

GEOMETRY: PLANELY SIMPLE

Grade Level or Special Area: Fifth Grade, Geometry

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Length of Unit: 9 Lessons, 2 weeks, approximately 45 minutes per lesson

I. ABSTRACT

- A. The goal of this unit is to build students knowledge of Geometry focusing on circles, angles, shapes, and area. This unit contains hands-on activities that will incorporate Core Knowledge Art, Language Arts, and Social Studies for fifth grade. A variety of assessments will be used to monitor the students understanding. The unit really comes to life when the students see how the topics taught in this Geometry unit are used to create an owl for the Language Arts poem *A Wise Old Owl*.

II. OVERVIEW

- A. Concept Objectives
1. Students will understand geometric concepts and applications. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
 2. Students will understand the basic properties of geometric shapes. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
 3. Students will appreciate how geometry influences artistic expression. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3, 5.3D3b) (Art 5.2 B4, 5.2D3)
- B. Content from the *Core Knowledge Sequence*
1. Polygons: triangle, quadrilateral, pentagon, hexagon, octagon, parallelogram, trapezoid, rhombus, rectangle, and square (p.125)
 2. *The Marriage of the Virgin* by Raphael (p.119)
 3. Renaissance architecture including *The Florence Cathedral* by Filippo Brunelleschi (p. 119)
 4. Circles: arc, chord, radius, diameter, and compass (p. 125)
 5. Angles: degree, right angle = 90 degree, acute angle = less than 90 degree, obtuse angle = greater than 90 degree, and straight angle = 180 degree (p.125)
 6. *Tales of Coyote American Indian Trickster Stories* (p. 111)
 7. Area: the formula for the area of a rectangle (Area = length x width) (p. 125)
 8. *A Wise Old Owl* by Edward Hersey Richards (p.110)
- C. Skill Objectives
1. Students will identify polygons and other geometric shapes. (NM Math 5.3C1,2)
 2. Students will identify polygons and other geometric shapes within pieces of Art. (NM Math 5.3C1,2) (Art 5.7I, 5.4A1-4)
 3. Students will use a compass to draw circles with a given diameter or radius. (NM Math 5.3D2)
 4. Students will identify arc, chord, radius, diameter. (NM Math 5.3D1)
 5. Students will use a protractor to measure the degrees of angles (NM Math 5.3B)
 6. Students will identify and construct different kinds of triangles: equilateral, right, and isosceles (NM Math 5.3G1)
 7. Students will find the area of specific shapes using given algebraic formulas (NM Math 5.3D3b, 5.3E, F1, F2, F3)

III. BACKGROUND KNOWLEDGE

- A. For Teachers
 - 1. Core Knowledge Foundation, edited by Hirsch: Jr. E.D. *Core Knowledge Teacher Handbook, Grade 5*. Charlottesville, Virginia: Core Knowledge Publishing, 2005, ISBN 1-890517-80-1
 - 2. A basic knowledge of geometry definitions, supplies used in geometry, and knowledge of geometry taught in previous grade levels.
- B. For Students
 - 1. Basic math knowledge from previous grades: shapes, lines, line segments, vertex, polygons, angles, types of angles, radius, diameter, and formula for area.

IV. RESOURCES

- A. Core Knowledge Foundation, *Core Knowledge Sequence*, Charlottesville, Virginia: Core Knowledge Publishing, 1999. ISBN 1-890517-20-8
- B. Core Knowledge Foundation, edited by Hirsch: Jr. E.D. *Core Knowledge Teacher Handbook, Grade 5*. Charlottesville, Virginia: Core Knowledge Publishing, 2005 ISBN 1-890517-80-1
- C. Core Knowledge Foundation, edited by Hirsch: Jr. E.D. *What Your Fifth Grader Needs to Know*. New York: Doubleday, 2005. ISBN 0-385-49721-0

V. LESSONS

Lesson One: Shapes

- A. *Daily Objectives*
 - 1. Concept Objectives
 - a. Students will understand geometric concepts and applications. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
 - b. Students will understand the basic properties of geometric shapes. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
 - 2. Lesson Content
 - a. Polygons: triangle, quadrilateral, pentagon, hexagon, octagon, parallelogram, trapezoid, rhombus, rectangle, and square (p.125)
 - 3. Skill Objective
 - a. Students will identify polygons and other geometric shapes. (NM Math 5.3 C1,2)
- B. *Materials*
 - 1. Appendix A: Geometric Shapes: 2 copies per student-1 copy for teacher
 - 2. Sharpened pencil: 1 per student
 - 3. Chalkboard/ whiteboard/ overhead- whatever is available to the teacher
 - 4. Appendix B: Geometric Shapes (Answer Key): 1 copy for teacher
- C. *Key Vocabulary*
 - 1. A *polygon* is a closed figure made of three or more line segments
 - 2. A *quadrilateral* is a four-sided polygon.
 - 3. A *square* is a special kind of rectangle in which all four sides are equal in length.
 - 4. A *trapezoid* is a quadrilateral in which only two of the four sides are parallel.
 - 5. A *parallelogram* is a quadrilateral in which both pairs of opposite sides are parallel. They are also of equal length.
 - 6. A *rhombus* is a special kind of parallelogram in which all four sides are of equal length.

7. A *pentagon* is a polygon with five sides.
8. A *hexagon* is a polygon with six sides.
9. An *octagon* is a polygon with eight sides.
10. A *triangle* is a three sided figure.

D. *Procedures/Activities*

1. Introduce the lesson by having key vocabulary displayed on the chalkboard/ whiteboard/ or overhead-whatever is available.
2. Assess the student's prior knowledge by having them identify items in the classroom that resembles the geometric shapes as the teacher calls each shape out. Make sure students are aware that the geometric shapes can be grouped by more than one classification.
3. With the words still on the board hand a copy of Appendix A: Geometric Shapes to each student. With a pencil have the students individually label the geometric shapes. Remind the students that each shape will have more than one classification and that the answers do not have to be in any particular order. NOTE: for the students assistance the number of possible answers is represented by numbers in each geometric shape. This part of the lesson should take approximately 15 minutes.
4. The teacher will post a blank Appendix A: Geometric Shapes on the board next to the key vocabulary words. As a group, with the teacher's assistance, students will check their worksheet and make corrections as needed.
5. The teacher will go back and review the shapes by again calling out the key vocabulary and having the students identify items in the classroom that resembles the geometric shapes discussed.
6. The teacher will give the students the second copy of Appendix A: Geometric Shapes. The students will be asked to once again label the given geometric shapes. They will do this on their own.

E. *Assessment/Evaluation*

1. The teacher will observe the students understanding as they are doing the activity orally.
2. The teacher will use Appendix B: Geometric Shapes (Answer Key) to grade Appendix A: Geometric Shapes to check for students mastery.

Lesson Two: Shapes (part 2)

A. *Daily Objectives*

1. Concept Objectives
 - a. Students will understand geometric concepts and applications. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
 - b. Students will understand the basic properties of geometric shapes. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
 - c. Students will appreciate how geometry influences artistic expression. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3, 5.3D3b) (Art 5.2 B4, 5.2D3)
2. Lesson Content
 - a. Polygons: triangle, quadrilateral, pentagon, hexagon, octagon, parallelogram, trapezoid, rhombus, rectangle, and square (p. 125)
 - b. *The Marriage of the Virgin* by Raphael (p.119)
 - c. Renaissance architecture including *The Florence Cathedral* by Filippo Brunelleschi (p. 119)
3. Skill Objective(s)

- a. Students will identify polygons and other geometric shapes. (NM Math 5.3 C1,2)
 - b. Students will identify polygons and other geometric shapes within pieces of Art. (NM Math 5.3C1,2) (Art 5.7I, 5.4A1-4)
- B. *Materials*
- 1. Displayed key vocabulary on the board from Lesson One
 - 2. Core Knowledge Art Print: *Marriage of the Virgin* by Raphael
 - 3. Core Knowledge Art Print: *The Florence Cathedral* by Filippo Brunelleschi
 - 4. The book *What Your Fifth Grader Needs To Know* from the Core Knowledge series by E.D. Hirsh, Jr. (p. 176, 182)
 - 5. Appendix C: Native American Pottery: 1 copy per student
 - 6. Crayons- 1 of each color per student: red, blue, green, yellow, purple, black, orange, pink, gray, brown
 - 7. *Optional*: 1 stick of clay per student
- C. *Key Vocabulary*
- 1. Review vocabulary from Lesson One: Shapes
- D. *Procedures/Activities*
- 1. *Optional*: Before beginning this lesson the teacher will need to have one stick of clay for each student set aside for the end activity. This is an optional activity and can be used if time permits.
 - 2. Orally review the key vocabulary from Lesson One: Shapes with the students.
 - 3. The teacher will lead a class discussion on how geometry plays an important role in art. As the class is discussing their ideas the teacher will display the first Core Knowledge Art Print: *Marriage of the Virgin* by Raphael. Explain briefly the print, the artist, and give the students a little background information about the piece. Ask the students, “*Can you identify any geometric shapes we have discussed in this piece of art?*” Student’s answers will vary.
 - 4. Once they have discussed the geometric properties in the art print, bring in the next art piece *The Florence Cathedral* by Filippo Brunelleschi. Again briefly explain the print, the artist, and information about the piece. Begin the class discussion again by asking the question, “*Can you identify any geometric shapes we have discussed in this architecture?*” Student’s answers will vary.
 - 5. Once they have discussed the geometric properties in the art print, briefly discuss Native Americans and their culture. Explain that their buildings and carvings hold family history as well as their beliefs. Hand each student a copy of Appendix C: Native American Pottery. Orally discuss with the students how geometric shapes influenced artistic expression in different parts of the world as well as here in Native America. Explain to the students that we have pottery made by Native Americans that contain perfect examples of geometric properties. Explain to the students that they will be using this worksheet to find the various geometric shapes within the pottery.
 - 6. Allow the students 15-20 minutes to complete Appendix C: Native American Pottery.
 - 7. *Optional Extension*: If time permits, pass out one stick of clay to each student and have them create a geometric shape of choice, or they may construct a piece of Native American Pottery with the clay and carve out different geometric shapes from Lessons One and Two in the pottery.
- E. *Assessment/Evaluation*

1. During the class discussions the teacher will observe students understanding of the geometric shapes and how they play a role in the art prints.
2. The teacher will check for understanding by grading Appendix C: Native American Pottery. Answers will vary.

