Project: Curriculum Unit Applying Focused Note-taking Steps

<table>
<thead>
<tr>
<th>Understanding by Design (UbD) Unit Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title:</strong> Day 1 Introductions</td>
</tr>
<tr>
<td><strong>Topic:</strong> Introductions &amp; Procedures</td>
</tr>
</tbody>
</table>

**Stage 1 – Desired Results**

<table>
<thead>
<tr>
<th>Established Goals:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Understandings:</strong> Students will learn the reasoning behind using the Focused Note-taking steps</td>
</tr>
<tr>
<td><strong>Essential Question/Big Idea:</strong> How will the steps of Focused Note-taking help me better understand mathematics content?</td>
</tr>
<tr>
<td><strong>Students will know...</strong> Students will know...</td>
</tr>
<tr>
<td><strong>How to do the processing and analyzing steps of Focused Note-taking</strong></td>
</tr>
<tr>
<td><strong>Students will be able to...</strong> Students will be able to...</td>
</tr>
<tr>
<td><strong>Name the five steps of Focused Note-taking</strong></td>
</tr>
</tbody>
</table>

**Stage 2 – Assessment Evidence**

<table>
<thead>
<tr>
<th>Performance Task:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will complete an activity in which they will utilize the steps of Focused Note-taking while learning about their teacher</td>
</tr>
<tr>
<td>Students will use the processing/analyzing steps of Focused Note-taking to review their course syllabus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment Evidence:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher observation</td>
</tr>
</tbody>
</table>

**Stage 3 – Learning Plan**

<table>
<thead>
<tr>
<th>Learning Activities:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who Is Mrs. Koerner? Activity (15 minutes):</strong> Students will go through the steps of the activity to learn about their teacher. After reviewing the directions, students will be given 6-8 minutes to walk around the classroom and record things they think are true about their teacher (take notes). Once they have enough down, they will return to their seat to go through what they recorded, reorganize and highlight the key information (process notes). They will then check with their neighbor to share what they have and record any additional information (connecting with the notes). Next, they will take all the information they have gathered to write a summary about who they think their teacher is (summarize notes). Finally, they will share their summary with another person (apply notes).</td>
</tr>
<tr>
<td><strong>Focused Note-taking Discussion (10 minutes):</strong> Students will be asked if they would like to share their summary about the teacher with the class. After a couple have shared – a discussion will be lead about the steps they took to get to know their teacher. This should lead into the five steps of Focused Note-taking</td>
</tr>
<tr>
<td>1. Take Notes</td>
</tr>
<tr>
<td>2. Process Notes</td>
</tr>
<tr>
<td>3. Make Connections with Notes</td>
</tr>
<tr>
<td>4. Summarize Notes</td>
</tr>
<tr>
<td>5. Apply Notes</td>
</tr>
</tbody>
</table>

After sharing the five steps, reference where each one occurred during the activity.
Rate of Forgetting Mini-Lesson (5 minutes): Share with students that these steps are not typically done all in one day, but over several days. Provide a visual by showing the forgetting curve. The curve will be a guide for the time frame of these steps, while adjusting for weekends, days off, and the length of each unit. Explain to students that by using the steps in the timeline suggested by the curve, the goal is for them to retain more of the content they are taught in this class.

Syllabus Mini-Lesson (15 minutes): Hand out the class syllabus to students. Students will use the syllabus to practice the processing and making connections steps of Focused Note-taking. Note that the taking notes step is already done. After going through the syllabus with students, give 5 minutes to go through and highlight important information - remind them to highlight things they need to remember for themselves (note that not everyone will have the same thing highlighted). Next, give students another 2-3 minutes to go back through and find one area in which to write a question. The first day is usually a lot of information for students and most of them usually have a question, but may not be comfortable enough yet to ask it, so have them write it down on the syllabus. They should then share their question with a neighbor, if that person can answer for them, great, if not that is OK too.

Resources:
Who is Mrs. Koerner Activity adapted from First Day of School Investigate the Teacher Activity by Miss G, retrieved from https://www.teacherspayteachers.com/Product/First-Day-of-School-Investigate-the-Teacher-Activity-3297979
Rate of Forgetting Curve adapted from C. Brown (2015)
Geometry Syllabus
<table>
<thead>
<tr>
<th>Understanding by Design (UbD) Unit Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title:</strong> Unit 1 Lesson 1 Day 1</td>
</tr>
<tr>
<td><strong>Topic:</strong> Points, Line, and Planes</td>
</tr>
</tbody>
</table>

### Stage 1 – Desired Results

#### Established Goals:

**Understandings:**
- Students will learn what a point, line, and plane are – as well as the difference between collinear and coplanar points
- Students will know...
  - How to identify and name a point, a line, and a plane
  - How to identify and name collinear and coplanar points

**Essential Question/Big Idea:**
- How can you compare points, lines, and planes to one another?
- Students will be able to...
  - Name points, lines, and planes

### Stage 2 – Assessment Evidence

#### Performance Task:
- Students will take notes
- Students will solve problems in their notes to practice the examples they just learned
- Students will discuss the mathematics content they were taught in the lesson with a peer

**Assessment Evidence:**
- Teacher observation
- Monitoring Progress questions in note packet – checked for accuracy by the student themselves, a peer, or teacher
- Two homework quizzes
- Mid-chapter quiz after lesson 1.3
- End of unit summative assessment after lesson 1.6

### Stage 3 – Learning Plan

#### Learning Activities:

**Quickwrite (2 minutes):** Give students two minutes to answer the quickwrite question in their note packet: *Write and/or draw what you think a point, a line, and a plane are.*

**Foldable Part 1 (15 minutes):** Students will create a foldable to organize their notes surrounding Points, Planes, Collinear Points, Coplanar Points, Line, Segments, Rays, and Opposite Rays.
A. Cut out foldable and fold so the main idea words (point, plane, etc.) are in the front and when unfolded - definitions and diagrams will be inside

B. Cut foldable in half so Point, Plane, Collinear, and Coplanar are one half that will be glued/taped into the first page of the 1.1 notes. Then Line, Ray, Segment, and Opposite Rays can be glued/taped into the second page.

C. Complete the inside portion for Point, Plane, Collinear, Coplanar, and Line
   a. Point: define as a single location in space, draw a point with label A, name with 1 capital letter
   b. Plane: define as a flat surface, draw a rectangle/parallelogram with several points and one letter without a point, name with 1 capital letter that is not a point or three points
   c. Collinear: two or more points on the same line, draw a plane with several points and a line with points, then name collinear points for an example (note that points should be separated with commas)
   d. Coplanar: two or more points on the same plane, draw a plane with several points and a line going through the plane with points, then name coplanar points for an example (note that points should be separated with commas)
   e. Line (this will be in the second day’s portion of notes, but complete for day 1): define as continuous in both directions, draw a plane with a line that can be names with two points or a single lowercase letter (note that if using points – it needs to show that it is a line with the line above the letters)

Lesson (15 minutes): Go over Example 1, 3, & 4 from SMART Notebook lesson 1.1 with students. While going through students should be recording notes in their Chapter 1 note packets.

