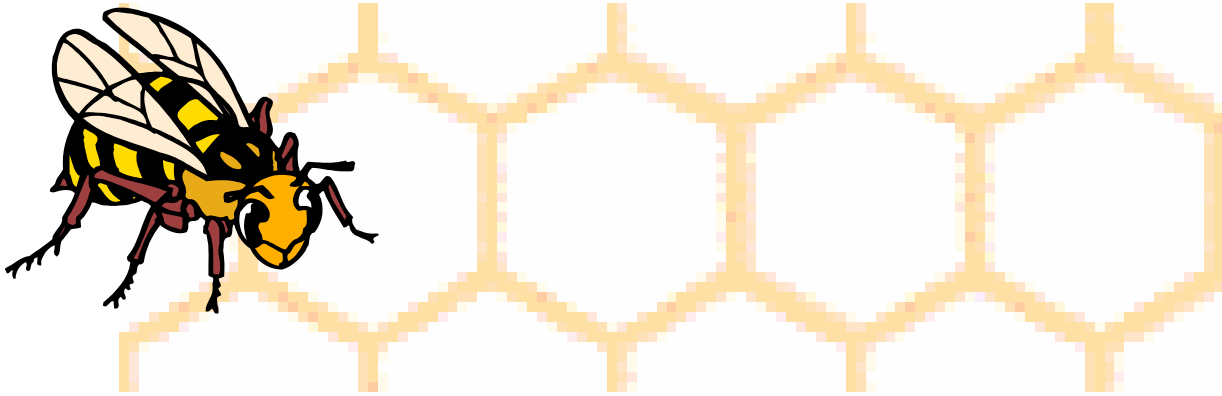
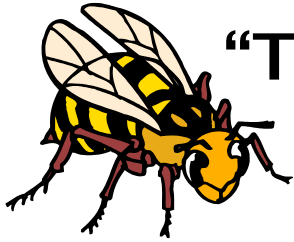


How is geometry used to build the honeycomb?





A selection from—
“The Honeycomb Conjecture”
by Ivars Peterson

“Honeybees know a thing or two about working with wax and fashioning elegant, symmetrical structures. Gorging themselves on honey, young worker bees slowly excrete slivers of wax, each fleck about the size of a pinhead. Other workers harvest these tiny wax scales, then carefully position and mold them to assemble a vertical comb of six-sided, or hexagonal, cells. The bees cluster in large numbers, maintaining a hive temperature of 35C, which keeps the wax firm but malleable during cell construction.”

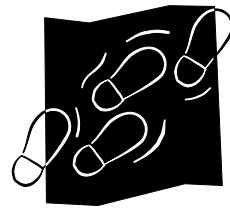
Peterson, Ivars. “The Honeycomb Conjecture.”
Science News July 24, 1999.