Lesson Three: Circles

A. Daily Objectives

1. Concept Objective(s)
 - a. Students will understand geometric concepts and applications. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
 - b. Students will understand the basic properties of geometric shapes. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
2. Lesson Content
 - a. Circles: arc, chord, radius, diameter, and compass (p. 125)
3. Skill Objective(s)
 - a. Students will use a compass to draw circles with a given diameter or radius. (NM Math 5.3D2)
 - b. Students will identify arc, chord, radius, diameter. (NM Math 5.3D1)

B. Materials

1. The book *Sir Cumference and the First Round Table* by Cindy Neuschwander and Wayne Geehan
2. Compass: one per student (compasses will need to have a measurement guide on them)
3. Pencil-one per student
4. Appendix D: Go Around-1 per student
5. Appendix E: Go Around-Teacher (Answer Key)
6. Crayons: one of each color per student: red, blue, green, and orange.
7. Whiteboard/ chalkboard/ overhead-whatever is available.
8. Notebook paper: 1 sheet per student

C. Key Vocabulary

1. A *circle* is the set of all points in a plane that are a fixed distance from a particular point.
2. A *chord* is a line segment joining two points on a circle.
3. The *diameter* of a circle is the length of a chord that passes through the center of the circle.
4. The *radius* is the distance from the center of a circle to the circle.
5. An *arc* is a part of the circle.
6. The *circumference* is the distance around a circle.
7. A *compass* is a tool for drawing a circle.

D. Procedures/Activities

1. The teacher will begin the discussion on circles by having the students discuss what they have learned in fourth grade and review the key vocabulary. NOTE: bring close attention to arc, chord, radius, and diameter. The teacher may wish to draw a circle on the whiteboard to identify each element as it is discussed.
2. The teacher will read orally *Sir Cumference and the First Round Table* by Cindy Neuschwander and Wayne Geehan. Have the students discuss the geometry vocabulary elements in the story.

3. Give each student one compass. Review with them the fact that the point of the compass will be on the center of the circle. Explain how to read the measurement guide on the compass.
 4. Instruct the students to get out one sheet of notebook paper and allow the students 5 minutes to practice using their compass. Encourage the students to draw circles of different measurements. The teacher will walk around and observe the students to check for understanding.
 5. Have students get out the correct crayons listed in the materials.
 6. Hand out Appendix D: Go Around to each student. Using their compass and the crayons stated have the students independently complete Appendix D: Go Around. The teacher will provide assistance as needed.
- E. *Assessment/Evaluation*
1. The teacher will check for understanding through class discussion about the book as well as their discussion of the vocabulary.
 2. The teacher will assess understanding of the information by grading Appendix D: Go Around. Possible answers are given on Appendix E: Go Around (Answer Key).
- A. **Lesson Four: Circles (part 2)**
1. Concept Objective(s)
 - a. Students will understand geometric concepts and applications. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
 - b. Students will understand the basic properties of geometric shapes. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
 2. Lesson Content
 - a. Circles: arc, chord, radius, diameter, and compass (p. 125)
 3. Skill Objective(s)
 - a. Students will use a compass to draw circles with a given diameter or radius. (NM Math 5.3D2)
 - b. Students will identify arc, chord, radius, diameter. (NM Math 5.3D1)
- B. *Materials*
1. 1 gallon size zip-loc bag per student with their name on it (this will be used for the culminating activity upon completion of lessons 4-8)
 2. Construction paper: 1-12x18 inch piece of dark brown construction paper per student (this will be used for the culminating activity)
 3. Construction paper: 1-6x6 inch piece of yellow construction paper per student (this will be used for the culminating activity)
 4. Construction paper: 1-6x6 inch piece of black construction paper per student (this will be used for the culminating activity)
 5. Appendix F: Using a Compass- 1 per student
 6. Appendix G: Using a Compass (Answer Key)- 1 per teacher
 7. Compass: 1 per student
 8. Pencil: 1 per student
 9. Scissors: 1 pair per student
- C. *Key Vocabulary*
1. Review vocabulary from lesson three: Circles
- D. *Procedures/Activities*
1. The teacher will review Lesson Three: Circles key vocabulary and how to use a compass.

2. The teacher will pass out Appendix F: Using a Compass to the students. Students should be allowed 20-30 minutes to complete the worksheet. The teacher may give assistance as needed.
3. Once the worksheet is completed the teacher will take up Appendix F: Using the Compass. The teacher will give the students their zip-loc bag, and one piece of each: brown, yellow, and black construction paper.
4. Before the students begin the teacher will explain that after several lessons the students will be making different shapes of different colors that will be used as part of the culminating activity at the conclusion of this unit. Explain to the students that they will not be told what the culminating activity will be, but rather it will be a surprise. Make sure the students have on their desk the 3 pieces of construction paper, their compass, and their scissors.
5. The teacher will call out very specific directions in which the students must follow in order for the culminating activity to be correct. Start with having the students draw a circle using the compass that has a radius of 2 inches (diameter of 4 inches) on the dark brown construction paper. Instruct the students to use the upper portion of the dark brown paper. Once they have drawn it, have the students cut it out and write their name on one side of the circle and put it in their zip-loc bag.
6. Using the bottom remaining portion of the dark brown construction paper have the students draw a circle using the compass that has a radius of 1 inch (diameter of 2 inches). Again have the students cut out the circle, write their name on one side of the circle, and put it in their zip-loc bag.
7. The teacher will have the students get their yellow piece of construction paper and using their compass draw 2 circles with the radius of $\frac{1}{4}$ inch for both ($\frac{1}{2}$ inch diameter). They will use their scissors to cut out both circles, put their name on one side of both, and put them in their zip-loc bag as well.
8. To complete this lesson's activities the students will use the black construction paper. The teacher will instruct them to draw 2 circles using their compass with a $\frac{1}{8}$ inch radius ($\frac{1}{4}$ inch diameter). They will use their scissors to cut out both circles, write their name on one side of them, and put them in their zip-loc bag.
9. The teacher will take up the zip-loc bags with the circles in them and keep them for use in the up coming lessons.

E. *Assessment/Evaluation*

1. The teacher will be able to check for understanding by using Appendix G: Using the Compass (Answer Key) to grade the students worksheets Appendix F: Using a Compass. They will also observe the students drawing their circles using their compasses for the culminating activity.

Lesson Five: Angles

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Students will understand geometric concepts and applications. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
2. Lesson Content
 - a. Angles: degree, right angle = 90 degree, acute angle = less than 90 degree, obtuse angle = greater than 90 degree, and straight angle = 180 degree (p.125)
3. Skill Objective(s)

- a. Students will use a protractor to measure the degrees of angles (NM Math 5.3B)

B. *Materials*

1. Chalkboard/Whiteboard---whichever is available
2. Pencil: 1 per student
3. Protractor: 1 per student
4. Appendix H: Using a Protractor- 1 per student
5. Appendix I: Using a Protractor (Answer Key)- 1 per teacher
6. Appendix J: Measuring the Angles- 1 per student
7. Appendix K: Measuring the Angles (Answer Key)- 1 per teacher

C. *Key Vocabulary*

1. An *angle* is formed when two lines, line segments, or rays meet at a common point.
2. A *vertex* is the point at which two lines, line segments, or rays come together.
3. A *degree* is a unit in which angles are measured.
4. A *protractor* is the tool used to measure the degree of an angle.
5. A *right angle* measures at 90 degrees.
6. An *acute angle* has a measure of less than 90 degrees and they are smaller than right angles.
7. An *obtuse angle* has a measure greater than 90 degrees but less than 180 degrees which makes them greater than right angles.
8. A *straight angle* is formed when its two rays are part of the same line. It measures 180 degrees.

D. *Procedures/Activities*

1. The teacher will have the key vocabulary as well as different angles displayed on the chalkboard/whiteboard at the start of the lesson. Make sure there is at least one angle to represent each type of angle: right, acute, obtuse, and straight.
2. The teacher will check for prior knowledge by having the students try to identify the obtuse, acute, right, and straight angles. To insure students understanding go over each angle as you are introducing the key vocabulary so that they can have a visual of the angle as it is being discussed.
3. Have each student get a protractor. Briefly review the proper techniques of using a protractor. Discuss that the center of the bottom part of the protractor should always be placed on the vertex of the angle and that the numbers on the protractor will represent the degrees of the angle.
4. Allow the students 2-3 minutes to look at the protractor, to study it, and to ask questions if they have any.
5. Hand out a copy of Appendix H: Using a protractor to each student. The teacher will do example X orally with the students and explain how the answer was achieved. Students will then be given 5-10 minutes to complete the worksheet Appendix H: Using a protractor on their own. Once the students have completed the worksheet the teacher will orally review all answers and check for understanding.
6. Students will then be handed a copy of Appendix J: Measuring the Angles to be completed individually. The teacher will assist as needed. (this should be approximately 15 minutes). The teacher will collect Appendix J: Measuring the Angles from the students once completed.