D. To start students should record the Essential Question in their notes, *how can you compare points, lines, and planes to one another?*

E. Go over Example 1, ask students to reference their foldable as they offer answers for the question, help guide students to the correct answers, offering helpful tips along the way
   a. After going over Example 1, give students a couple minutes of processing time to answers questions 1-4 on the left side portion of their notes. Once it appears as though most students have completed the questions ask them to share their answers with a neighbor

F. Return to taking notes by completing the definition portion for *intersection*, then work through Examples 3 & 4 with students. This will likely be more modeling then asking for student input, as they do not have a reference for this piece.
   a. Once Examples 3 & 4 are completed in the notes, give students another couple minutes of processing time to answer questions 5-7 on the left side portion of their notes. Again, when finished have them compare with a neighbor.
**Processing the notes (10 minutes):** Here students will be taught how to go back through the notes they just took and process them. Model first by going back through the SMART Notebook slides and noting areas that would be good to highlight for study reminders. Share with students why certain parts are being highlighted and have them highlight the same parts (if students do not have a highlighter they can underline, circle, or star). Then go back through again adding reminders in certain areas (for example – a plane needs to be named with three points). Again, model this for students and have them write down the same reminders. Finally, give students a couple minutes to look back through one more time and highlight or add anything else they think would be helpful to them.

**Resources:**
- SMART Notebook presentation adapted from Big Ideas Math Curriculum
- Chapter 1 note-packet adapted from Big Ideas Math Curriculum
- Points, Lines, and Planes foldable
Understanding by Design (UbD) Unit Plan

Title: Unit 1 Lesson 1 Day 1
Subject: Geometry
Topic: Points, Line, and Planes
Grade: High School

Stage 1 – Desired Results

Established Goals:

Understandings:
Students will learn what segment, ray, and opposite rays are – as well as the difference between a line, segment, and ray

Essential Question/Big Idea:
How can you compare points, lines, and planes to one another?

Students will know...
How to identify and name a segment and a ray
How to identify and name opposite rays

Students will be able to...
Name lines, segments, rays, and opposite rays

Stage 2 – Assessment Evidence

Performance Task:
Students will take notes
Students will solve problems in their notes to practice the examples they just learned
Students will discuss the mathematics content they were taught in the lesson with a peer
Students will offer assistance to the teacher in the processing step of their notes

Assessment Evidence:
Teacher observation
Monitoring Progress questions in note packet – checked for accuracy by the student themselves, a peer, or teacher
Homework Quiz #1 – next day (one additional later in unit)
Mid-chapter quiz after lesson 1.3
End of unit summative assessment after lesson 1.6

Stage 3 – Learning Plan

Learning Activities:

Homework Review (5 minutes): Give students five minutes to go over the previous day’s homework with a classmate. Then check in to see if there are any questions that should be reviewed as a whole class.

Foldable Part 2 (10 minutes): Students will finish the foldable created the previous day – it should already be cut out and pasted into the second part of the 1.1 notes.

A. Complete the inside portion of the foldable for Segment, Ray, and Opposite Rays
   a. Segment: define as has two endpoints, draw a plane with several points, a line, and a segment, name several segments with two points – including a segment portion of the drawn line (be sure to add the segment above the points when naming)
   b. Ray: define as continues on one end and starts with an endpoint, draw a plane with several points, a line, and ray, name with two points – including a ray portion of the drawn line (be sure to add the ray above the points when naming)
   c. Opposite Rays: define as two rays that start at the same endpoint, but then continue in opposite directions, draw a plane with several points, a line, and a ray, name the opposite rays as two parts of the drawn line
Lesson (15 minutes): Go over Example 2 & 5 from SMART Notebook lesson 1.1 with students. While going through students should be recording notes in their Chapter 1 note packets.

B. Go over Example 2, ask students to reference their foldable as they offer answers for the question, help guide students to the correct answers, offering helpful tips along the way
   a. After going over Example 2, give students a couple minutes of processing time to answers questions 8-10 on the left side portion of their notes. Once it appears as though most students have completed the questions ask them to share their answers with a neighbor

C. Return to taking notes and work through Example 5 with students. Once Example 5 is completed in the notes, give students another couple minutes of processing time to answer questions 11-15 on the left side portion of their notes. Again, when finished have them compare with a neighbor.

Processing the notes (5 minutes): Students should process the new information added to their notes. Remind them of the processing they did with the teacher the previous day. This time when going back through the notes ask students offer ideas of what they think is important to highlight, underline, or circle, then go through the process with them. It should take less time because there is not as much information and less modeling needs to be done.

Connecting with the notes (10 minutes): Now that it has been 24 hours since the students have taken the notes from Day 1, they should go back to review and make connections. Model for students going back through the notes from the previous day and adding in questions or reminders. Explain that the questions can be ones they do not know the answers to OR they may already know the answers, but it may be an area of struggle. The point is for them to review the information and give guidance for themselves when they come back again to study. For example, they could add a question about how to name a plane. Once a few ideas have been provided have students write a question or two in their notes from day one – they may use an idea that has already been said. Then have them practice on their own by adding a question or two for today’s notes.

Resources:
SMART Notebook presentation adapted from Big Ideas Math Curriculum
Chapter 1 note-packet adapted from Big Ideas Math Curriculum
Points, Lines, and Planes foldable
Understanding by Design (UbD) Unit Plan

<table>
<thead>
<tr>
<th>Title: Unit 1 Lesson 2</th>
<th>Subject: Geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic: Measuring and Constructing Segments</td>
<td>Grade: High School</td>
</tr>
</tbody>
</table>

### Stage 1 – Desired Results

**Established Goals:**
MN Benchmark 9.3.4.4 – Use coordinate geometry to represent and analyze line segments and polygons including determine lengths, midpoints and slopes of line segments.

**Understandings:**
- Students will learn the difference between congruent and equal
- Students will learn Segment Addition Postulate

**Essential Question/Big Idea:**
How can you measure and break-apart a line segment?

**Students will know...**
- How to determine if two segments are congruent
- How to use the Segment Addition Postulate

**Students will be able to...**
- Use Segment Addition Postulate to find missing segment lengths

### Stage 2 – Assessment Evidence

**Performance Task:**
- Students will take notes
- Students will solve problems in their notes to practice the examples they just learned
- Students will discuss the mathematics content they were taught in the lesson with a peer
- Students will offer assistance to the teacher in the processing step of their notes

**Assessment Evidence:**
- Teacher observation
- Monitoring Progress questions in note packet – checked for accuracy by the student themselves, a peer, or teacher
- Mid-chapter quiz after lesson 1.3
- End of unit summative assessment after lesson 1.6

### Stage 3 – Learning Plan

**Learning Activities:**

**Homework Review (5 minutes):** Give students five minutes to go over the previous day’s homework with a classmate. Then check in to see if there are any questions that should be reviewed as a whole class.

**Homework Quiz (10 minutes):** This is an online formative assessment that is a quick check for student understanding on naming – points, lines, planes, segments, and rays. Students may use their completed homework and notes.