PROBLEM- SOLVING STEPS

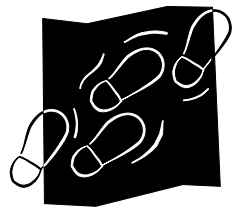


1. Understand the Problem

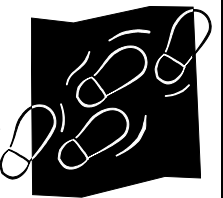
2. Decide on a Plan



3. Carry out the Plan

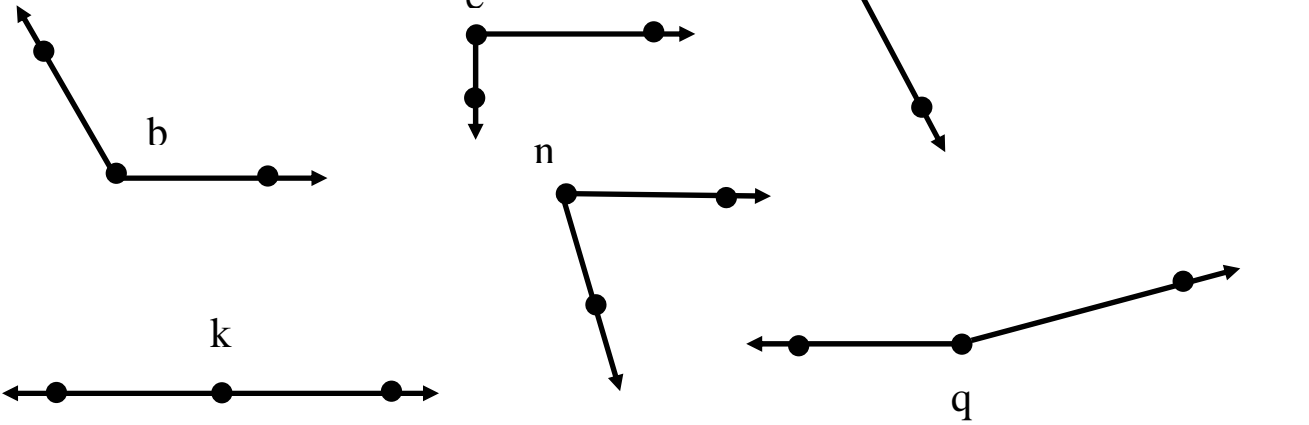


4. Look Back and Review



Classifying Angles*

Here are some angles.



Sort the angles into two groups based on a common property. Each