E. *Assessment/Evaluation*

1. The teacher will observe the students understanding as they are doing the activity orally.
2. The teacher will check for students understanding by grading Appendix J: Measuring the Angles by using Appendix K: Measuring the Angles (Answer Key) as a guide.

Lesson Six: Angles (part 2)

A. Daily Objectives

1. Concept Objective(s)
 - a. Students will understand geometric concepts and applications. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
2. Lesson Content
 - a. Angles: degree, right angle = 90 degree, acute angle = less than 90 degree, obtuse angle = greater than 90 degree, and straight angle = 180 degree (p.125)
3. Skill Objective(s)
 - a. Students will use a protractor to measure the degrees of angles (NM Math 5.3B)
 - b. Students will identify and construct different kinds of triangles: equilateral, right, and isosceles (NM Math 5.3G1)

B. Materials

1. Displayed key vocabulary on the board from Lesson Five: Angles
2. The book *What Your Fifth Grader Needs To Know* from the Core Knowledge series by E.D. Hirsh, Jr. (p. 43)
3. Appendix L: Coyote- 1 per student and 1 per teacher
4. Appendix M: Coyote (Answer Key)- 1 per teacher
5. Sharpened Pencil: 1 per student
6. Protractor: 1 per student
7. Chalkboard/Whiteboard/overhead- whatever is available to the teacher
8. Construction paper: 1 3x3 inch piece of yellow construction paper per student (this will be used for the culminating activity)
9. Construction paper: 1 6x9 inch piece of light brown construction paper per student (this will be used for the culminating activity)
10. Scissors: 1 pair per student
11. Students gallon sized zip-loc bag with their name on it from Lesson Four: Circles (part 2) that has their pieces for the culminating activity

C. Key Vocabulary)

1. Review vocabulary from Lesson Five: Angles

D. Procedures/Activities

1. Introduce the lesson by having the key vocabulary displayed on the chalkboard/ whiteboard/ or overhead- whatever is available. The teacher will review the vocabulary with the students.
2. Students will need to have a pencil, protractor, and a copy of Appendix L: Coyote on their desks. Once everyone has their supplies the teacher will divide the students into groups of 2-3 per group.
3. Once the students are in their groups the teacher will remind and briefly discuss with the students that the combined sum of the angles of a triangle equal 180 degrees in any given triangle (this is prior knowledge from being taught in fourth grade Core Knowledge).

4. The teacher will model how to measure the angles of a complete triangle on the overhead using a student copy of Appendix L: Coyote (the teacher will only model the measuring of 1 complete triangle of the Appendix L: Coyote worksheet). The students will then complete the rest of the worksheet within their group.
 5. *Optional:* For extra credit the students draw from prior knowledge of triangles to identify isosceles triangle, right triangle, and equilateral triangle on Appendix L: Coyote.
 6. Culminating activity: once the students have completed and turned in Appendix L: Coyote worksheet they will do the angles for the culminating activity (the owl). The students will be given the light brown construction paper as well as the yellow construction paper. They will also be given their zip loc bags from Lesson Four: Circles. The students will use their protractor to make 20 isosceles triangles each with a base measuring $\frac{1}{2}$ inch and the sides measuring $\frac{3}{4}$ inch out of the light brown paper (the teacher may wish to model making one with the students...hint, it is easier if you have the students fold the construction paper 3 times to make multiple triangles at once).
 7. The students will then use the light brown construction paper to make 2 equilateral triangles with the measurement of 1 inch by 1 inch by 1 inch.
 8. The students will use the yellow construction paper to make 1 equilateral triangle with the measurement of $\frac{1}{2}$ inch by $\frac{1}{2}$ inch by $\frac{1}{2}$ inch.
 9. The students will cut out all the triangles, put their name on one side of them, and put them in their zip loc bags along with their circles to keep for the culminating activity.
- E. *Assessment/Evaluation*
1. The teacher will observe the students understanding as they are doing the activity orally.
 2. The teacher will check for understanding by using Appendix M: Coyote (Answer Key) to grade Appendix L: Coyote.

Lesson Seven: Area

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will understand geometric concepts and applications. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
 2. Lesson Content
 - a. Area: the formula for the area of a rectangle (Area = length x width). (p. 125)
 3. Skill Objective(s)
 - a. Students will find the area of specific shapes using given algebraic formulas (NM Math 5.3D3b, 5.3E, F1, F2, F3)
- B. *Materials*
1. Ruler: 1 per student
 2. Paper: 2 pieces of regular sized notebook paper per student
 3. Sharpened pencil: 1 per student
 4. Whiteboard/ chalkboard/ overhead-whatever is available to the teacher
- C. *Key Vocabulary*
1. The surface of a two dimensional object enclosed within a boundary is known as the *area* of an object.

D. *Procedures/Activities*

1. The teacher will begin the lesson by giving the definition of area. She will lead a class discussion about when it will be important to know how to figure the area of an object (example: floor space, desk space, wall space, etc.)
2. The teacher will model measuring a desk top with a ruler to find the length and the width of the desk. The teacher will then record on the whiteboard the measurements of the desk and demonstrate how to solve the equation using the formula $A=l \times w$ (Area = length x width).
3. The teacher will have the students get out a book that they each have in their desk (example: a spelling book, or English book). The students will use their ruler to get a measurement of the book. They will first measure the length of the book and the teacher will write it on the board. They will then get the width of the book and the teacher will write that measurement on the board. The students will record this on their own paper as the teacher works the problem on the board. The teacher will check for the students understanding as they complete the problem.
4. The teacher will have the students measure the bottom portion of their chair and figure the area on their own. Once the students have finished they will work the problem on the board with the teacher to make sure they have successfully answered it.
5. With the teachers guidance the student will look around the room and find different objects that can be measured for area (for example: the surface of a filing cabinet, bulletin board, counter top, etc). As the students call out different objects the teacher will record them on the whiteboard.
6. The students will be allowed to move around the room to measure the given objects that the teacher wrote on the board. They will record their answers and work the problems on their paper. Remind the students to label in inches, feet, or centimeters. The students will turn this in when completed.

E. *Assessment/Evaluation*

1. The teacher will observe the students as they are doing this activity to check for understanding.
2. The teacher will check for mastery by grading the papers once completed.

Lesson Eight: Area (part 2)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Students will understand geometric concepts and applications. (NM Math 5.3B, 5.3C1,2, 5.3D1,2,3b)
2. Lesson Content
 - a. Area: the formula for the area of a rectangle (Area = length x width). (p. 125)
3. Skill Objective(s)
 - a. Students will find the area of specific shapes using given algebraic formulas (NM Math 5.3D3b, 5.3E, F1, F2, F3)

B. *Materials*

1. Appendix N: The Area of Geometry- 1 per student
2. Appendix O: The Area of Geometry (Answer Key)- 1 per teacher
3. Sharpened pencil: 1 per student
4. Ruler: 1 per student

5. Scissors: 1 pair per student
 6. Whiteboard/ Chalkboard/ Overhead- whatever is available to the teacher.
 7. Construction paper: 1 piece of 8 x 8 inch dark brown construction paper per student
 8. Students gallon sized zip-loc bag with their name on it from Lesson Four: Circles (part 2) that has their pieces for the culminating activity
- C. *Key Vocabulary*
1. The surface of a two-dimensional object enclosed within a boundary is known as the *area* of an object.
- D. *Procedures/Activities*
1. The teacher will review the key vocabulary and yesterday's lesson by working one example on the board and discussing the formula of area orally.
 2. To check for mastery the students will complete Appendix N: The Area of Geometry worksheet on their own. This should take between 15-20 minutes to complete. Have the students turn this in when completed.
 3. Culminating Activity: the students will be handed the dark brown construction paper and their zip-loc bags containing their pieces. They will be asked to make a rectangle with the area of 12 inches allowing the students to make their own measurements of l x w (this could be 6 inch x 2 inch, or 3 inch by 4 inch, or 1 inch by 12 inch) (this will be the oak branch that the owl is sitting on).
 4. They will cut it out, write their name on it, and place their rectangle in their zip lock bag for use during the culminating activity.
- E. *Assessment/Evaluation*
1. The teacher will use Appendix O: The Area of Geometry (Answer Key) to check for mastery of Appendix N: The Area of Geometry.

VI. CULMINATING ACTIVITY

- A. To introduce the culminating activity the teacher will read The Wise Old Owl by Edward Hersey Richards in the Core Knowledge book *What Your Fifth Grader Needs to Know* (p.4). On a piece of 12 x 18 dark blue construction paper have the students assemble the pieces from their zip –loc bags in the likeness of Appendix P: The Wise Old Owl. Once assembled and glued to the top portion of the dark blue paper the students will need to draw the owl's legs as well as any background objects they choose (example: moon, stars, tree, etc.). Have the students write the poem The Wise Old Owl and attach it to the bottom of the construction paper. The teacher may choose to display the final projects for viewing.