1. **A.** As students finish their homework quiz, have them complete the quickwrite on the left hand side of their 1.2 notes. They will answer the question, what are some common distances that you know?

**Lesson (20 minutes):** Go over Examples 2 & 3 from SMART Notebook lesson 1.2 with students. While going through students should be recording notes in their Chapter 1 note packets.

2. **D.** To start, students should record the Essential Question in their notes, how can you measure and break-apart a line segment?
E. Before going over Example 2, help students complete the notes on congruent segments in their notes packets. Then go over Example 2 as a class, help guide students to the correct answers, offering helpful tips along the way
   a. After going over Example 2, give students a couple minutes of processing time to answers question 1 on the left side portion of their notes. Once it appears as though most students have completed the question ask them to share their answers with a neighbor
F. Return to taking notes and work through Example 3 with students.
   a. Once Example 3 is completed in the notes, give students another couple minutes of processing time to answer questions 2-5 on the left side portion of their notes. Again, when finished have them compare with a neighbor.

**Processing the notes (5 minutes):** Students should now process their 1.2 notes. Remind them of the processing they did with the teacher the previous two days. Again, when going back through the notes ask students to offer ideas of what they think is important to highlight, underline, or circle, then go through the process with them. Try to do even less modeling than the previous two days, get input from students while going through the process – then allow them some time to add any additional highlighting/notes.

**Resources:**
SMART Notebook presentation adapted from Big Ideas Math Curriculum
Chapter 1 note-packet adapted from Big Ideas Math Curriculum
Online Schoology Assessment
## Understanding by Design (UbD) Unit Plan

<table>
<thead>
<tr>
<th>Title: Unit 1 Lesson 3</th>
<th>Subject: Geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic: Using Midpoint and Distance Formulas</td>
<td>Grade: High School</td>
</tr>
</tbody>
</table>

### Stage 1 – Desired Results

**Established Goals:**
- MN Benchmark 9.3.4.4 – Use coordinate geometry to represent and analyze line segments and polygons including determine lengths, midpoints and slopes of line segments.
- MN Benchmark 9.3.4.7 – Use algebra to solve geometric problems unrelated to coordinate geometry, such as solving for an unknown length in a figure involving similar triangles, or using the Pythagorean Theorem to obtain a quadratic equation for a length in a geometric figure.

**Understandings:**
- Students will understand what the midpoint of a segment is and how to find it.
- Students will understand the distance formula and when to use it.

**Essential Question/Big Idea:**
- How can you find the midpoint and length of a line segment in a coordinate plane?

**Students will know:**
- The midpoint formula
- The distance formula
- How to find an endpoint, given the midpoint

**Students will be able to:**
- Use the midpoint and distance formulas
- Find an endpoint, given the midpoint and another endpoint

### Stage 2 – Assessment Evidence

**Performance Task:**
- Students will take notes
- Students will solve problems in their notes to practice the examples they just learned
- Students will discuss the mathematics content they were taught in the lesson with a peer
- Students will process their notes
- Students will review notes to make connections by adding questions and discussing with a peer

**Assessment Evidence:**
- Teacher observation
- Monitoring Progress questions in note packet – checked for accuracy by the student themselves, a peer, or teacher
- Mid-chapter quiz after lesson 1.3
- End of unit summative assessment after lesson 1.6

### Stage 3 – Learning Plan

**Learning Activities:**

**Connecting with the notes (10 minutes):** Students should take a few minutes at the beginning of the hour to go back and analyze their 1.2 notes. Remind students that this is the point in which they should add a question or two to their notes (they can already know the answer to the question, the point is to review). Give students a couple of ideas for their questions. Once each student has a question have them ask it to their neighbor and see if they can answer each other’s questions.

A. As students finish analyzing their notes have them complete the review questions on the left hand side of their 1.3 notes – then have them check their answers with a partner.
Lesson (30 minutes): Go over Examples 1-4 from SMART Notebook lesson 1.3 with students. While going through students should be recording notes in their Chapter 1 note packets.

B. To start, students should record the Essential Question in their notes, **how can you find the midpoint and length of a line segment in a coordinate plane?**

C. Before going over Example 1, help students complete their notes on midpoint and segment bisector. Then go over Examples 1 & 2 as a class, help guide students to the correct answers, offering helpful tips along the way
   a. After going over Examples 1 & 2, give students a couple minutes of processing time to answers question 1 on the left side portion of their notes. Once it appears as though most students have completed the questions ask them to share their answers with a neighbor

D. Return to taking notes by first providing students with the Midpoint Formula, then work through Example 3 with students.
   a. Once Example 3 is completed in the notes, give students another couple minutes of processing time to answer questions 2-5 on the left side portion of their notes. Instead of doing all four problems, have students choose either 2 or 3 and either 4 or 5.
      i. After each student appears to be done, have students who completed #2 on one side of the room and those who completed 3 on the other side. Students should compare their answer with someone on their side of the classroom.
      ii. Repeat above process for problems 4 & 5

E. As discussion wrap up, return to the notes by first providing students with the Distance Formula, then go over Example 4 with students.
   a. Once Example 4 is completed in the notes, give students another couple of minutes of processing time to answer question 6 on the left side portion of their notes. Once it appears as though most students have completed the questions ask them to share their answers with a neighbor

Processing the notes (5 minutes): Students should now process their 1.2 notes. Remind them of the processing they did with the teacher the previous few days, but now have them try it on their own or with a neighbor. As students work, walk around and ensure they understand the process and are going back through their notes. Through observation check for students highlighting/underlining pieces of their notes - if it appears a student needs help, guide them with the questions: **why are you highlighting that piece of information? or what do you think will be important to remember for a quiz or test?**

Resources:
SMART Notebook presentation adapted from Big Ideas Math Curriculum
Chapter 1 note-packet adapted from Big Ideas Math Curriculum
### Understanding by Design (UbD) Unit Plan

| Title: Unit 1 Mid-Chapter Review & Quiz | Subject: Geometry |
| Topic: Mid-Chapter Review & Quiz       | Grade: High School |

**Stage 1 – Desired Results**

**Established Goals:**
- **MN Benchmark 9.3.4.4** – Use coordinate geometry to represent and analyze line segments and polygons including determine lengths, midpoints and slopes of line segments.
- **MN Benchmark 9.3.4.7** – Use algebra to solve geometric problems unrelated to coordinate geometry, such as solving for an unknown length in a figure involving similar triangles, or using the Pythagorean Theorem to obtain a quadratic equation for a length in a geometric figure.

**Understandings:**

<table>
<thead>
<tr>
<th>Students will know...</th>
<th>Students will be able to...</th>
</tr>
</thead>
</table>

**Stage 2 – Assessment Evidence**

**Performance Task:**
- Students will offer assistance to the teacher in the summarizing step of their notes
- Students will review notes to make connections by adding questions and discussing with a peer
- Students will work with their peers to review the content from the chapter

**Assessment Evidence:**
- Mid-chapter quiz (sections 1.1-1.3)

**Stage 3 – Learning Plan**

**Learning Activities:**

**Connecting with the notes (5 minutes):** Students should take a few minutes at the beginning of the hour to go back and analyze their 1.3 notes. Remind students that this is the point in which they should add a question or two to their notes (they can already know the answer to the question, the point is to review). Give students a couple of ideas for their questions. Once each student has a question have them ask it to their neighbor and see if they can answer each other’s questions.