angle must fit into one group, but not both. It is possible for a group to have only one angle.

Part A

Fill in the chart below. Write the letters of the angles in the groups you have made.

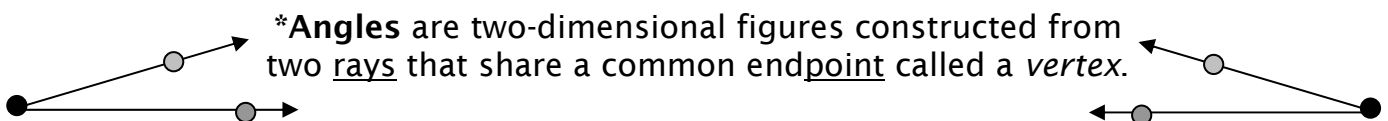
Group 1	Group 2

Part B

Explain your sorting method.

Group 1:

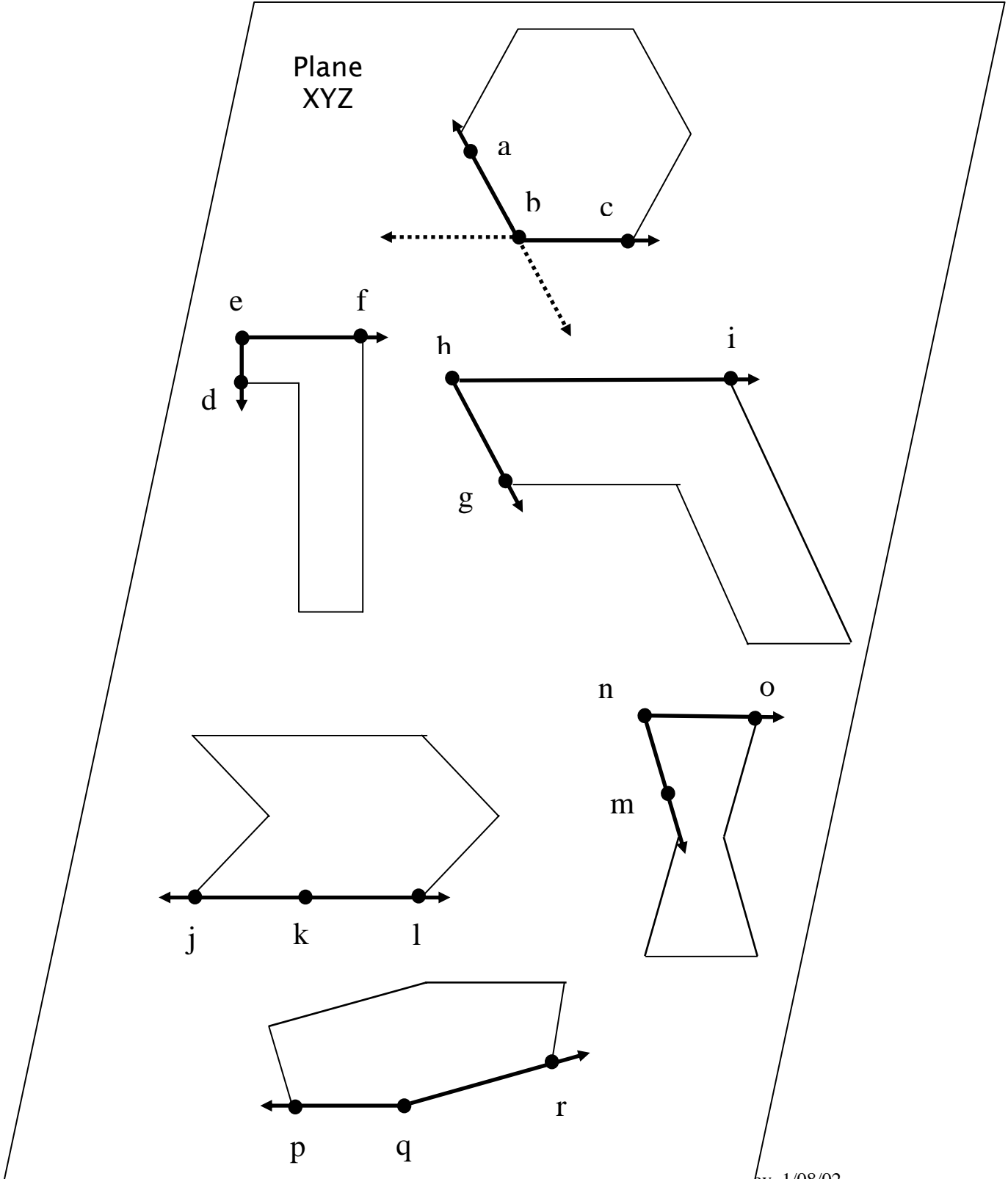
Group 2:



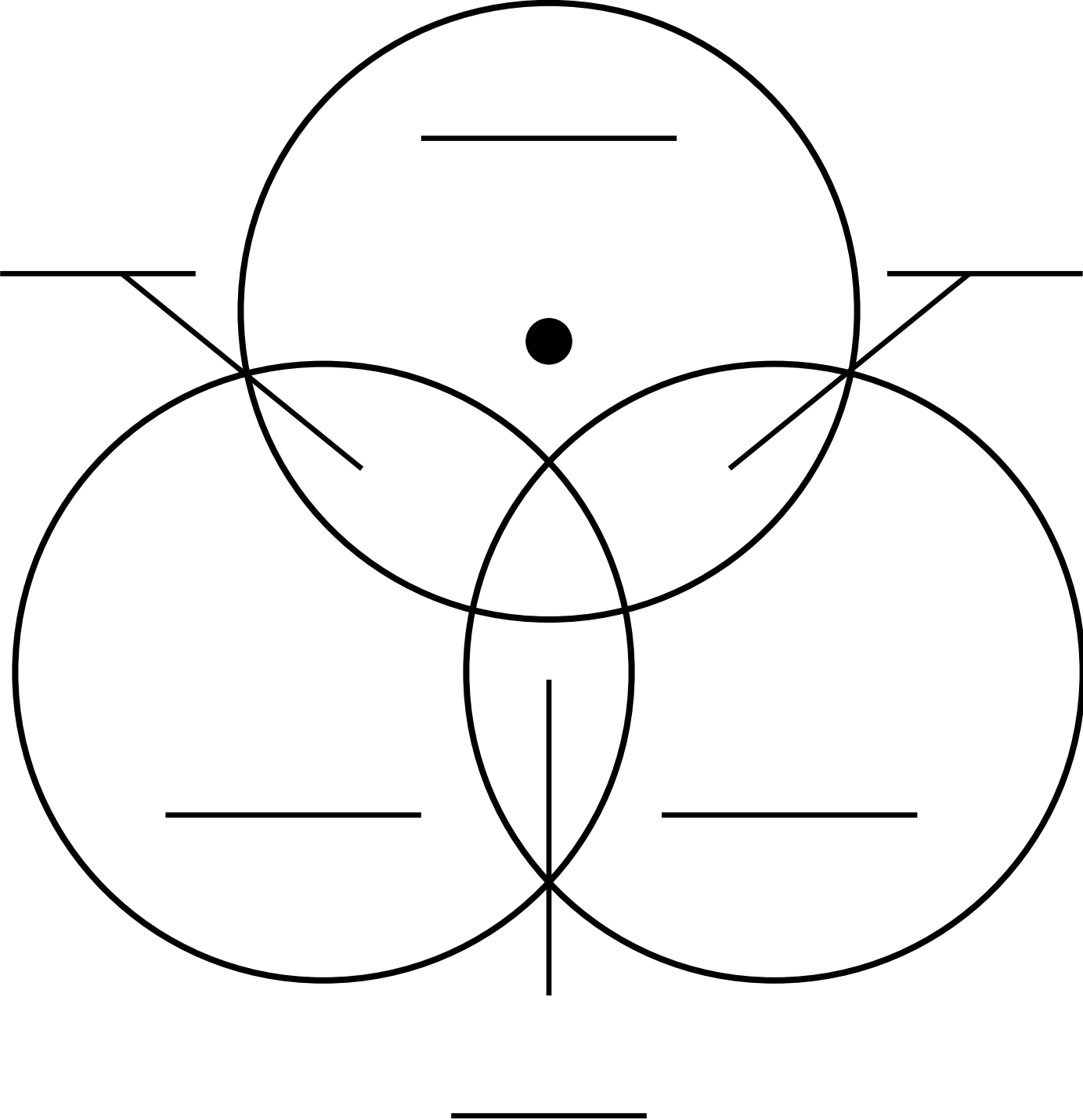
*Angles are two-dimensional figures constructed from two rays that share a common endpoint called a vertex.