VII. HANDOUTS/WORKSHEETS

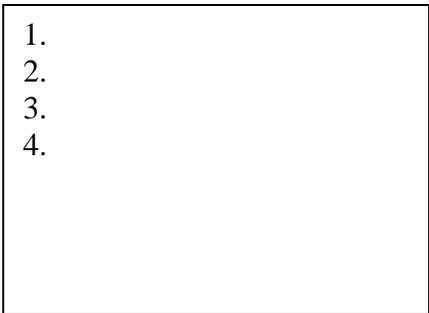
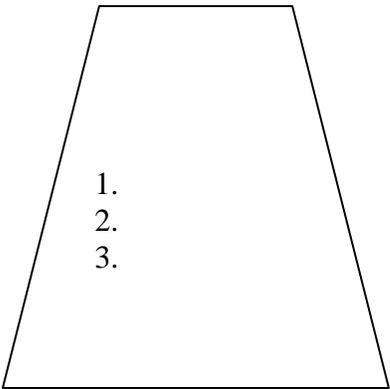
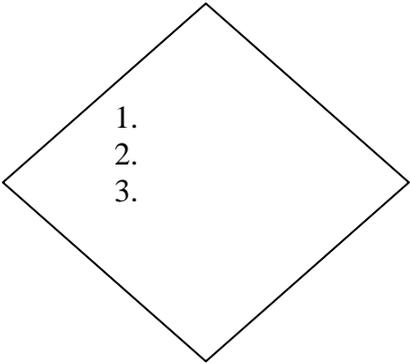
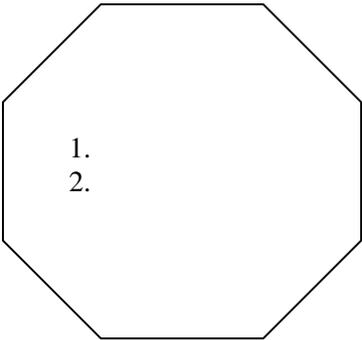
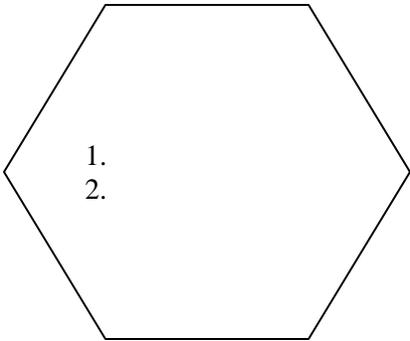
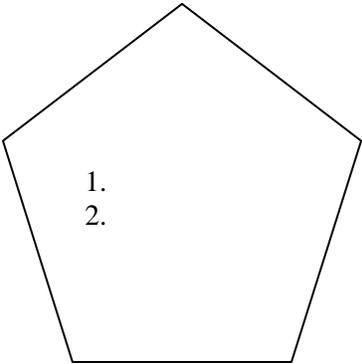
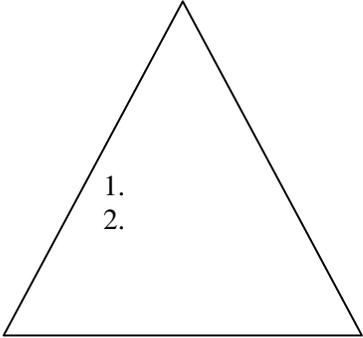
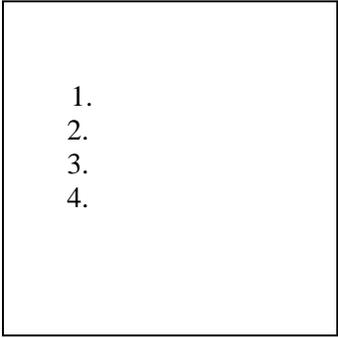
- A. Appendix A: Geometric Shapes
- B. Appendix B: Geometric Shapes (Answer Key)
- C. Appendix C: Native American Pottery
- D. Appendix D: Go Around
- E. Appendix E: Go Around (Answer Key)
- F. Appendix F: Using a Compass
- G. Appendix G: Using a Compass (Answer Key)
- H. Appendix H: Using a Protractor
- I. Appendix I: Using a Protractor (Answer Key)
- J. Appendix J: Measuring the Angles

- K. Appendix K: Measuring the Angles (Answer Key)
- L. Appendix L: Coyote
- M. Appendix M: Coyote (Answer Key)
- N. Appendix N: The Area of Geometry
- O. Appendix O: The Area of Geometry (Answer Key)
- P. Appendix P: The Wise Old Owl

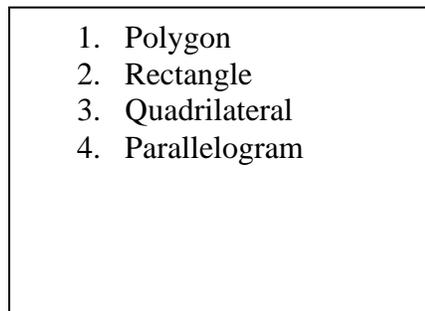
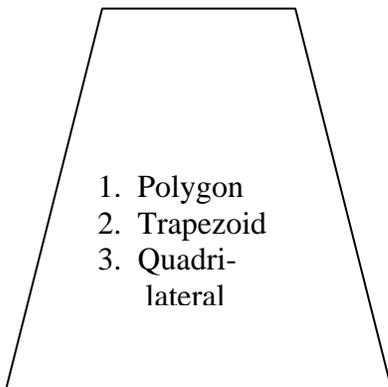
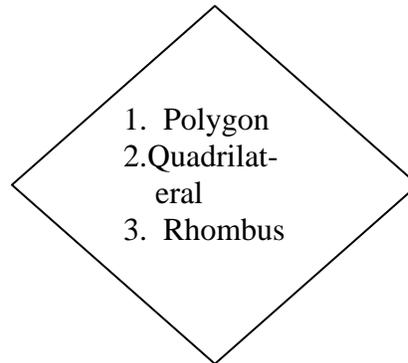
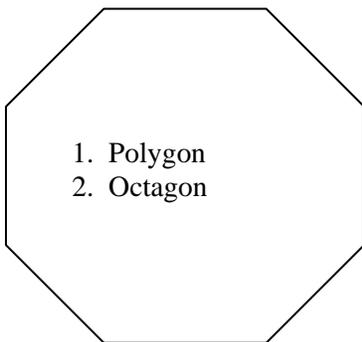
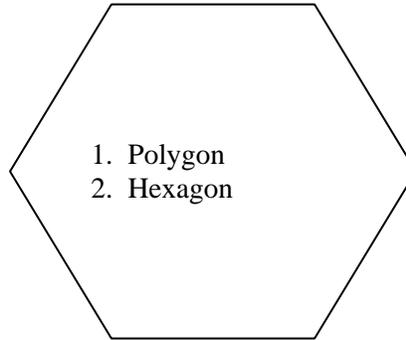
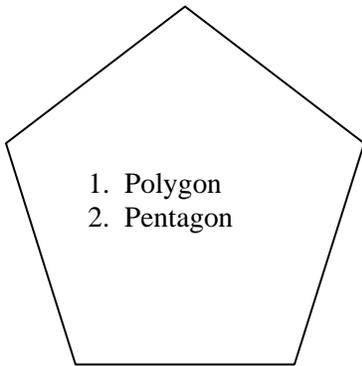
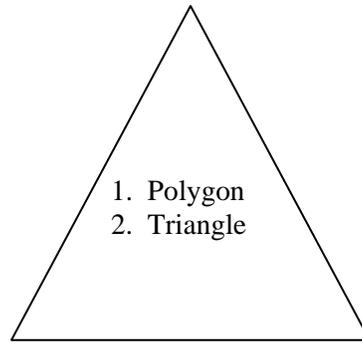
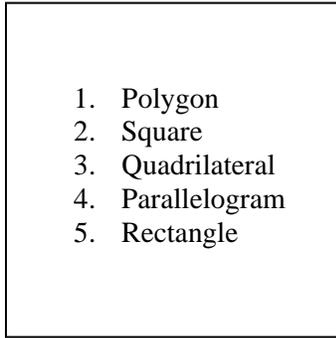
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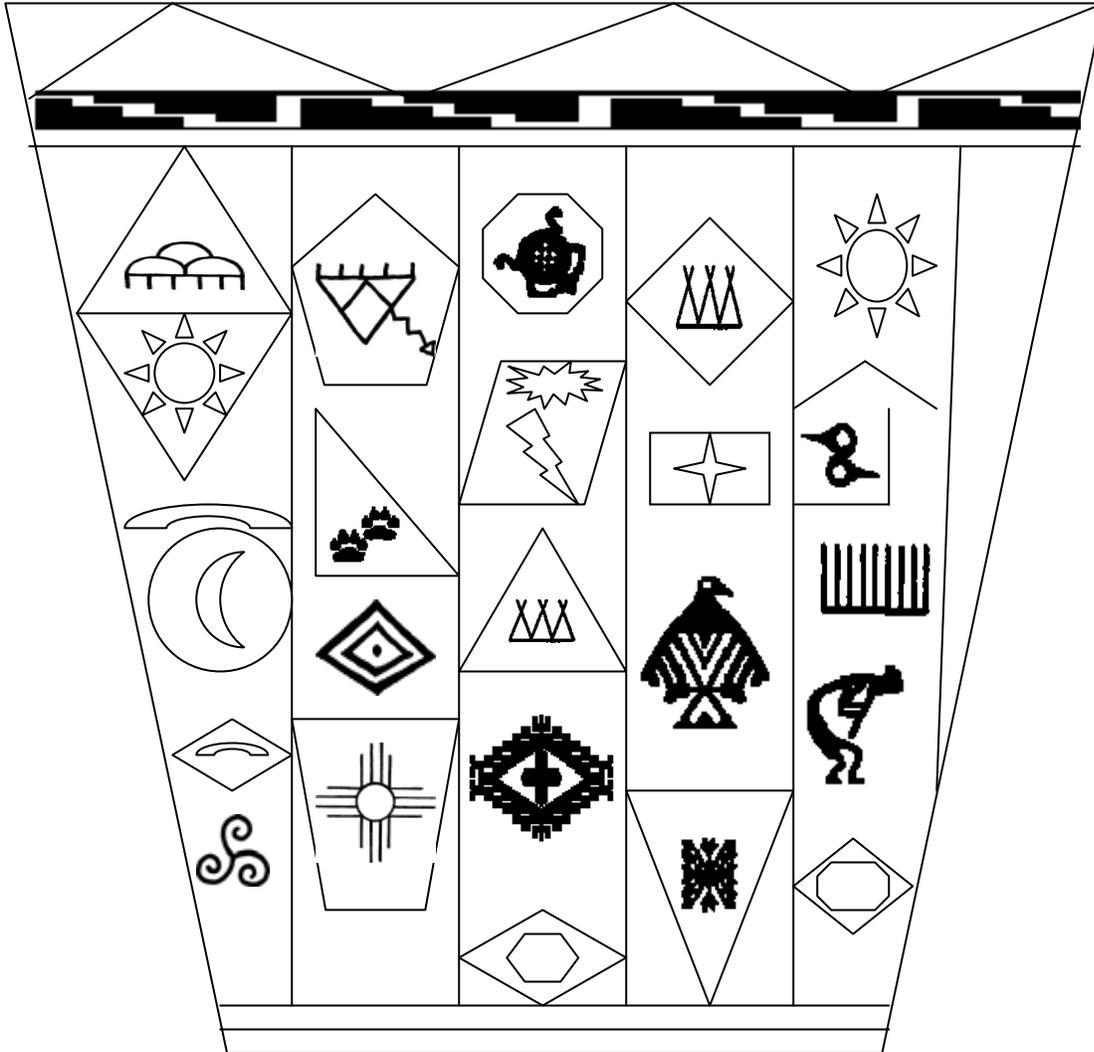
Geometry Planely Simple
Appendix A: Geometric Shapes



