

Geometry Unit for Introductory Algebra

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Day One- An introduction to Geometry:

- Topics covered: Introduce geometry by having the students do a web search on Euclid. Give definitions of undefined terms (point, line, plane), segments, rays, measurements, congruence, parallel lines and perpendicular lines.
- Supplies: A lab with internet access is needed.
- Activity(see attached pages): Have students do a web search to find out who Euclid was and how he is related to Geometry.
- Guided notes(see attached pages, make copies for students and overheads for yourself): Go through the first set of guided notes to gain a working knowledge of undefined terms and definitions that will be needed in this Geometry unit.

Day Two - Undefined terms and Basic definitions in Geometry

- Topics covered: Define an angle, types of angles, complementary angles, supplementary angles, and vertical angles. Teach students how to use a protractor and explore the basics of geometry sketchpad.
- Supplies: Protractors and a lab with Geometry Sketchpad should be available.
- Guided notes: Continue with the guided notes so students learn foundational definitions.
- Activity: Students will use the last part of class to explore geometry sketchpad.

Day Three- Parallel and Perpendicular lines:

- Topics covered: Give students the definitions for transversals, alternate interior angles, corresponding angles and parallel lines. Have them use Geometry Sketchpad to explore the relationship between alternate interior angles, corresponding angles, alternate exterior angles and two interior angles on the same side of the transversal given two parallel lines. Also have students explore the relationship of the sum of the angles in a triangle.
Supplies: A lab with Geometry Sketchpad should be available.
- Guided notes: A few more definitions will be given at the start of class.
- Activity: The bulk of the hour will be spent in the lab.

Day 4 - Triangles

- Topics covered: Give students the basic definitions for a triangle (three vertices, three sides, three angles, and altitude). Run the attached activity in which students will derive that triangles fall into three basic groups based on sides, equilateral, isosceles, scalene and four basic groups, right, acute, obtuse, equiangular based on angles(note: students will more than likely put equiangular in with acute triangles, you can make highlight that they can be put in their own unique group). Also have them continue their exploration of the relationship of the sum of the angles in a triangle.
- Supplies: Students will need a ruler, protractor, scratch paper, scissors and card stock.
- Guided notes: A few more definitions will be given at the start of class.
- Activity: Have students explore the difference in triangles based on angle measures.
- Activity: Have students explore the difference in triangles based on side measures.

Day 5 - Perimeter and Area

- Topics covered: Have students explore the area of a triangle. Give the basic definition for perimeter and have the students derive the formula for area. Note: students will need to know the definition for the area of a rectangle.
- Supplies: Students will need a ruler, scissors, and a card stock.
- Guided notes: Begin with a few definitions/guided notes.
- Activity: Students will derive the formula for the area of a triangle on their own.

Day 6-8- Assessment

- Topics covered: No new topics will be covered. Have students use all that they have learned in this unit to write an exam. Spend two days forming/writing the exams and then on the third day have the students work in pairs on two exams that have been written by classmates.
- Activity: Students will write an exam.
- Activity: Students will pair up and work together on two exams.

Day 1 – Introduction to Geometry Activity

What does Euclid have to do with Geometry? Do a web search and see what you can find out about Euclid and his connection to Geometry. Write a brief paragraph about what you found.

Day 1- Undefined terms and Basic Definitions in Geometry Guided Notes

***What are the undefined terms?**

***Segments, rays, measurements, and congruence.**

***Types of lines**

***What are the undefined terms?**

Notation:

***Segments, rays, measurements, and congruence.**

Segment

Ray

Measurement of \overline{AB}

Congruent Segments

***Types of lines**

Perpendicular lines:

Parallel lines:

Use the figure to answer the following questions.