Constructing Angles

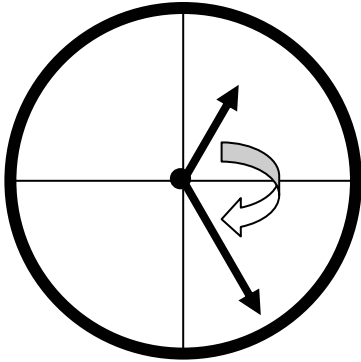
In Plane XYZ, **angles** were constructed from the interaction of points, lines, and rays. Each of these **angles** could be part of a larger hexagon.



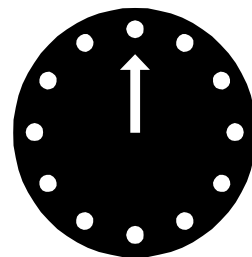
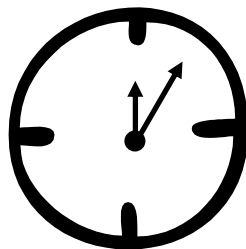
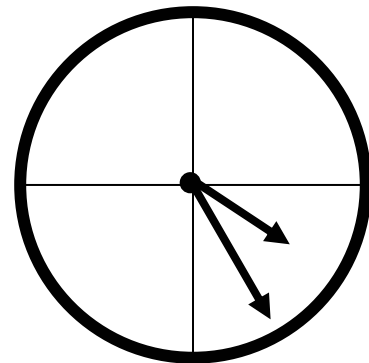
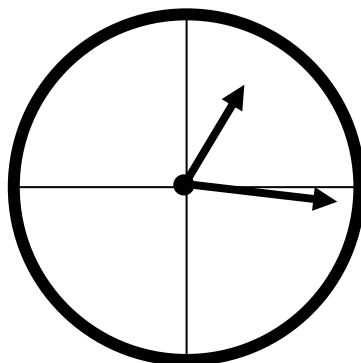
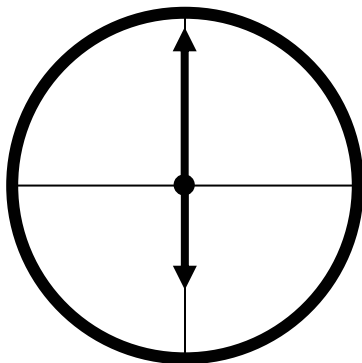
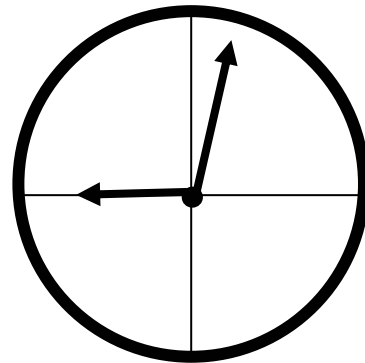
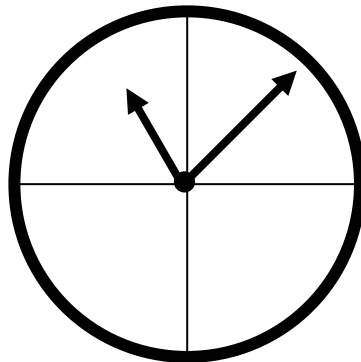
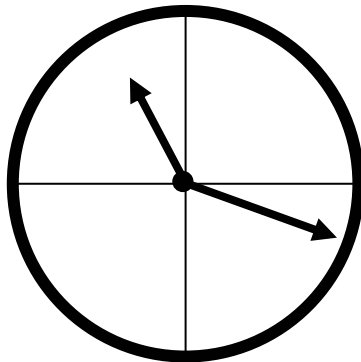
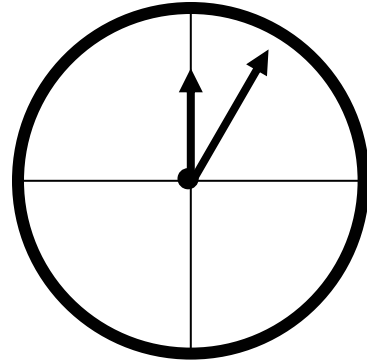
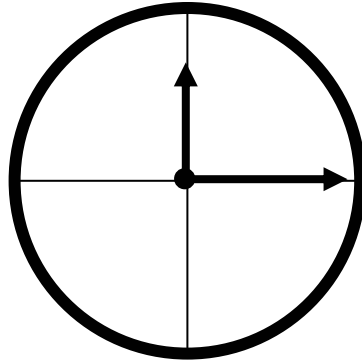
Exploring Angles