Geometry Planely Simple
Appendix B: Geometric Shapes (Answer Key)

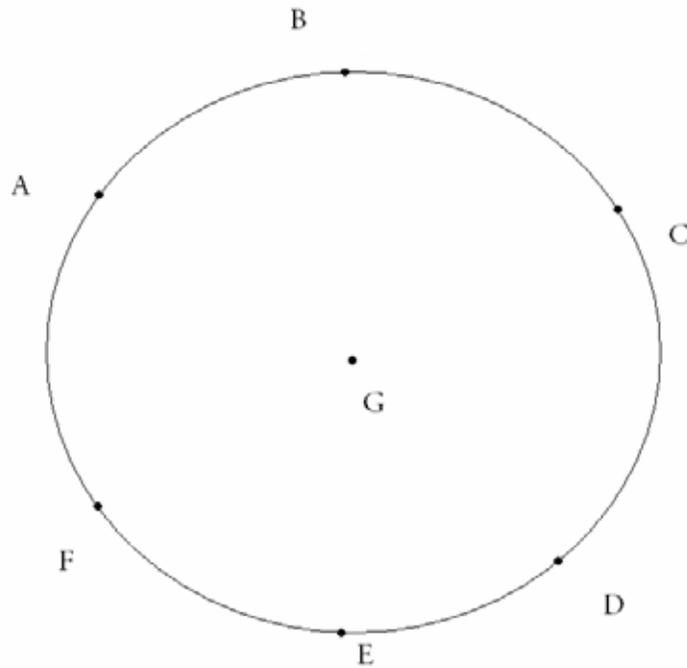


Geometry Planely Simple
 Appendix C: Native American Pottery



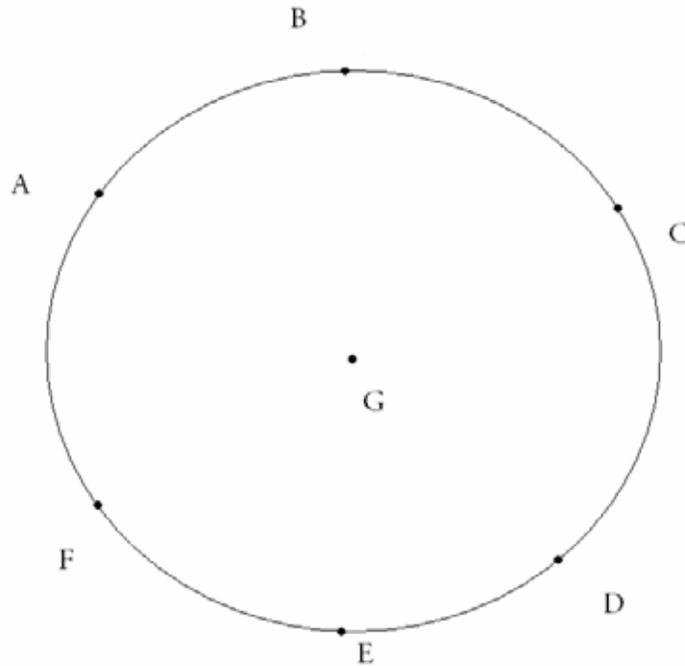
- Color 1 *trapezoid* purple.
- Color 1 *octagon* red.
- Color 1 *hexagon* blue.
- Color 1 *pentagon* green.
- Color 1 *parallelogram* yellow.
- Color 1 *quadrilateral* black.
- Color 1 *square* orange.
- Color 1 *rectangle* pink.
- Color 3 *triangles* gray.
- Color 1 *rhombus* brown.

Geometry Planely Simple
Appendix D: Go Around



1. Find two points that identify an arc on the circle. Trace the arc using a red crayon.
2. Find two points that identify a chord. Using a blue crayon, draw a line that connects the two points.
3. Find two points that identify a radius. Use a green crayon connecting those points.
4. Find the points that identify a diameter. Use an orange crayon connecting those points.

Geometry Planely Simple
Appendix E: Go Around (Answer key)



5. Find two points that identify an arc on the circle. Trace the arc using a red crayon. *Possible answers (/A-B/B-C/C-D/D-E/E-F/F-A/) Other possibilities available.*
6. Find two points that identify a chord. Using a blue crayon, draw a line that connects the two points. *Possible answers (/A-B/B-C/C-D/D-E/E-F/F-A/) Other possibilities available.*
7. Find two points that identify a radius. Use a green crayon connecting those points. *Point G connecting any dot on the perimeter of the circle.*
8. Find the points that identify a diameter. Use an orange crayon connecting those points. *Any two dots that travel over the center point G and connect (F-G-C for example)*

Geometry Planely Simple

Appendix F: Using the Compass

1. Using the compass, make a circle that will connect these dots together. Place the pointer of your compass on the center point, then extend the compass until the pencil point touches a dot opposite of the center point, then rotate to connect the dots on the *diameter* of your circle.

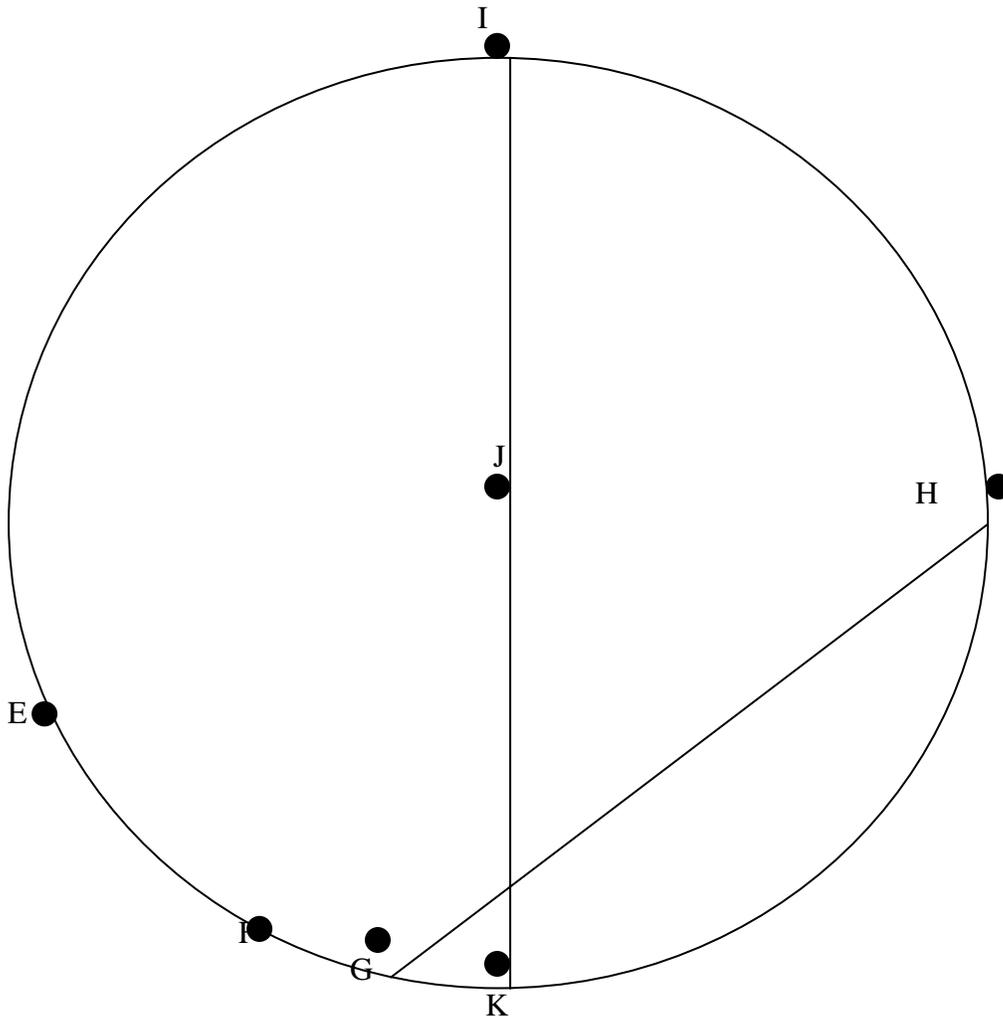


2. Using the circle you made in #1, look at the measurement guide on your compass, this will represent the *radius*. Record your answer here. _____
3. Using your compass, put the pointer on one of the dots that falls on the perimeter of the circle that you have made in question #1, then open it until the pencil point touches the dot on the opposite side. Look at the measurement guide on the compass and this will represent the *diameter*. Record your answer here using inches. _____ This can also be done by using the formula $D = 2 \times \text{Radius}$.
4. In the space below, make a circle that has a *radius* of 1 1/2 inches. Your center point is provided for you. What is the *diameter* of this circle? _____

Geometry Planely Simple
Appendix F: Using the Compass (page 2)

Directions: Use the circle below to answer the questions.