Is C on \overline{AF}

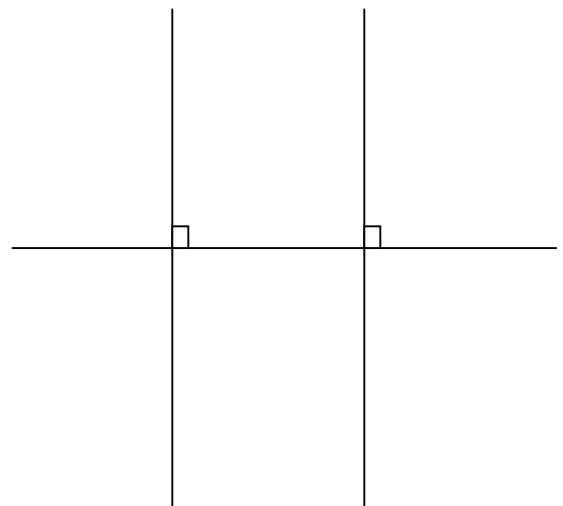
Is B on \overleftrightarrow{CD}

Is B on \overleftrightarrow{CD}

Are m and n intersecting lines?

name a set of parallel lines

name a set of perpendicular lines:



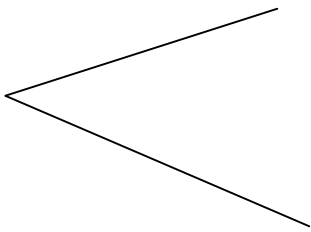
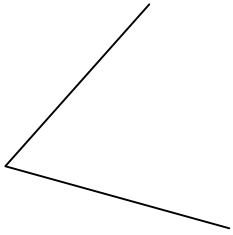
Day 2- Angles Guided Notes

*Define an angle

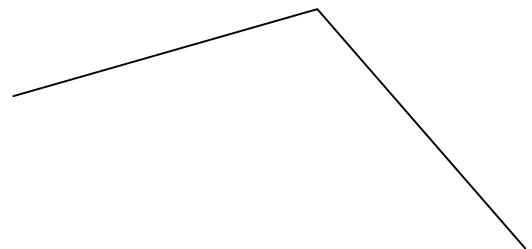
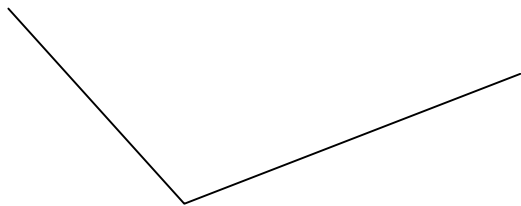
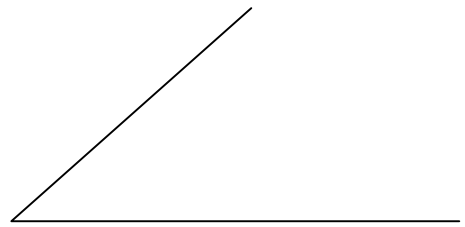
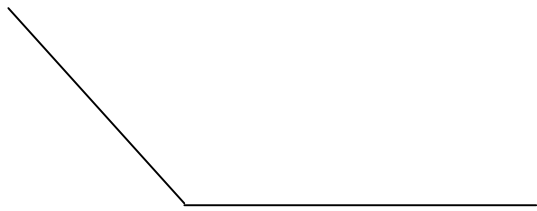
*Using a Protractor

*Types of angles

*Define an angle



*Using a Protractor

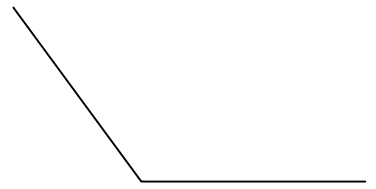
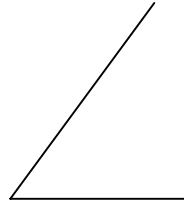
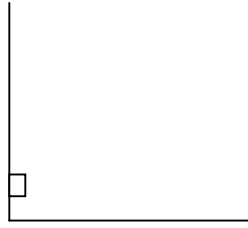
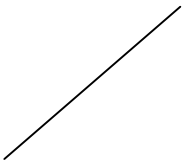


Draw an angle that is

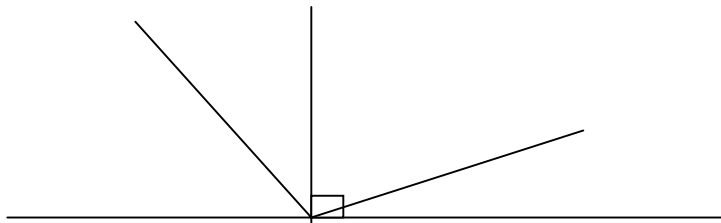
32 degrees

157 degrees

***Types of angles**



Find an example of each type of angle in the figure below:



Complementary Angles

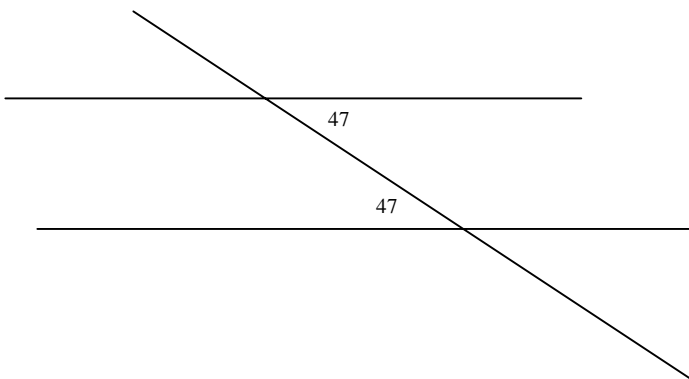
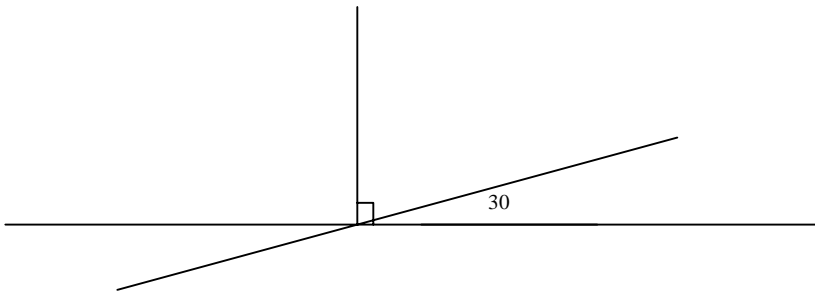
Supplementary Angles

Congruent angles

Vertical Angles:

Vertical angles are congruent!!!!

Using what we just learned about vertical angles, supplementary angles, and complementary angles, find the missing angle measures and describe how you found each value.



Day 2- Geometry Sketchpad Activity.

Using Geometry sketchpad, go through the following activities.

- 1) If this is your first time using geometry sketchpad, welcome! The instructor will give a brief demo and then it will be your turn to play with the program and see what it can do. Begin by using the numerous tool bar options and pull down menus to construct a picture. Be sure to have your teacher initial this drawing and also check the additional activities, #2-8, you will complete.
- 2) Construct a segment.
- 3) Construct a triangle. Once you construct a triangle, drag a corner of the triangle to see how easy it is to form a number of triangles without redrawing each time.
- 4) Redo what you just did with a quadrilateral, a four sided figure(square, rectangle, kite).
- 5) Draw a segment and label it AB.
- 6) Measure segment AB. (hint: the measurement tool is in the _____ menu)
- 7) Draw an angle.
- 8) Measure the angle in the previous step. Drag a side of the angle and form an acute, obtuse and right angle.

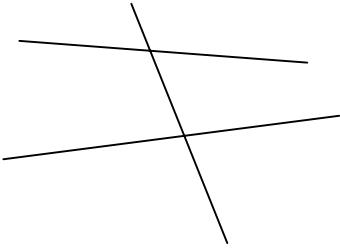
Day 3-Parallel and Perpendicular Lines Guided Notes

***Define transversals, alternate interior angles and corresponding angles**

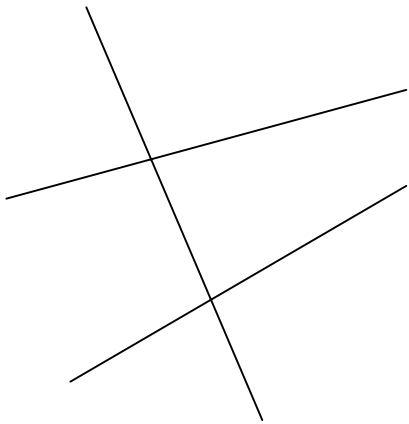
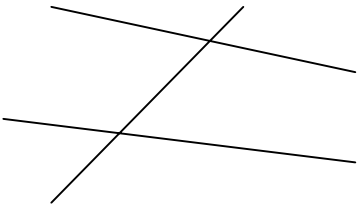
***Parallel lines**

Transversals

Alternate interior angles:



Corresponding angles:



Name 4 pair of corresponding angles

Name 2 pair of interior angles

Name 2 pair of vertical angles

***Define Parallel lines**

Parallel lines

Day 3-Parallel and Perpendicular Lines Geometry Sketchpad Activity

Using geometry sketchpad, answer the following questions.