**Summarizing the notes (10 minutes):** After students have finished analyzing their 1.3 notes, have them go back to their 1.1 notes. As a class add a summary – the summary should answer the essential question and any questions they may have added when they went back through to analyze their notes. Model for students first rereading the essential question and any other questions that were added, then reviewing the notes to answer those questions. Combine the answers together in a summary – have students add the summary to their notes.

**Review (15 minutes):** Hand out review sheet to students, then have them work in pairs or groups to go through and review the material. Students should have their notes with them as they are reviewing. While they are reviewing, walk around and offer assistance where needed.

**Quiz (20 minutes):** With the remaining time in class, pass back the 1.1-1.3 quiz to students. They should work on this individually without their notes. This is to assess what they have retained thus far.

**Resources:**
- Chapter 1 quiz adapted from Big Ideas Math Curriculum
- 1.1-1.3 review sheet adapted from Big Ideas Math Curriculum
# Understanding by Design (UbD) Unit Plan

<table>
<thead>
<tr>
<th>Title: Unit 1 Lesson 4</th>
<th>Subject: Geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic: Perimeter and Area in the Coordinate Plane</td>
<td>Grade: High School</td>
</tr>
</tbody>
</table>

## Stage 1 – Desired Results

### Established Goals:
- **MN Benchmark 9.3.1.5** – Make reasonable estimate and judgement about the accuracy of values results from calculators involving measurements.
- **MN Benchmark 9.3.4.4** – Use coordinate geometry to represent and analyze line segments and polygons including determine lengths, midpoints and slopes of line segments.

### Understandings:
- Students will understand when distance formula is needed to find perimeter or area in the coordinate plane.
- Students will understand the difference between convex and concave.

### Essential Question/Big Idea:
- How can you find the perimeter and area of a polygon in the coordinate plane?

### Performance Task:
- Students will take notes.
- Students will solve problems in their notes to practice the examples they just learned.
- Students will discuss the mathematics content they were taught in the lesson with a peer.
- Students will offer assistance to the teacher in summarizing their notes.
- Students will process their notes.

### Assessment Evidence:
- Teacher observation.
- Monitoring Progress questions in note packet – checked for accuracy by the student themselves, a peer, or teacher.
- End of unit summative assessment after lesson 1.6.
- Homework quiz the day after next (during lesson 1.6 day 1).

## Stage 2 – Assessment Evidence

## Stage 3 – Learning Plan

### Learning Activities:

**Summarizing the notes (10 minutes):** During this time students should summarize their 1.2 notes. Remind them of the summary done as a class for the 1.1 notes and to use the questions provided as a guide when writing their summary. Have students do this individually, walking around and offering assistance as needed.

- **A.** Tell students to complete the quickwrite question, *what is a polygon?*, on the left hand side of their 1.4 notes when they have finished the summary for 1.2.
**Lesson (30 minutes):** Go over Examples 1-4 from SMART Notebook lesson 1.4 with students. While going through students should be recording notes in their Chapter 1 note packets.

B. To start, students should record the Essential Question in their notes, *how can you find the perimeter and area of a polygon in the coordinate plane?*

C. Before going over Example 1, show students several different polygons and have them sort them into two groups. Discuss with students why they should the groups they did, guiding them to the groups of Convex & Concave. Review these terms with students, then go over Examples 1 as a class, help guide students to the correct answers, offering helpful tips along the way
   a. Students may notice while going through Example 1 that they need a reminder of the names of different polygons, so assist them in filling out the Types of Polygons table in their notes
   b. After going over Example 1, give students a couple minutes of processing time to answer questions 1 & 2 on the left side portion of their notes. Once it appears as though most students have completed the questions ask them to share their answers with a neighbor

D. Return to taking notes and work through Example 2 with students.
   a. Once Example 2 is completed in the notes, give students another couple minutes of processing time to answer questions 2 & 3 on the left side portion of their notes. Again, when finished have them compare with a neighbor.

E. Return to taking notes and work through Example 3 with students.
   a. Once Example 3 is completed in the notes, give students another couple minutes of processing time to answer questions 5 & 6 on the left side portion of their notes. Again, when finished have them compare with a neighbor.

F. Return to taking notes and work through Example 4 with students.
   a. Once Example 4 is completed in the notes, give students another couple minutes of processing time to answer question 7 on the left side portion of their notes. Again, when finished have them compare with a neighbor.

**Processing the notes (5 minutes):** Students should now process their 1.4 notes. Now that students have done this a few times, hopefully they understand the process, but as students work walk around and ensure they understand the process and are going back through their notes.

**Resources:**
- SMART Notebook presentation adapted from Big Ideas Math Curriculum
- Chapter 1 note-packet adapted from Big Ideas Math Curriculum
## Understanding by Design (UbD) Unit Plan

<table>
<thead>
<tr>
<th>Title: Unit 1 Lesson 5</th>
<th>Subject: Geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic: Measuring and Classifying Angles</td>
<td>Grade: High School</td>
</tr>
</tbody>
</table>

### Stage 1 – Desired Results

#### Established Goals:
- **MN Benchmark 9.3.1.5** – Make reasonable estimate and judgement about the accuracy of values results from calculators involving measurements.
- **MN Benchmark 9.3.4.7** – Use algebra to solve geometric problems unrelated to coordinate geometry, such as solving for an unknown length in a figure involving similar triangles, or using the Pythagorean Theorem to obtain a quadratic equation for a length in a geometric figure.

#### Understandings:
- Students will understand the different ways to name an angle
- Students will understand whether a measure is reasonable for an angle or not
- Students will understand what an angle bisector does

#### Essential Question/Big Idea:
How can you measure and classify an angle?

### Stage 2 – Assessment Evidence

#### Performance Task:
- Students will take notes
- Students will solve problems in their notes to practice the examples they just learned
- Students will discuss the mathematics content they were taught in the lesson with a peer
- Students will summarize their notes
- Students will make connections with their notes and share with a peer
- Students will process their notes

#### Assessment Evidence:
- Teacher observation
- Monitoring Progress questions in note packet – checked for accuracy by the student themselves, a peer, or teacher
- End of unit summative assessment after lesson 1.6
- Homework quiz the next day (during lesson 1.6 day 1)

### Stage 3 – Learning Plan

#### Learning Activities:

**Homework Review (5 minutes):** Give students five minutes to go over the previous day’s homework with a classmate. Then check in to see if there are any questions that should be reviewed as a whole class.