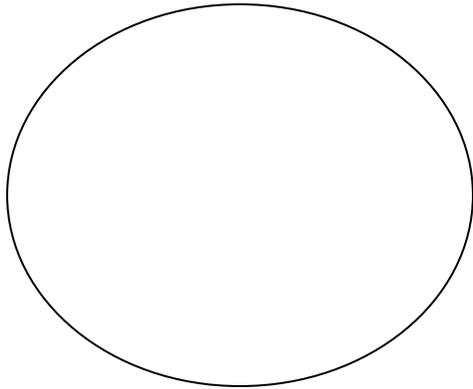
5. Points E, F represent a/an _____.
6. Points G, H represent a/an _____.
7. Which two points represent the radius? _____
8. Which two points represent the diameter? _____



Geometry Planely Simple

Appendix G: Using the Compass (Answer Key)

1. Using the compass, make a circle that will connect these dots together. Place the pointer of your compass on the center point, then extend the compass until the pencil point touches a dot opposite of the center point, then rotate to connect the dots on the *diameter* of your circle.

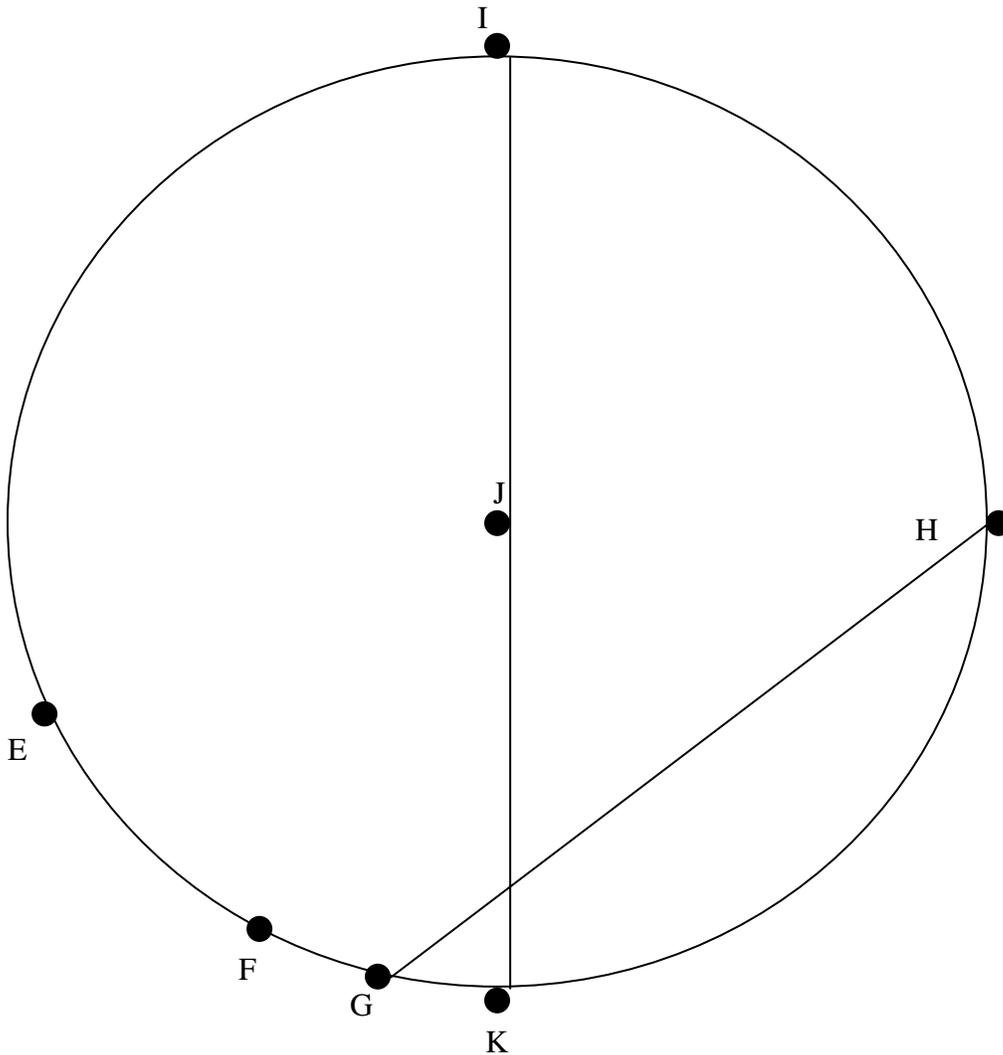


2. Using the circle you made in #1, look at the measurement guide on your compass, this will represent the *radius*. Record your answer here. 1 in
3. Using your compass, put the pointer on one of the dots that falls on the perimeter of the circle that you have made in question #1, then open it until the pencil point touches the dot on the opposite side. Look at the measurement guide on the compass and this will represent the *diameter*. Record your answer here using inches. 2 in. This can also be done by using the formula $D = 2 \times \text{Radius}$.
4. In the space below, make a circle that has a *radius* of 1 1/2 inches. Your center point is provided for you. What is the *diameter* of this circle? 3 in.

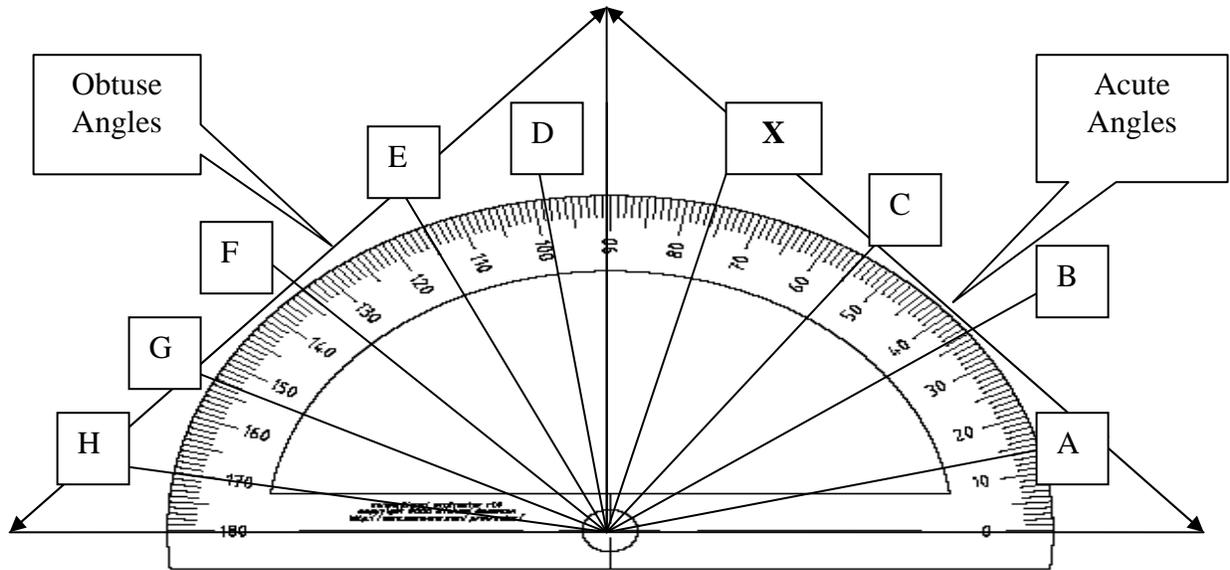
Geometry Planely Simple
Appendix G: Using the Compass (page 2)(Answer Key)

Directions: Use the circle below to answer the questions.