Question 1: When given two parallel lines, can we make any conjectures about the alternate interior angles or the corresponding angles? (Hint: begin by drawing two parallel lines and a transversal and then measure the angles.)

Alternate interior angles:

Corresponding angles:

Question 2: Similar to above, can you make a conjecture about the alternate exterior angles(the nonadjacent angles on the same side of the transversal and on the exterior of the two lines) and two interior angles on the same side of the transversal?

Alternate exterior angles:

Two interior angles on the same side of the transversal:

Question 3: Draw a triangle. Can you make a conjecture about the sum of the angles in a triangle? (hint: draw a triangle, measure the angles, and drag a vertex to construct a number of triangles.)

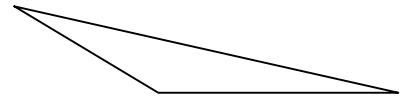
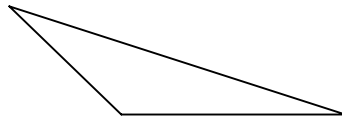
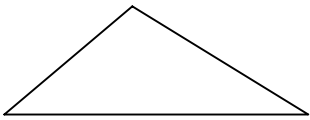
Day 4- Triangles Guided Notes

Basic definitions for a triangle:

A triangle is a plane figure with three sides and three angles.

Vertices of a triangle:

Altitude/height is the distance from a vertex perpendicular to the opposite side, possibly extended.



Day 4- Triangle Activities

Naming triangles:

Supplies: Ruler, protractor, scratch paper, scissors, card stock

- 1) Form groups of 3-4.
- 2) Have each person cut out 4 different triangles.
- 3) Using what you know about sides is there a way to separate the triangles into groups. (Hint: try to divide them into three groups and make up possible names for these three groups)
- 4) Come together as a class and report findings.
- 5) Repeat what you just did, but instead of looking at angles, use the sides of the triangles to divide them into three groups.

Note to the instructor: have a set of 8 precut triangles to add to each groups triangles. In this set of 8, make sure you have equiangular/equilateral, isosceles, and right triangles.

Sum of the angles in a triangle:

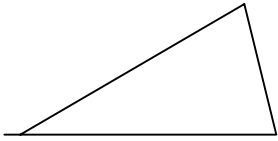
Supplies: Triangles from previous activity and patty paper

Using the same triangles from above, can you find a different way to show/prove that the sum of the angles of a triangle equal 180 degrees that we found in lab yesterday.

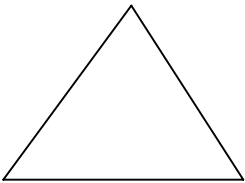
Day 5-Perimeter and Area of Triangles Guided Notes

*Perimeter of a triangle

Find the perimeter of:



Find x if the perimeter of the following triangle is 37.

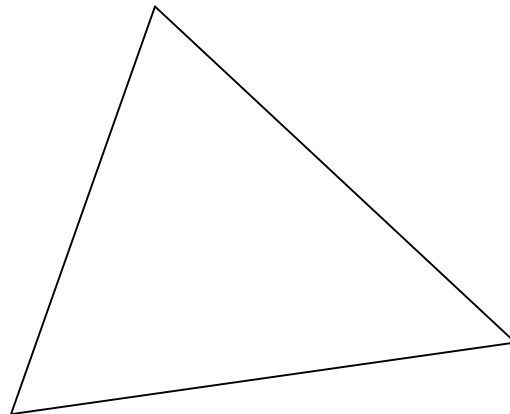
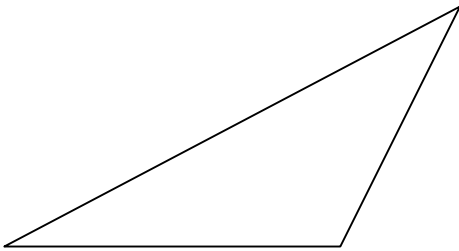
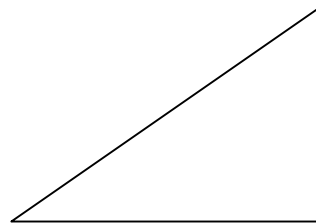
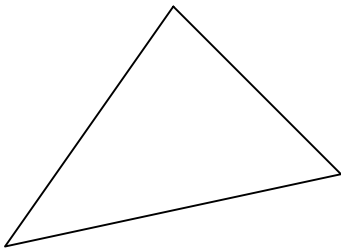


