

Geometry A

Unit 1 Lesson 4 Classroom Extension

Plane Geometry

Objectives

- ⇒ Manipulate triangles to make various polygons.
- ⇒ Classify triangles.

Instructional Materials

- ⇒ Scissors
- ⇒ Glue
- ⇒ “Just two triangles” activity sheet (refer to NCTM’s website listed below)

Classroom Activity

- ⇒ Visit <http://illuminations.nctm.org/LessonDetail.aspx?ID=L233> (NCTM) and read the instructions found at the top of the page.

Other Content Area Tie-in

- ⇒ This will prepare students for triangulation. Triangulation is the method of breaking irregular polygons into triangles and rectangles to find the area. This can also prepare students for tessellations. Tessellations are patterns formed by geometric shapes.

Unit 1 Lesson 11 Classroom Extension

Visualizing Three-Dimensional Objects

Objectives

- ⇒ Construct geometric figures
- ⇒ Determine when two isometric drawings can represent the same shape
- ⇒ Explain their reasoning

Instructional Materials

- ⇒ “Do they match” handout (or overhead)
 - ⇒ found at <http://illuminations.nctm.org/lessons/isometric/Isometric-OVH-Match.pdf>
- ⇒ Computer with internet access

Classroom Activity

- ⇒ Distribute “Do they match” handout, and have students predict which pairs could be drawings of the same object.
- ⇒ Use the isometric drawing tool (<http://illuminations.nctm.org/ActivityDetail.aspx?ID=125>) to recreate the objects in the handout
 - ⇒ Use the view tool and the rotation tools to determine whether predictions were correct.

Unit 2 Lesson 1 through 6 Classroom Extension
“Pieces of Proof”

Objectives

- ⇒ Identify properties that exist in a given figure.
- ⇒ Apply postulates and theorems to a figure to build a formal proof.

Instructional Materials

- ⇒ Proof kits consisting of envelopes with the statement and reason strips and diagrams inside.
If you use all the proofs, you’ll want to print copies of each proof on different colored paper to help keep them separate.
- ⇒ Scissors
- ⇒ Poster paper and markers (optional)

Classroom Activity

- ⇒ Visit <http://illuminations.nctm.org/LessonDetail.aspx?id=L727> and follow the instructional plan.

Further Extensions

- ⇒ Provide proof kits that contain only statements. Expect students to generate the reasoning as they construct the proofs.
- ⇒ Provide students with proof kits that contain decoy statements and reasons. Students will have to only use necessary information to construct the proofs.
- ⇒ Provide students with proof kits that have some statements or reasons missing. Students have to supply the missing pieces as well as write out the proof.

Unit 2 Lesson 11 Classroom Extension

More Constructions

Objectives

- ⇒ Construct the circumcenter of a triangle.
- ⇒ Construct the incenter of a triangle.

Instructional Materials

- ⇒ Computer with internet access
- ⇒ Hospital Problem Overhead
- ⇒ Cities Triangle Overhead
- ⇒ Hospital Map Activity Sheet (1 copy for each student)
- ⇒ Blank transparencies (several per pair or group of students)
- ⇒ Compass, straight edge, ruler

Classroom Activity

- ⇒ Project, or distribute a copy of the hospital problem
(<http://illuminations.nctm.org/Lessons/Hospital/Hospital-OVH-Problem.pdf>)
- ⇒ Show students the location of the three cities with the hospital map activity sheet
(<http://illuminations.nctm.org/Lessons/Hospital/Hospital-AS-Map.pdf>)
- ⇒ Give student a blank transparency, and let them trace from the activity sheet onto the transparency, using the location of the cities as vertices of a triangle.
- ⇒ Using a compass and straight edge, have students construct the perpendicular bisector of each of the three sides of the triangle.
- ⇒ Have the students create a circle from the point where all the perpendicular bisectors intersect, so that the circle intersects each of the three vertices of the triangle.
- ⇒ If computer access is available, this can be explored with the following applet:
<http://illuminations.nctm.org/ActivityDetail.aspx?id=156>

Other Content Area Tie-in

- ⇒ Students have constructed the circumcenter. This will serve as a connection when students study properties of circles.

Unit 4 Lesson 5 Classroom Extension

Area of triangles

Objectives

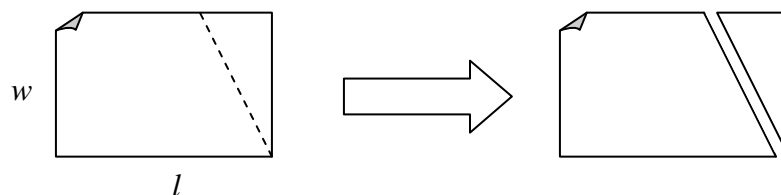
- ⇒ Determine the measure of parallelograms and triangles based on an initial rectangle.
- ⇒ Develop the idea of different area formulas based on the dimensions of a rectangle.