**Summarizing the notes (5 minutes):** During this time students should summarize their 1.3 notes. Now students should be able to do this on their own, but walk around to offer assistance.
Connecting with the notes (5 minutes): Next, students should take a few minutes to go back and analyze their 1.4 notes. Remind students that this is the point in which they should add a question or two to their notes (they can already know the answer to the question, the point is to review). Once each student has a question have them ask it to their neighbor and see if they can answer each other’s questions.

A. Tell students to complete the quickwrite, write down everything you remember about angles, on the left hand side of their 1.5 notes when they have finished the summary for 1.3

Lesson (30 minutes): Go over Examples 1-5 from SMART Notebook lesson 1.5 with students. While going through students should be recording notes in their Chapter 1 note packets.

B. To start students should record the Essential Question in their notes, how can you measure and classify an angle?

C. Before going over Example 1, go over the parts of an angle and how to name an answer with the class. Then go over Examples 1 as a class, help guide students to the correct answers, offering helpful tips along the way

   a. After going over Example 1, give students a couple minutes of processing time to answers questions 1-3 on the left side portion of their notes. Once it appears as though most students have completed the questions ask them to share their answers with a neighbor

D. Return to taking notes by first going over Protractor Postulate and reviewing the different types of angles, then work through Example 2 with students.

   a. Once Example 2 is completed in the notes, give students another couple minutes of processing time to answer questions 4-7 on the left side portion of their notes. Again, when finished have them compare with a neighbor.

E. Return to taking notes by first helping students complete their notes on congruent angles, then work through Example 3 with students.

   a. Once Example 3 is completed in the notes, give students another couple minutes of processing time to answer question 8 on the left side portion of their notes. Again, when finished have them compare with a neighbor.

F. Return to taking notes and work through Example 5 with students.

   a. Once Example 4 is completed in the notes, give students another couple minutes of processing time to answer questions 9 & 10 on the left side portion of their notes. Again, when finished have them compare with a neighbor.

G. Finally, return to the notes by first helping students complete their notes on angle bisector, then go over Example 5 as a class.

Processing the notes (5 minutes): Students should now process their 1.5 notes. Now that students have done this a few times, hopefully they understand the process, but as students work walk around and ensure they understand the process and are going back through their notes.

Resources:
SMART Notebook presentation adapted from Big Ideas Math Curriculum
Chapter 1 note-packet adapted from Big Ideas Math Curriculum
<table>
<thead>
<tr>
<th>Understanding by Design (UbD) Unit Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title:</strong> Unit 1 Lesson 6 Day 1</td>
</tr>
<tr>
<td><strong>Topic:</strong> Describing Pairs of Angles</td>
</tr>
</tbody>
</table>

### Stage 1 – Desired Results

**Established Goals:**
- **MN Benchmark 9.3.3.2** – Know and apply properties of angles, including corresponding, exterior, interior, vertical, complementary and supplementary angles, to solve problems logically and justify results.
- **MN Benchmark 9.3.4.7** – Use algebra to solve geometric problems unrelated to coordinate geometry, such as solving for an unknown length in a figure involving similar triangles, or using the Pythagorean Theorem to obtain a quadratic equation for a length in a geometric figure.

**Understandings:**
- Students will understand the difference between supplementary and complementary

**Essential Question/Big Idea:**
- How can you describe angle pair relationships and use these descriptions to find angle measures?

**Students will know...**
- Supplementary
- Complementary
- Adjacent Angles

**Students will be able to...**
- Identify supplementary, complementary, and adjacent angles
- Find missing angles values using algebra and the concepts of supplementary and complementary

### Stage 2 – Assessment Evidence

**Performance Task:**
- Students will take notes
- Students will solve problems in their notes to practice the examples they just learned
- Students will discuss the mathematics content they were taught in the lesson with a peer
- Students will summarize their notes
- Students will make connections with their notes and share with a peer
- Students will process their notes

**Assessment Evidence:**
- Teacher observation
- Monitoring Progress questions in note packet – checked for accuracy by the student themselves, a peer, or teacher
- End of unit summative assessment after lesson 1.6
- Homework quiz

### Stage 3 – Learning Plan

**Learning Activities:**

**Homework Review (5 minutes):** Give students five minutes to go over the previous day’s homework with a classmate. Then check in to see if there are any questions that should be reviewed as a whole class.
Homework Quiz (10 minutes): This is an online formative assessment that is a quick check for student understanding on finding area and perimeter in the coordinate plane, naming a plane, and measuring an angle with a protractor.
A. As students finish their homework quiz, have them complete the review questions on the left hand side of their 1.6 notes.

Summarizing the notes (5 minutes): During this time students should summarize their 1.4 notes. Now students should be able to do this on their own, but walk around to offer assistance.

Connecting with the notes (5 minutes): Next, students should take a few minutes to go back and analyze their 1.5 notes. Remind students that this is the point in which they should add a question or two to their notes (they can already know the answer to the question, the point is to review). Once each student has a question have them ask it to their neighbor and see if they can answer each other’s questions.

Lesson (20 minutes): Go over Examples 1-3 from SMART Notebook lesson 1.6 with students. While going through students should be recording notes in their Chapter 1 note packets.
B. To start, students should record the Essential Question in their notes, how can you describe angle pair relationships and use these descriptions to find angle measures?
C. Before going over Example 1, go over complementary, supplementary, and adjacent angles. Show students a visual as well as describe the relationships in these pairs of angles. Have students record in the chart on their notes – they do not need to write down everything that is shown/told to them, but enough so they will remember these angle pairs. Then go over Examples 1 & 2 as a class, help guide students to the correct answers, offering helpful tips along the way
b. After going over Examples 1 & 2, give students a couple minutes of processing time to answers questions 1-5 on the left side portion of their notes. Once it appears as though most students have completed the questions ask them to share their answers with a neighbor
D. Return to taking notes and work through Example 3 with students.
a. Once Example 3 is completed in the notes, give students another couple minutes of processing time to answer question 6 on the left side portion of their notes. Again, when finished have them compare with a neighbor.

Processing the notes (5 minutes): Students should now process their 1.6 notes. Now that students have done this a few times, hopefully they understand the process, but as students work walk around and ensure they understand the process and are going back through their notes.

Resources:
SMART Notebook presentation adapted from Big Ideas Math Curriculum
Chapter 1 note-packet adapted from Big Ideas Math Curriculum
Understanding by Design (UbD) Unit Plan

Title: Unit 1 Lesson 6 Day 2
Topic: Describing Pairs of Angles
Subject: Geometry
Grade: High School

Stage 1 – Desired Results

Established Goals:
MN Benchmark 9.3.3.2 – Know and apply properties of angles, including corresponding, exterior, interior, vertical, complementary and supplementary angles, to solve problems logically and justify results.
MN Benchmark 9.3.4.7 – Use algebra to solve geometric problems unrelated to coordinate geometry, such as solving for an unknown length in a figure involving similar triangles, or using the Pythagorean Theorem to obtain a quadratic equation for a length in a geometric figure.

Understandings:
Students will understand the difference between supplementary and a linear pair
Essential Question/Big Idea:
How can you describe angle pair relationships and use these descriptions to find angle measures?