Classify the angles displayed below.



obtuse



Defining Angles

Angles are two-dimensional figures constructed from two rays that share a common endpoint. There are six different classifications of angles. Use the chart below to record specific details about each classification.

Classification	General Class	Specific Details
1. Perigon	Angles	-sides complete a full rotation -the angle opening is a circle -
2. Acute	Angles	- - -
3. Right	Angles	- - -
4. Obtuse	Angles	- - -
5. Straight	Angles	- - -
6. Reflex	Angles	-sides almost complete a rotation -larger than a straight angle -

Constructing Angles Note Sheet

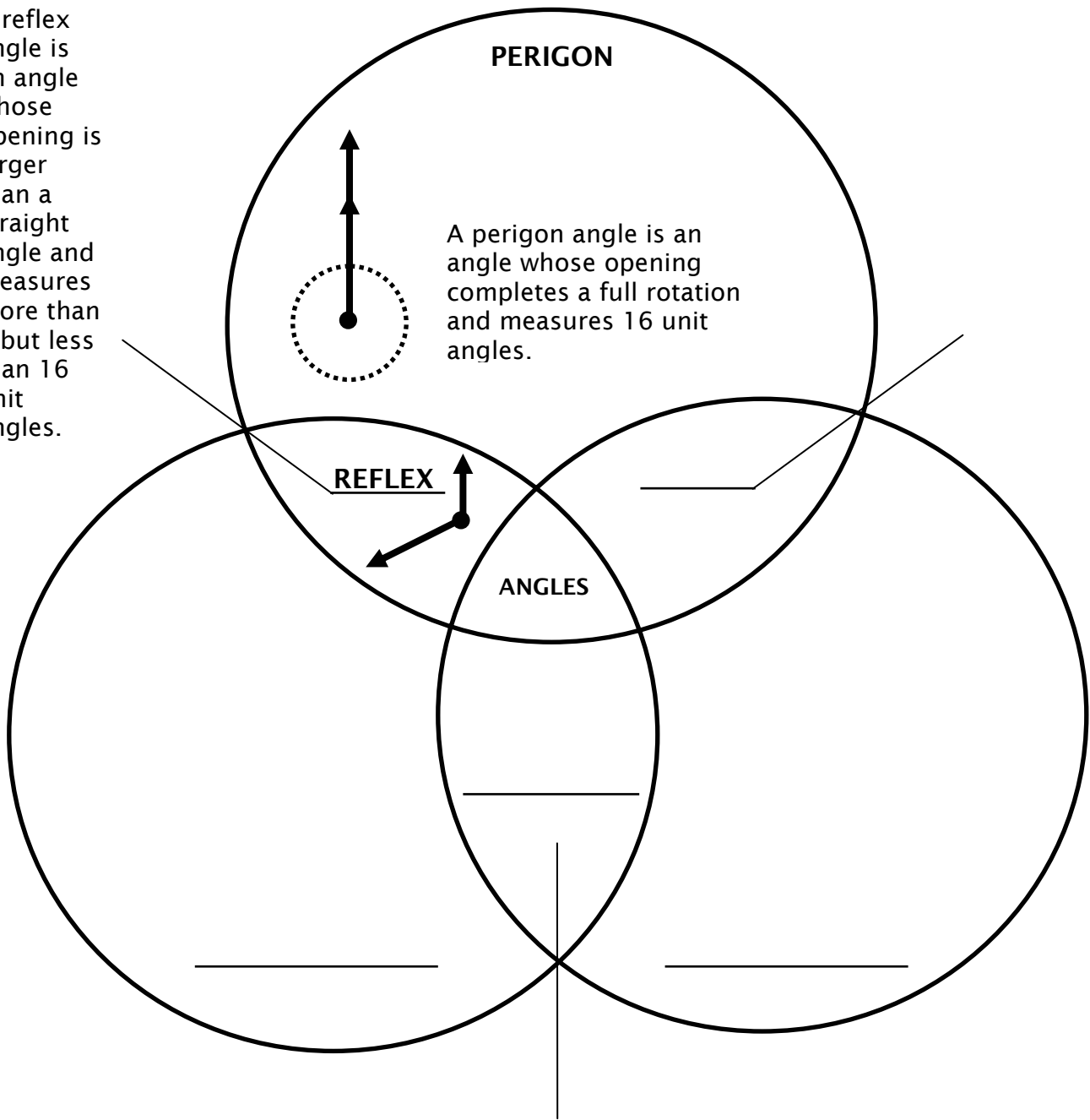
Directions: Label, classify, and measure each angle shown on the “Constructing Angles” worksheet. Follow the example presented below.

	Angle	Classification	Measurement
	Label the angle using symbols and points	Acute, right, obtuse, straight, or perigon	Number of Unit Angles
1	<i>$\angle b$ or $\angle abc$ or $\angle cba$ are correct</i>	_____	_____ unit angles
2			
3			
4			
5			
6			

Exploring Angles Assessment

Directions: Complete the Venn Diagram below by 1) labeling, 2) defining, and 3) drawing an example for each angle classification. *On the back of the diagram*, explain how the geometric building blocks are used to construct angles.

A reflex angle is an angle whose opening is larger than a straight angle and measures more than 8 but less than 16 unit angles.



Geometric Concepts in Architecture

The builder below is using triangles to construct a roof.
Identify and *define* the angles that occur in the black triangle.



Short-Answer Question Rubric

	2 points	1 point	0 points
Answering the Problem	You arrive at a correct answer.	You arrive at a partially correct answer.	Your answer was incorrect or not given at all.
Showing your Work	You follow the given directions in order to show how you solved the problem. All of the steps show correct math procedures.	You follow the given directions in an attempt to show how the problem was solved. Some of the steps show correct math procedures.	You make no attempt to show how you solved the problem, or all of the steps shown are incorrect.
Explaining & Interpreting your Answer	You explain how you solved the problem so clearly and completely that someone else can find the answer. When asked, you make true statements about the given answer.	You explain how you solved the problem, but leave out steps that are needed to guide the reader to the correct answer. When asked, you attempt to make true statements about the given answer.	Your explanations and interpretations are not correct, understood, or given.
Remember:	<i>A score of two means your work shows a complete understanding of the math concepts and procedures used in the problem.</i>	<i>A score of one means your work shows a partial understanding of the math concepts and procedures used in the task.</i>	<i>A score of zero means your work was completely incorrect, not understood, or that you gave no response at all.</i>