5. Points E, F represent a/an Arc.
6. Points G, H represent a/an Chord.
7. Which two points represent the radius? (J-K) or (J-I)
8. Which two points represent the diameter? K I



Geometry Planely Simple
Appendix H: Reading a Protractor



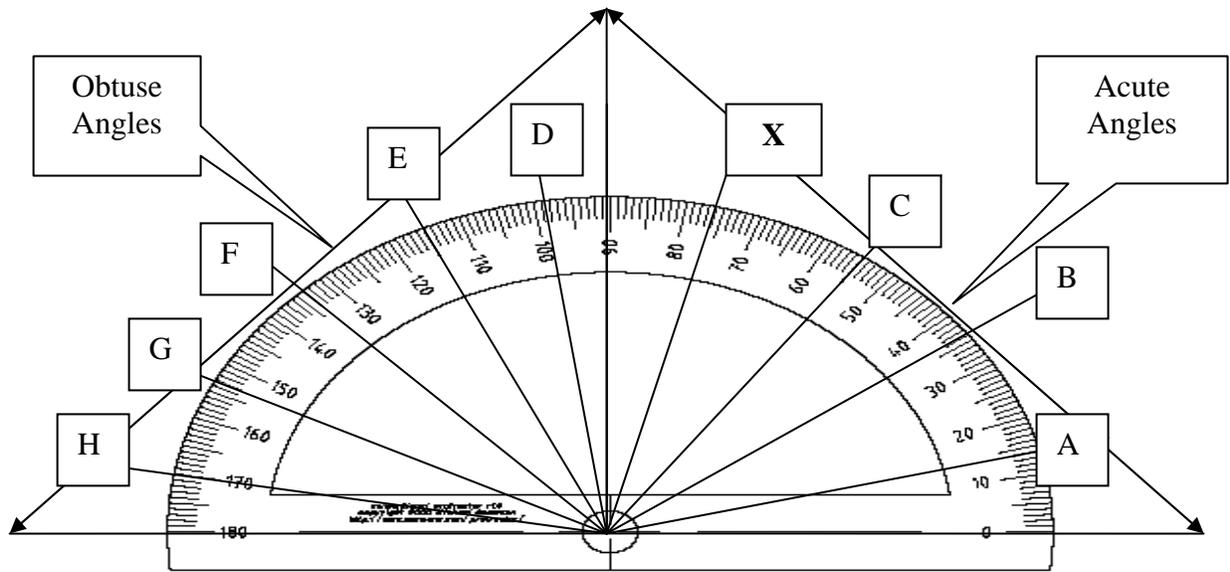
On the lines below write the degrees to angles A, B, C, and D and state whether it is an acute or obtuse angle. **Example X** has been done for you.

Example X

X. 76° it is an acute angle.

- | | |
|----------|----------|
| A. _____ | B. _____ |
| C. _____ | D. _____ |
| E. _____ | F. _____ |
| G. _____ | H. _____ |

Geometry Planely Simple
Appendix I Reading a Protractor (Answer Key)



On the lines below write the degrees to angles A, B, C, and D and state whether it is an acute or obtuse angle. **Example X** has been done for you.

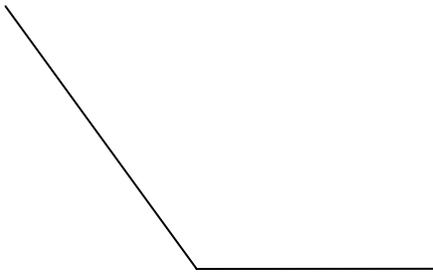
Example X

X. 76° it is an acute angle.

- | | |
|-----------------------------|-----------------------------|
| A. <u>14</u> <u>acute</u> | B. <u>36</u> <u>acute</u> |
| C. <u>55</u> <u>acute</u> | D. <u>99</u> <u>obtuse</u> |
| E. <u>115</u> <u>obtuse</u> | F. <u>134</u> <u>obtuse</u> |
| G. <u>154</u> <u>obtuse</u> | H. <u>170</u> <u>obtuse</u> |

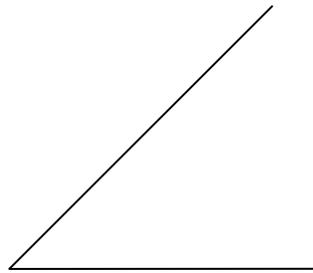
Geometry Planely Simple
Appendix J: Measuring the Angle

Use the protractor to measure the angles below, write the degree in the blank space provided and put an X on the blank line under the appropriate terms provide (acute, obtuse, or right angle).



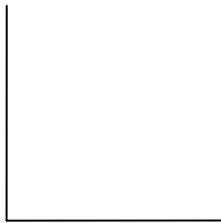
1. _____

acute _____ obtuse _____ right _____



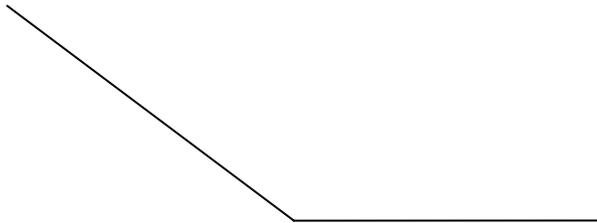
2. _____

acute _____ obtuse _____ right _____



3. _____

acute _____ obtuse _____ right _____



4. _____

acute _____ obtuse _____ right _____

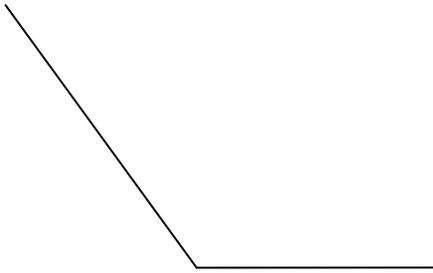


5. _____

acute _____ obtuse _____ right _____

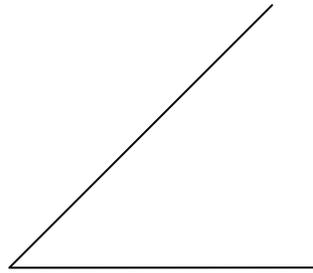
Geometry Planely Simple
Appendix K: Measuring the Angle

Use the protractor to measure the angles below, write the degree in the blank space provided and put an X on the blank line under the appropriate terms provide (acute, obtuse, or right angle).