Students will know...
Linear Pair
Vertical Angles
Students will be able to...
Identify linear pairs and vertical angles
Find missing angle measures using the concepts of linear pairs and vertical angles

Stage 2 – Assessment Evidence

Performance Task:
Students will take notes
Students will solve problems in their notes to practice the examples they just learned
Students will discuss the mathematics content they were taught in the lesson with a peer
Students will summarize their notes
Students will make connections with their notes and share with a peer

Assessment Evidence:
Teacher observation
Monitoring Progress questions in note packet – checked for accuracy by the student themselves, a peer, or teacher
End of unit summative assessment after lesson 1.6

Stage 3 – Learning Plan

Learning Activities:

Homework Review (5 minutes): Give students five minutes to go over the previous day’s homework with a classmate. Then check in to see if there are any questions that should be reviewed as a whole class.

Summarizing the notes (5 minutes): During this time students should summarize their 1.5 notes. Now students should be able to do this on their own, but walk around to offer assistance.

Lesson (20 minutes): Go over Examples 4-5 from SMART Notebook lesson 1.6 with students. While going through students should be recording notes in their Chapter 1 note packets.
A. Before going over Example 4, go over linear pairs and vertical angles. Show students a visual as well as describe the relationships in these pairs of angles. Have students record in the chart on their notes – they do not need to write down everything that is shown/told to them, but enough so they will remember these angle pairs. Then go over Examples 1 & 2 as a class, help guide students to the correct answers, offering helpful tips along the way.
   c. After going over Example 4, give students a couple minutes of processing time to answers question 7 on the left side portion of their notes. Once it appears as though most students have completed the questions ask them to share their answers with a neighbor.

E. Return to taking notes and work through Example 5 with students.
   a. Once Example 5 is completed in the notes, give students another couple minutes of processing time to answer question 8 on the left side portion of their notes. Again, when finished have them compare with a neighbor.

F. Finally, as a review of the angle pairs. Students are going to add cover that will spin to the angle pairs wheel in their notes.
   a. Pass out the covers to students, they will have to cut out two pizza like slices opposite of each other, so only two things are visible at a time. For example, they would only see the word linear pair and visual of a linear pair when done properly. Model this process for students and assist as the work to get theirs completed.
   b. Once their wheel is done have students quiz each other on the different angle pairs using their wheel.

Processing the notes (5 minutes): Students should now process their 1.6 notes. Now that students have done this a few times, hopefully they understand the process, but as students work walk around and ensure they understand the process and are going back through their notes.

Connecting with the notes (5 minutes): Finally, students should take a few minutes to go back and analyze their 1.6 notes. Remind students that this is the point in which they should add a question or two to their notes (they can already know the answer to the question, the point is to review). Once each student has a question have them ask it to their neighbor and see if they can answer each other’s questions.

Resources:
SMART Notebook presentation adapted from Big Ideas Math Curriculum
Chapter 1 note-packet adapted from Big Ideas Math Curriculum
Angle Relationships Wheel adapted from Mrs. Newell’s Math retrieved from https://newellssecondarymath.blogspot.com/2016/07/angle-relationships-flipbook.html
Understanding by Design (UbD) Unit Plan

Title: Chapter 1 Review
Subject: Geometry
Topic: End of Unit Review
Grade: High School

Stage 1 – Desired Results

Established Goals:
MN Benchmark 9.3.1.5 – Make reasonable estimate and judgement about the accuracy of values results from calculators involving measurements.
MN Benchmark 9.3.3.2 – Know and apply properties of angles, including corresponding, exterior, interior, vertical, complementary and supplementary angles, to solve problems logically and justify results.
MN Benchmark 9.3.4.4 – Use coordinate geometry to represent and analyze line segments and polygons including determine lengths, midpoints and slopes of line segments.
MN Benchmark 9.3.4.7 – Use algebra to solve geometric problems unrelated to coordinate geometry, such as solving for an unknown length in a figure involving similar triangles, or using the Pythagorean Theorem to obtain a quadratic equation for a length in a geometric figure.

Understandings:
Essential Question/Big Idea:
Students will know...
Students will be able to...

Stage 2 – Assessment Evidence

Performance Task:
Students will summarize their notes
Students will review the unit content with a peer(s)

Assessment Evidence:
Teacher observation
End of unit summative assessment the next day

Stage 3 – Learning Plan

Learning Activities:

Homework Review (5 minutes): Give students five minutes to go over the previous day’s homework with a classmate. Then check in to see if there are any questions that should be reviewed as a whole class.

Summarizing the notes (5 minutes): During this time students should summarize their 1.6 notes. Now students should be able to do this on their own, but walk around to offer assistance.

Lesson (35 minutes): Collect the unit review sheet from students and sort into piles based on the amount completed. Use these piles to sort students into groups.

A. Students will then work together to review for the unit test in their groups.
   a. Based on the level of completion of the review sheet, some students may simply be comparing answer – while others may be starting from scratch to complete the review
   b. Students with majority of the review completed can be provided with extension problems once they have finished checking answer with their group

Resources:
End of unit review sheet adapted from Big Ideas Math Curriculum
Who is Mrs. Koerner Activity

Who is Mrs. Koerner?

Today you will be learning about your teacher. Your first task is to observe your teacher and the classroom. What do you notice, and what does it say about your teacher? Use the space below to record each piece of information. Once you think you have enough, go back through to process your notes – reorganize and highlight important aspects. Then analyze your notes and discuss with a neighbor what that may mean about your teacher (you can add something a neighbor had that you did not). You will then summarize your conclusions below. Finally, you will apply what you have learned about Mrs. Koerner by sharing who she is to another classmate. (In your search consider things like personality, likes, family/friends, teaching style, etc.)

Notes:

Summary:

Koerner, 2019 adapted from adapted from First Day of School Investigate the Teacher Activity by Miss G, retrieved from
https://www.teacherspayteachers.com/Product/First-Day-of-School-Investigate-the-Teacher-Activity-3297979
Points, Lines, and Planes Foldable

POINT             PLANE

COLLINEAR         COPLANAR

LINE              RAY

SEGMENT           OPPOSITE RAYS
<table>
<thead>
<tr>
<th>Definition</th>
<th>Name with...</th>
<th>Name with...</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example:</td>
<td></td>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td>[Diagram]</td>
<td></td>
<td></td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Definition</td>
<td>Remember to...</td>
<td>Remember to...</td>
<td>Definition</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td>[Diagram]</td>
<td></td>
<td></td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Definition</td>
<td>Name with...</td>
<td>Name with...</td>
<td>Definition</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td>[Diagram]</td>
<td></td>
<td></td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Definition</td>
<td>Remember to...</td>
<td>Name with...</td>
<td>Definition</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td>[Diagram]</td>
<td></td>
<td></td>
<td>[Diagram]</td>
</tr>
</tbody>
</table>

Koerner, 2019
Angle Relationships Wheel

Angle Relationships Wheel adapted from Mrs. Newell’s Math retrieved from

https://newellssecondarymath.blogspot.com/2016/07/angle-relationships-flipbook.html


## Chapter 1

**BASICS OF GEOMETRY**

NAME:

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quickwrite:
Write and/or draw what you think a point, a line, and a plane are.

