overview

Day 1  Review of definitions and terms used in describing basic types of angles by using a graphic organizer. Terms covered are acute, right, obtuse, straight, adjacent, vertical, linear, complementary, and supplementary.

Day 2  Use The Geometer’s Sketchpad to investigate the properties of angles formed by two intersecting lines.

Day 3  Explore Properties of the angles formed by two parallel lines cut by a transversal using The Geometer’s Sketchpad.

Day 4  Review how to calculate the slope of a line given two points and also when given its equation (standard and slope-intercept form).

Day 5  Use The Geometer’s Sketchpad to discover how the slopes of parallel and perpendicular lines are related.

Day 6  Review topics covered by playing Tic, Tac, Toe.

Day 7  Give assessment.
Day 1

Essential Question:
What is an angle and what are some properties of angles?

Lesson:
- Define an angle and review various ways to name an angle using symbols and one letter, three letters or numbers.
- Use the graphic organizer to review and define types of angles beginning with acute, right, obtuse and straight. Extend to linear, complementary, supplementary, and vertical, filling in appropriate properties. Introduce the term adjacent when talking about linear angles. Omit corresponding angles. (This part of the organizer will be completed on day 4.)
- Hand out assignment and work with students on #13-16. Review how to use algebra to solve for the missing values. Then allow students to work in collaborative pairs to complete #1-12, checking at every even number to see if they agree.
- Have students complete “ticket out the door”.

Ticket out the door:
Name a property that is the same for linear angles and supplementary angles.

Assignment: Lesson Master 3-3B: #1-16
Day 2

**Essential Question:**
What are the properties of the angles formed by two intersecting lines?

**Lesson:**
- In the computer lab, introduce the class to what they are going to be doing.
- Allow students to work in pairs at each computer.
- Using p.15 from *Exploring Geometry with The Geometer’s Sketchpad*, guide the students through the instructions.
- Since this will probably be their first experience using the program, you will need to introduce the tools and help students select the correct tools to do the constructions.
- Students should take turns at the computer and recording answers for Questions 1-3.
- Work slowly and watch to see who needs help by circulating around the room.
- This lesson is supposed to take about 15-30 minutes and is for the beginner.
- Have students complete “the ticket out the door”.

**Ticket out the door:**
Write an equation that could be used to find \( x \) in each figure.

1. \((7x-15)^\circ \quad (3x+5)^\circ\)

2. \((4x + 20)^\circ \quad (6x -10)^\circ\)

**Assignment:**
Have students complete p. 141: 2-12 in text, *UCSMP Geometry*, for homework.
Day 3

**Essential question:**
What are the properties and names of the angles formed by parallel lines cut by a transversal?

**Lesson:**
- In the computer lab, allow students to work in pairs at each computer.
- This lesson is again for the beginner and will take approximately 25-35 minutes to complete.
- Before beginning, review the words interior, exterior, alternate, and corresponding.
- Using p. 17 from *Exploring Geometry with The Geometer’s Sketchpad*, again guide students through the directions.
- Students should take turns, one at the computer and the other reading directions and recording results for questions 1 & 2.
- Work your way around the room to assist students who are having difficulty.
- Have students complete the “ticket out the door”.

**Ticket out the door:**
In the figure below, $m \parallel n$. Label the measures of the other 7 angles.

![Diagram of parallel lines with angles labeled](image)

**Assignment:**
Lesson Master 3-6 p.1
Essential Question:
How do you calculate the slope of a line given two points on the line or its equation?

Lesson:
- Begin by completing the graphic organizer from Day 1, filling in the properties of corresponding angles.
- Review the idea of slope and how to identify the slope in an equation that is in the slope-intercept form.
- Give examples of changing equations in standard form to the slope-intercept form so that the slopes can be found.
- Then, working in collaborative pairs, allow students to find the slope of another equation that is in standard form.
- Choose a pair to demonstrate and explain the procedure at the board.
- Next, give the slope formula and show how it can be used to find the slope of a line when two points on the line are given.
- Again, working in pairs, allow students to find the slope of a different line given two points on the line.
- Choose a different pair to demonstrate the solution at the board.
- Continuing to work in pairs and checking at every even number to see if they agree, allow students to work on the assignment.
- Have students complete the “ticket out the door”.

Ticket out the door:
What is the slope of a line with the equation $3x + 5y = 10$?

Assignment:
Slope worksheet
Day 5

Essential Question:
How are the slopes of parallel and perpendicular lines related?

Lesson:
• In the computer lab, introduce the class to the topic they will be investigating.
• Students will again be working in pairs at each computer.
• Using p.22 from The Geometer’s Sketchpad, students will take turns using the computer and reading and recording discoveries as they did in previous lessons.
• Guide students through the directions.
• Move around the room to assist any pairs that might have questions.
• This lesson should take approximately 25-35 minutes.
• Have students complete the “ticket out the door”.

Ticket out the door:
Two lines have the following equations, $y = 3x + 5$ and $12x – 4y = 8$. Determine if the lines are parallel, perpendicular, or neither. Justify your answer.

Assignment:
Worksheet from lesson masters 3-6 and 3-7
Day 6

Essential Question:
How can you review for a test and have fun at the same time?

Lesson:
- Prepare class for Tic, Tac, Toe.
- Divide the class into two teams.
- Choose a captain for each team who will be speaking for the team.
- If desired, each team may quickly choose a team name.
- Flip a coin to see which team will start.
- Captain chooses a square (teammates may help decide, but only the captain may speak). (Numbers of squares are read 1,1 or 1,2 or 1,3 as in 1\textsuperscript{st} row, 1\textsuperscript{st} column or 1\textsuperscript{st} row, 2\textsuperscript{nd} column, or 1\textsuperscript{st} row, 3\textsuperscript{rd} column, etc.)
- The square is uncovered to reveal a question that the team must answer.
- The problem or question may be worked out as a team. Answers may be compared and shared until an answer is agreed upon. (You may need to agree on a time limit if the team spends too much time. I don’t usually have a problem with this. Some problems just naturally take longer than others.)
- The answer is to be given only by the captain. (If an answer is spoken by another teammate, the team loses the turn.)
- If the answer is correct, the team wins the square and it becomes the other team’s turn.
- If the answer is incorrect, it still becomes the other team’s turn.
- The other team may choose to answer the question missed, if they want the square, or they may choose a different square altogether.
- Continue in his manner until one team wins or it is a cat’s game.
- There are four games included. Make them into transparencies to use on the overhead. Cover all nine squares until chosen. Use markers of your choice.
- You could give a treat to the winning team if you choose to.
- You can have more than 4 games ready to play if you think your students will finish quickly.

Ticket out the door:
Name one important thing you learned today.
Day 7

Administer assessment on angles and lines.