Instructional Materials

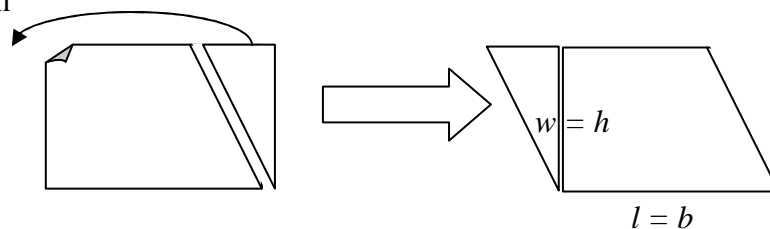
- ⇒ Construction Paper
- ⇒ Scissors
- ⇒ Rulers

Classroom Activity

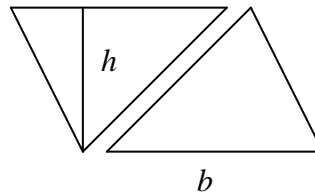
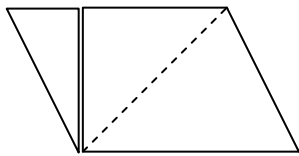
- ⇒ Have students break into groups and work together. Give each group a sheet of construction paper, a ruler, and a pair of scissors.
- ⇒ Ask the class to find the dimensions and area of the rectangular sheet of construction paper.
- ⇒ Then ask students to draw a line from the bottom right hand corner of the construction paper to anywhere on the top of the construction paper. Then, using the scissors, ask students to cut along that line. (Example shown below)



- ⇒ Next, have students slide the triangle from one side of the paper to the other, to form a parallelogram



- ⇒ Students should then realize that the new shape is a parallelogram (all students should have a parallelogram, but they do not have to be the same shape). They should also conclude that the area of the parallelogram should be the same as the area of the rectangle. No paper was wasted, so the areas are the same.
- ⇒ See if they can determine which dimensions are the same between the rectangle and parallelogram. ($A = bh = lw$)
- ⇒ Lastly, have the students draw the diagonal in the parallelogram, and cut along that line. (Example shown below)



- ⇒ Students should see that they cut the parallelogram into two triangles. They should also notice that they cut the parallelogram in half, so the area of each triangle should be half that of the parallelogram.
- ⇒ Ask students if there are any dimensions that are the same between the parallelogram and the triangle (The base and height are the same).
- ⇒ Show them that the area formula for a triangle is half the area formula for a parallelogram.

$$(A = \frac{1}{2}bh)$$

Other Content Area Tie-in

- ⇒ Students will have practice evaluating expressions with variables. Students will practice classifying shapes based on their properties. Students will get practice with geometry vocabulary.

Unit 4 Lesson 11 Classroom Extension

“Fishing for the best prism”

Objectives

- ⇒ Create nets of rectangular prisms that have the same volume but different surface areas
- ⇒ Discover the type of rectangular prism that can be built to minimize cost
- ⇒ Apply real life considerations to minimizing cost, such as aesthetic appeal

Instructional Materials

- ⇒ “Fishing for the best prism” activity sheet
 - ⇒ <http://illuminations.nctm.org/Lessons/PrismFishing/PrismFishing-AS-FishTank.pdf>
- ⇒ “Fishing for the best prism” activity sheet

Classroom Activity

- ⇒ Distribute the “Fishing for the best prism” activity sheet
- ⇒ With the students, complete questions 1.
- ⇒ Divide students into three groups: each group assigned to work with one of the configurations found in question 1.
- ⇒ Groups will complete pages 1 and 2.

Math Connections

- ⇒ Students will discover that surface area is found by finding the total area of the net of any prism.

Unit 5 Lesson 13 Classroom Extension

Law of Cosines

Objectives

- ⇒ Use right triangle trigonometry to develop the law of cosines.
- ⇒ Use the law of cosines to solve problems.

Instructional Materials

- ⇒ Law of cosines activity sheet
(<http://illuminations.nctm.org/Lessons/LawSinesCosines/LawCosines-AS-Discover.pdf>)

Classroom Activity

- ⇒ Distribute the activity sheet, and have students read the introduction.
- ⇒ Explain that students will be developing the law of cosines, a method that can be used when the law of sines can not be.
- ⇒ Have students complete the activity sheet. (In pairs, if you choose)

Other Content Area Tie-in

- ⇒ Law of cosines comes in to play when students explore the triangle inequality, and the cosine and sine of the difference of two angles.

Unit 5 Lesson 14 Classroom Extension

Law of Sines

Objectives

- ⇒ Use right triangle trigonometry to develop the law of sines.
- ⇒ Use the law of sines to solve problems.

Instructional Materials

- ⇒ Law of sines activity sheet
(<http://illuminations.nctm.org/Lessons/LawSinesCosines/LawSines-AS-Discover.pdf>)

Classroom Activity

- ⇒ Distribute the activity sheet, and have students read the introduction.
- ⇒ Explain that students will be developing the law of sines, a method that can be used for solving problems involving right triangles, as well as non-right triangles.
- ⇒ Have students complete the activity sheet. (In pairs, if you choose)

Other Content Area Tie-in

- ⇒ Law of sines is essential to discovering many other trigonometric relationships with geometric figures.

Geometry B

Unit 1 Lesson 4 Classroom Extension

Chords and Arcs

Objectives

- ⇒ Understand the concept of curvature as it relates to circles.
- ⇒ Understand that circles with greater curvature have smaller radii, and vice versa.
- ⇒ Apply definitions and theorems regarding curvature to solve circle problems.

Instructional Materials

- ⇒ Circle packing activity sheet

(<http://illuminations.nctm.org/Lessons/CirclePack/CirclePacking/CirclePack-AS-Packet.pdf>)

Classroom Activity

- ⇒ Visit <http://illuminations.nctm.org/LessonDetail.aspx?ID=L692> and follow the instructional plan

Other Content Area Tie-in

- ⇒ This activity offers students insight into the world of packaging science.

Unit 5 Lesson 3 Classroom Extension

Reflections

Objectives

- ⇒ understand how reflections work and what happens when two or more reflections are applied one after the other

Instructional Materials

- ⇒ A computer with internet access

Classroom Activity

- ⇒ Visit <http://illuminations.nctm.org/LessonDetail.aspx?ID=L470> (NCTM). Follow the instructional plan.

Other Content Area Tie-in

- ⇒ Creating figures as reflections of other figures develops a students' understanding of congruent figures.

NOTES



End of Tutor Guide