Use the diagram to the right.

1. Give two other names for $\overline{DE}$.
2. Give two other names for Plane C.
3. Name three points that are collinear.
4. Name four points that are coplanar.

5. Sketch a plane and line that is in the plane.

6. Sketch a plane and a line that does not intersect the plane.

7. Sketch a plane and line that intersects the plane at a point.
Lesson 1.1: Points, Line, and Planes

Essential Question:

Questions

Example 1:
  a. Give two other names for \( \overline{PQ} \)
  
  b. Give two other names for Plane \( R \)
  
  c. Name three collinear points and four coplanar points.

Two or more geometric figures intersect when they have one or more points in common. The ________ of the figures is the set of points the figures have in common.

Examples 3 & 4:
  a. Sketch two lines that intersect  
  b. Sketch two planes that intersect

The intersection of two lines is a ______. The intersection of two planes is a ______.
Use the diagram.

8. Give another name for $KL$.

9. Are $KP$ and $PK$ the same ray? Explain.

10. Are $NP$ and $NM$ the same ray? Explain.

Use the diagram.

11. Name a plane

12. Name a line

13. Name a segment

14. Name a ray

15. Name the intersection of plane $A$ and plane $B$

**Summary:**

How can you compare points, lines, and planes to one another?

How can you compare lines, rays, and segments to one another?
Example 2:
   a. Give another name for \( \overline{HI} \).

   b. Name all the rays with endpoint \( J \). Which ones are opposite rays?

Example 5:
Use the diagram to the right.
   a. Name two lines.

   b. Name two rays.

   c. Name two segments.

   d. What is the intersection of line \( p \) and line \( r \)?
Quickwrite:
What are some common distances that you know?

1. Plot A(-2, 4), B(3, 4), C(0, 2), and D(0, -2) in a coordinate plane. Then determine whether \( \overrightarrow{AB} \) and \( \overrightarrow{CD} \) are congruent.

Use the diagrams at the right.

2. Use the Segment Addition Postulate to find \( XZ \).

3. In the diagram, \( WY = 30 \). Can you use the Segment Addition Postulate to find the distance between points \( W \) and \( Z \)? Explain your reasoning.

4. Find \( KL \).

5. The cities shown on the map lie approximately in a straight line. Find the distance from Albuquerque, New Mexico, to Provo, Utah.

Summary:
Lesson 1.2: Measuring and Constructing Segments

Essential Question:

Questions

Line segments that have the same length are called _________.
You can say "the length of \( AB \) is ________ \( CD \)," or you can say "\( AB \) ________ \( CD \)."

Example 2:
Plot \( J(-3, 4) \), \( K(2, 4) \), \( L(1, 3) \), and \( M(1, -2) \) in the coordinate plane below. Then determine whether \( J K \) and \( L M \) are congruent.

In geometry, a rule that is accepted without proof is called a _________.
When three points are collinear, you can say that one point is _________ the other two.

Segment Addition Postulate:

Example 3:
Use the Segment Addition Postulate.

\( a. \) Find \( DF \).

\( b. \) Find \( GH \).
Review:
   a. Name three collinear points
   b. Name two lines
c. Name two planes
d. Name three rays

1. Identify the segment bisector of \( \overline{PQ} \). Then find \( MQ \).

   Segment Bisector:
   \[ MQ = \]

2. The endpoints of \( \overline{AB} \) are \( A(1, 2) \) and \( B(7, 8) \). Find the coordinates of the midpoint \( M \).

3. The endpoints of \( \overline{CD} \) are \( C(-4, 3) \) and \( D(-6, 5) \). Find the coordinates of the midpoint \( M \).

4. The midpoint of \( \overline{TU} \) is \( M(2, 4) \). One endpoint is \( T(1, 1) \). Find the coordinates of endpoint \( U \).

5. The midpoint of \( \overline{WV} \) is \( V(-1, -2) \). One endpoint is \( W(4, 4) \). Find the coordinates of endpoint \( V \).
Lesson 1.3: Using Midpoint & Distance Formulas

Essential Question:

Questions

The ______ of a segment is the point that divides the segment into two congruent segments.

A ______ is a point, ray, line, line segment, or plane that intersects the segments at its midpoint. A midpoint or a segment bisector ______ a segment.

Example 1:
In the skateboard design, \( VW \) bisects \( XY \) at point \( T \), and \( XT = 39.9 \) cm. Find \( XY \).

Example 2:
Point \( M \) is the midpoint of \( VW \). Find the length of \( VM \).

Midpoint Formula:

Example 3
a. The endpoints of \( RS \) are \( R(1, -3) \) and \( S(4, 2) \). Find the coordinates of the midpoint \( M \).

b. The midpoint of \( JK \) is \( M(2, 1) \). One endpoint is \( J(1, 4) \). Find the coordinates of endpoint \( K \).

8
6. Given $A(-3, 5)$ and $B(4, -1)$, find the coordinates of the midpoint of $AB$ AND the length of segment $AB$.

**Summary:**
How do you know when to use the Midpoint Formula versus finding a missing endpoint of a segment?

How will you remember the Midpoint and Distance formulas?
<table>
<thead>
<tr>
<th>Questions</th>
<th>Distance Formula:</th>
</tr>
</thead>
</table>

**Example 4:**
Your school is 4 miles east and 1 mile south of your apartment. A recycling center, where your class is going on a field trip, is 2 miles east and 3 miles north of your apartment. Estimate the distance between the recycling center and your school.
Quickwrite:
What is a polygon?

Classify the polygon by the number of sides. Tell whether it is convex or concave.
1. 
2. 

Find the perimeter of the polygon with the given vertices.
3. D(-3, 2), E(4, 2), F(4, -3)
4. K(-1, 1), L(4, 1), M(2, -2), N(-3, -2)
Lesson 1.4: Perimeter and Area in the Coordinate Plane

Essential Question:

<table>
<thead>
<tr>
<th>Questions</th>
<th>Group 1:</th>
<th>Group 2:</th>
</tr>
</thead>
</table>

Example 1:
Classify each polygon by the number of sides. Tell whether it is convex or concave.

<table>
<thead>
<tr>
<th>Sides</th>
<th>Type of Polygon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example 2:
Find the perimeter of ΔABC with vertices A(-2, 3), B(3, -3), and C(-2, -3).

FORMULAS
Find the area of the polygon with the given vertices.
5. G(2, 2), H(3, -1), J(-2, -1)
6. F(-2, 3), G(1, 3), H(1, -1), J(-2, -1)

7. Without performing any calculations, determine whether the triangle or the rectangle has a greater area. Which one has a greater perimeter? Explain your reasoning.

Summary:
What are some of the strategies you used to find area and perimeter of shapes in the coordinate plane? Where have you used these strategies before?
Example 3:
Find the area of ΔDEF with vertices D(1, 3), E(4, -3), and F(-4, -3).