Area of a two-dimensional figure

Day 5- Area of a Triangle Activity

Supplies: Card stock, scissors, and ruler.

- 1) Form groups of 3-4.
- 2) Have each group member cut out 5 rectangles.
- 3) From the rectangles you just made, form triangles that have one side that is a full side of the original rectangle. Can you see a connection between the area of the triangle and the area of rectangle? Can you come up with a general formula for the area of a triangle?
- 4) Report your findings on the board. Can the class agree on a formula for the area of a triangle?
- 5) Using this formula for perimeter and area, find the area and perimeter of the figures below.



Day 6-8- Assessment

Students will be given two days in the lab to make an exam that has 5 problems that can be done on sketchpad and 5 problems that can be done by hand. The exams must be typed in a word document. (Figures made in Geometry Sketchpad can be cut and pasted into word.). The problems should address what we have covered in class over the geometry unit, they should not involve basic definitions and they should address at least one topic from each day. On the third day, students will pair up and the instructor will give the pair two exams to complete.

PERFORMANCE PACKAGE TASK 1
Geometry Unity

Content Standard: Geometry

Level: MN Standard Middle School (6-8) Level and Introductory Algebra, 0200.

Specific Statement(s) from the Standard:

MN Standards

1. Use facts about angles including the relationship between complementary angles, supplementary angles and the angles within triangles to solve real-world and mathematical problems.
2. Classify triangles as equilateral, isosceles or scalene, and right, acute or obtuse.
3. Find the area and circumference of a circle given the radius or diameter using common approximations of pi where appropriate.
4. Measure, identify, and draw perpendicular and parallel lines, angles and rectangles by using appropriate tools such as straightedge, ruler, compass, protractor or software.

Leaner Outcomes (requirements at Anoka-Ramsey Community College):

1. Identify types of angles (acute, obtuse, right, supplementary, and complementary) and be able to use relationships involving the angles in problem solving.
2. Classify triangles (using lengths of sides or types or measures of angles) and use related properties in problem solving.
3. Find the area and perimeter of triangles and quadrilaterals.
4. Utilize the relationship of angles created by parallel lines cut by a transversal in problem solving.

Product(s):

Read and apply geometric terminology to successfully draw (on sketchpad or by hand), identify, measure and classify:

1. Types of angles
2. Types of triangles
3. Area and perimeter of triangles
4. Parallel lines and the relationship of the angles formed by a transversal

Task Description:

Students will be writing an exam that covers the above products. After the tests are written, students will work in pairs to complete two exams.

Special Notes:

Please see the daily activity explanations and guided notes for information on special notes for each class day. Guided notes can be filled out by using Algebra and Geometry Shed Light on Each Other, 2nd, Edition, Barbara Brown or by any Geometry textbook.

PERFORMANCE PACKAGE TASK 1
Geometry Unit

FEEDBACK CHECKLIST FOR TASK 1

The purpose of the checklist is to provide feedback to the student about his/her work relative to the content standard. Have the standard available for reference.

Y=Yes

N=Needs Improvement

<u>Student</u>		<u>Teacher</u>
_____	Use facts about angles including the relationship between complementary angles, supplementary angles and the angles within triangles to solve real-world and mathematical problems.	_____
_____	Classify triangles as equilateral, isosceles or scalene, and right, acute or obtuse.	_____
_____	Identify types of angles (acute, obtuse, right, supplementary, complementary) and be able to use relationships involving the angles in problem solving.	_____
_____	Find the area and perimeter of triangles.	_____

Overall Comments (information about student progress, quality of the work, next steps for teacher and student, needed adjustments in the teaching and learning processes, and problems to be addressed):