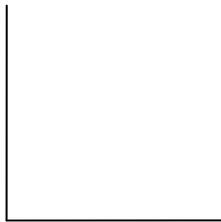
1. 124

acute _____ obtuse X right _____



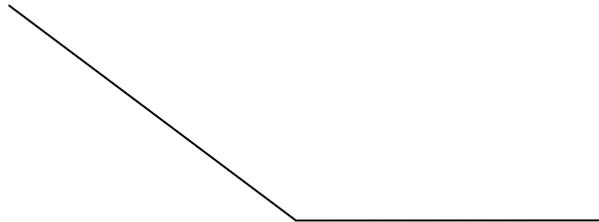
2. 47

acute X obtuse _____ right _____



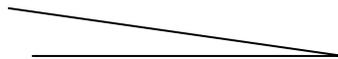
3. 90

acute _____ obtuse _____ right X



4. 141

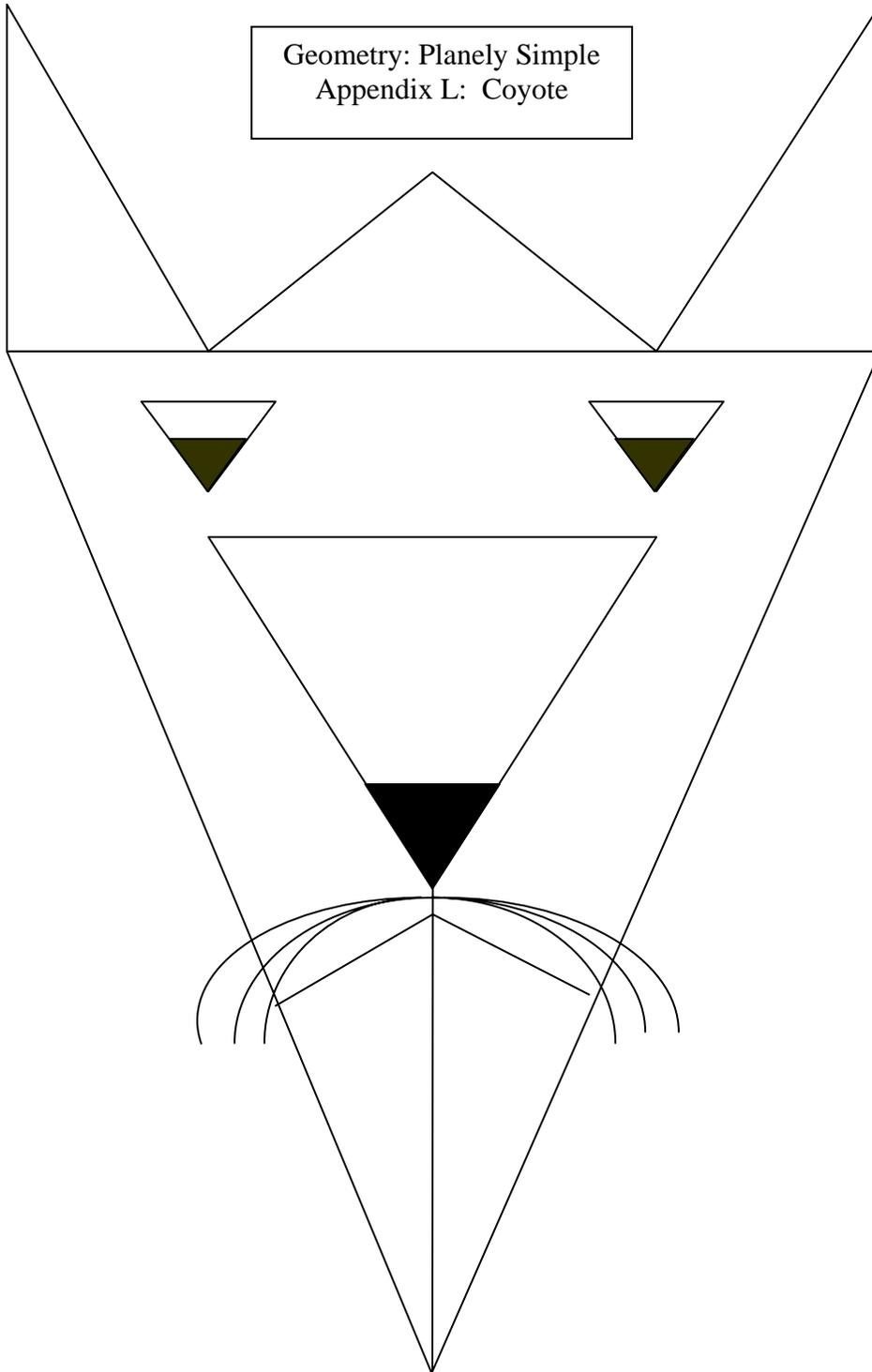
acute _____ obtuse X right _____

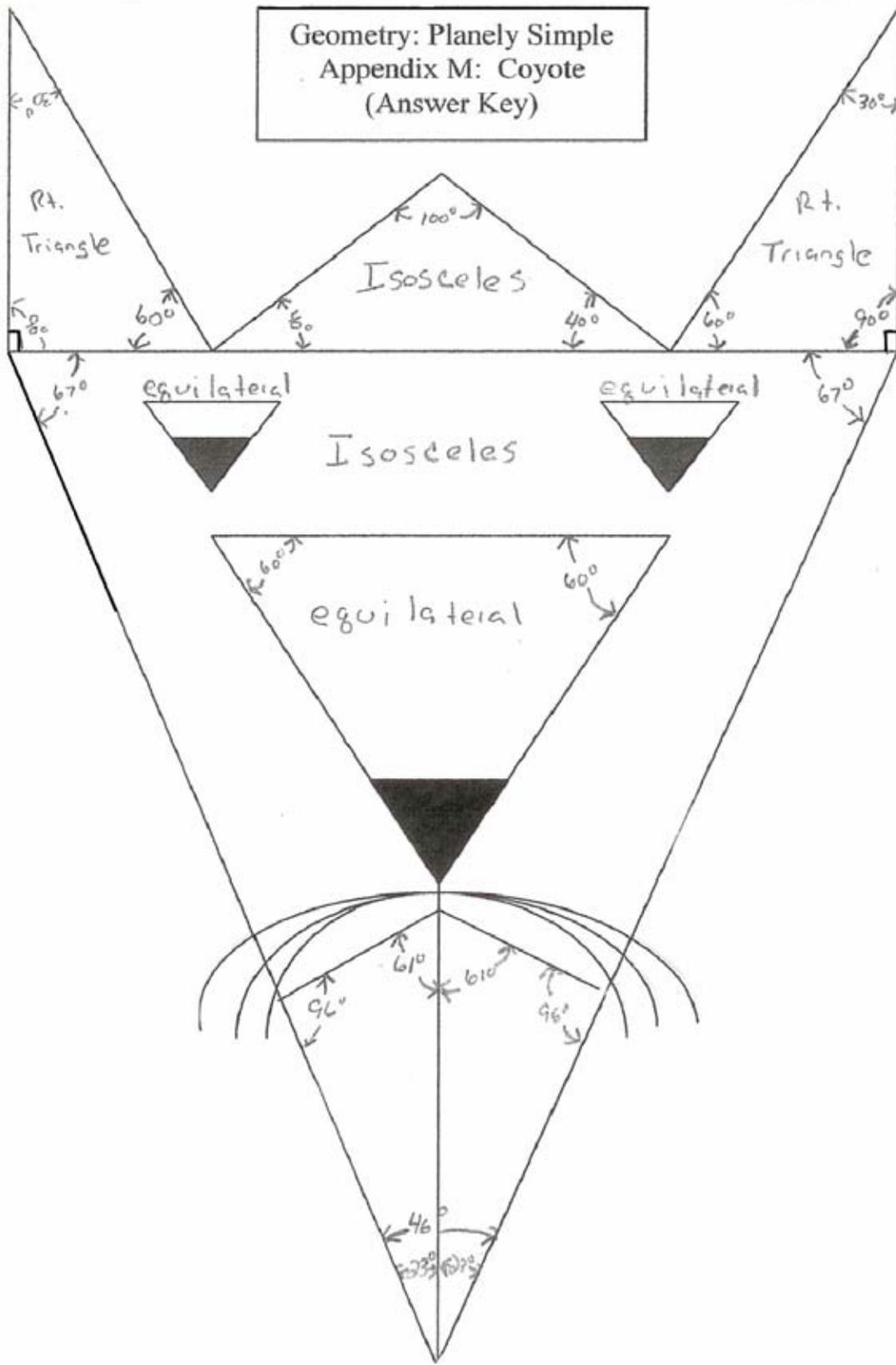


5. 9

acute X obtuse _____ right _____

Geometry: Planely Simple
Appendix L: Coyote





Error!

Geometry Planely Simple
Appendix: N The Area of Geometry

Directions: Read the following story problems. Use your prior knowledge to determine the measurements of each shape. Remember the equation for Area: $A = L \times W$

1. If one side of a square is 4 inches, how long are the measurements of the other sides?

Answer: _____ 4 in.



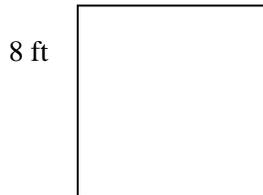
2. If one side of a rectangle is 10 centimeters, how long is the opposite side?

Answer: _____ 10 cm



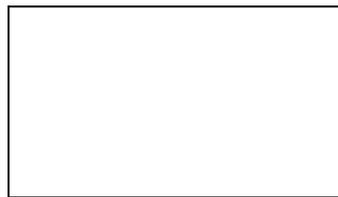
3. If one side of a square measures 8 feet, what is the area of the square?

$A =$ _____



4. What is the area of a rectangle whose sides are 7 meters by 10 meters?

$A =$ _ _ _ _ _ 7 m



10 m

5. What is the area of a rectangle whose sides are 5 feet by 3 feet?

$A =$ _____

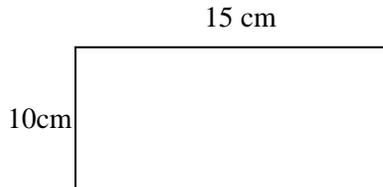


5 ft

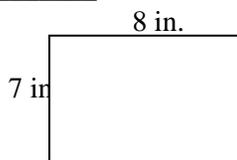
Geometry Planely Simple
Appendix: N The Area of Geometry (*continued*)

Directions: Determine the area of the following objects.

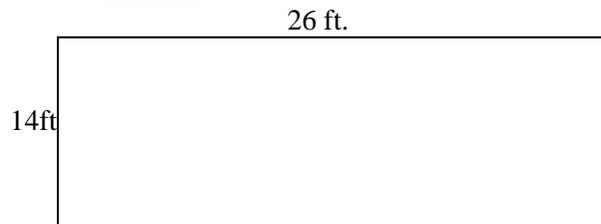
6. $A = \underline{\hspace{2cm}}$



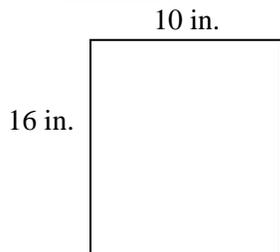
7. $A = \underline{\hspace{2cm}}$



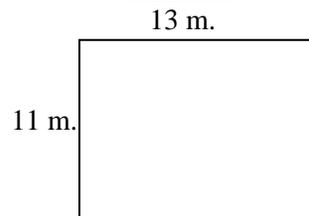
8. $A = \underline{\hspace{2cm}}$



9. $A = \underline{\hspace{2cm}}$



10. $A = \underline{\hspace{2cm}}$



Geometry Planely simple

Appendix: O The Area of Geometry (Answer Key)

Directions: Read the following story problems. Use your prior knowledge to determine the measurements of each shape. Remember the equation for Area: $A = L \times W$

1. If one side of a square is 4 inches, how long are the measurements of the other sides?

Answer: 4 in

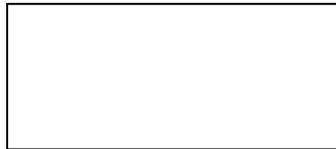
4 in.



2. If one side of a rectangle is 10 centimeters, how long is the opposite side?

Answer: 10 cm.

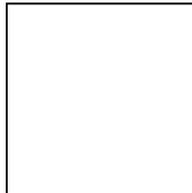
10 cm



3. If one side of a square measures 8 feet, what is the area of the square?

A = 64 ft.

8 ft



4. What is the area of a rectangle whose sides are 7 meters by 10 meters?

A = 70 cm
7 m



10 m

5. What is the area of a rectangle whose sides are 5 feet by 3 feet?

A = 15 ft.

3ft



5 ft

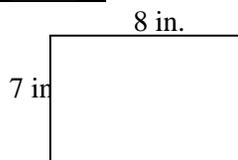
Geometry Planely Simple
Appendix: O The Area of Geometry (*continued*) (Answer Key)

Directions: Determine the area of the following objects.

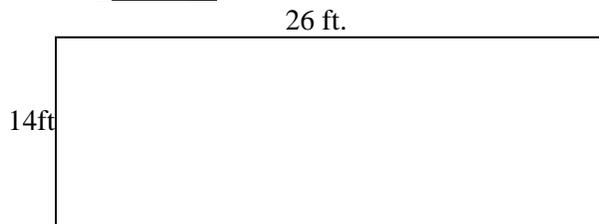
6. $A = \underline{150 \text{ cm.}}$
15 cm



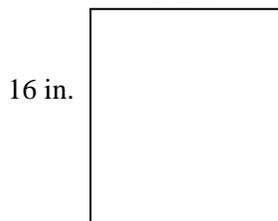
7. $A = \underline{56 \text{ in.}}$



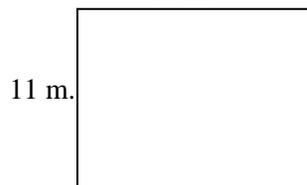
8. $A = \underline{364 \text{ ft.}}$



9. $A = \underline{160 \text{ in.}}$
10 in.



10. $A = \underline{143 \text{ m.}}$
13 m.



Geometry: Planely Simple
Appendix P: The Wise Old Owl