Example 4:
You are building a shed in your backyard. The diagram shows the four vertices of the shed. Each unit in the coordinate plane represents 1 foot. Find the area of the floor of the shed.
Quickwrite:
Write down everything you remember about angles.

Write three names for each of the angles below.

1. 

2. 

3. 

4. How will you know you have the right measurement when using a protractor?

Use the diagram in Example 2 to find the angle measure. Then classify the angle.

5. \( \angle GHK \) 

6. \( \angle MHK \) 

7. \( \angle MHK \)
Lesson 1.5: Measuring and Classifying Angles

Essential Question:

An __________ is a set of points consisting of two different rays that have the same endpoint, called the __________. The rays are the __________ of the angle.

Different ways to name an angle are:

Example 1:
A lighthouse keeper measures the angles formed by the lighthouse at point M and three boats. Name the three angles in the diagram.

Protractor Postulate:

Types of Angles

Example 2:
Find the measure of each angle. Then classify each angle.
   a. $\angle GHK$
   b. $\angle JHL$
   c. $\angle LHK$
8. Without measuring, is \( \angle DAB \cong \angle FEH \) in Example 3? Explain your reasoning.

Find the indicated measures.

9. Given that \( \angle KLM \) is a straight angle, find \( m\angle KLN \) and \( m\angle NLM \).

10. Given that \( \angle EFG \) is a right angle, find \( m\angle EFH \) and \( m\angle HFG \).

Summary:

3 things that were new to me about angles...

2 things I already knew about angles...

1 question I have...
| Questions | Two angles are \( \text{__________} \) when they have the same measure.

**Example 3:**

a. Identify the congruent angles labeled in the quilt designs.

b. \( m\angle ADC = 140^\circ \), what is \( m\angle EFG \)?

**Angle Addition Postulate:**

**Example 4:**

Given that \( m\angle LKN = 145^\circ \), find \( m\angle LKM \) and \( m\angle MKN \).

An \( \text{__________} \) is a ray that divides an angle into two angles that are congruent.

**Example 5:**

\( QS \) bisects \( \angle PQR \), and \( m\angle QPS = 24^\circ \). Find \( m\angle PQR \).
Review:
Given A(-3, 5) and B(4, -1), find the coordinate of the midpoint of \( \overline{AB} \) and the length of \( \overline{AB} \).

Use the diagram at the right for Exercises 1 & 2.
1. Name a pair of complementary angles, a pair of supplementary angles, and a pair of adjacent angles.

2. Are \( \angle KGH \) and \( \angle LKG \) adjacent angles? Are \( \angle FGH \) and \( \angle FGH \) adjacent angles? Explain.

3. \( \angle 1 \) is a complement of \( \angle 2 \), and \( m\angle 2 = 5^\circ \). Find \( m\angle 1 \).

4. \( \angle 3 \) is a supplement of \( \angle 4 \), and \( m\angle 3 = 148^\circ \). Find \( m\angle 4 \).

5. How will you remember the difference between complementary and supplementary?

6. \( \angle LMN \) and \( \angle PQR \) are complementary angles. Find the measures of the angles when \( m\angle LMN = (4x - 2)^\circ \) and \( m\angle PQR = (9x + 1)^\circ \).
Lesson 1.6: Describing Pairs of Angles

**Essential Question:**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Complementary Angles</th>
<th>Supplementary Angles</th>
<th>Adjacent Angles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example 1:</td>
<td>In the figure, name a pair of complementary angles, a pair of supplementary angles, and a pair of adjacent angles.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Diagram](image)

<table>
<thead>
<tr>
<th>Example 2:</th>
<th>a. ( \angle 1 ) is a complement of ( \angle 2 ), and ( m\angle 1 = 62^\circ ). Find ( m\angle 2 ).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b. ( \angle 3 ) is a supplement of ( \angle 4 ), and ( m\angle 4 = 47^\circ ). Find ( m\angle 3 ).</td>
</tr>
</tbody>
</table>

| Example 3: | When viewed from the side, the frame of a ball-return net forms a pair of supplementary angles with the ground. Find \( m\angle BCE \) and \( m\angle ECD \). |

![Diagram](image)
7. Do any of the number angles in the figure form a linear pair? Which angles are vertical angles? Explain your reasoning.

8. Two measure of an angle is twice the measure of its complement. Find the measure of each angle.

Summary:
Describe all the different types of angle pairs in your own words...
<table>
<thead>
<tr>
<th>Questions</th>
<th>Linear Pair</th>
<th>Vertical Angles</th>
</tr>
</thead>
</table>

**Example 4:**
Identify all the linear pairs and all the vertical angles in the figure.

![Diagram of angles](image)

**Example 5:**
Two angles form a linear pair. The measure of one angle is five times the measure of the other angle. Find the measure of each angle.
<table>
<thead>
<tr>
<th>Know</th>
<th>Understand</th>
<th>Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHAT A POINT, LINE, SEGMENT, PLANE, AND RAY IS.</td>
<td>DIFFERENCE BETWEEN A LINE, SEGMENT, AND RAY.</td>
<td>NAME A POINT, LINE, SEGMENT, PLANE, AND RAY.</td>
</tr>
<tr>
<td>SEGMENT ADDITION POSTULATE</td>
<td>FIND THE LENGTH OF A SEGMENT.</td>
<td>SKETCH COMBINATIONS OF POINTS, LINES, SEGMENTS, PLANES, AND RAYS.</td>
</tr>
<tr>
<td>DISTANCE FORMULA</td>
<td>DIFFERENCE BETWEEN CONGRUENT AND EQUAL.</td>
<td>USE SEGMENT ADDITION POSTULATE.</td>
</tr>
<tr>
<td>MIDPOINT FORMULA</td>
<td>WHEN TO USE THE MIDPOINT TO FIND AN ENDPOINT.</td>
<td>USE THE DISTANCE FORMULA.</td>
</tr>
<tr>
<td>ACUTE, RIGHT, OBTUSE, AND STRAIGHT ANGLES.</td>
<td>WHAT A BISECTOR DOES.</td>
<td>USE THE MIDPOINT FORMULA.</td>
</tr>
<tr>
<td>ANGLE ADDITION POSTULATE</td>
<td>DIFFERENCE BETWEEN CONVEX AND CONCAVE.</td>
<td>CLASSIFY POLYGONS.</td>
</tr>
<tr>
<td>SUPPLEMENTARY AND COMPLEMENTARY ANGLES.</td>
<td>DIFFERENCE BETWEEN LINEAR PAIR AND SUPPLEMENTARY ANGLES.</td>
<td>FIND THE AREA AND/OR PERIMETER OF A POLYGON IN A COORDINATE PLANE.</td>
</tr>
<tr>
<td>LINEAR PAIR</td>
<td></td>
<td>CLASSIFY, NAME, AND MEASURE ANGLES.</td>
</tr>
<tr>
<td>VERTICAL ANGLES</td>
<td></td>
<td>USE ANGLE ADDITION POSTULATE.</td>
</tr>
</tbody>
</table>