1.3 Estimating Measures of Rotations and Angles
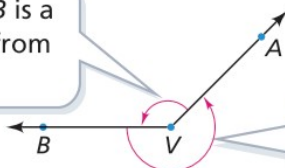
The next sketch shows two rays with a common endpoint. The rays are named $\overrightarrow{VA}$ and $\overrightarrow{VB}$. They define two rotation angles.

The angle named ∠AVB is a counterclockwise turn from ray $\overrightarrow{VA}$ to ray $\overrightarrow{VB}$.

The angle named ∠BVA is a counterclockwise turn from ray $\overrightarrow{VB}$ to ray $\overrightarrow{VA}$.
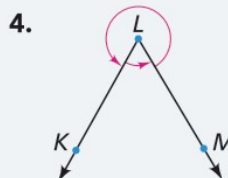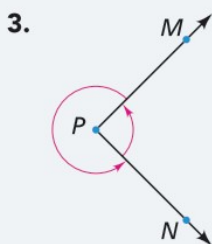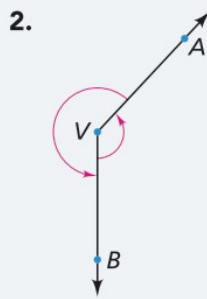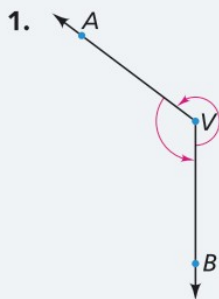
- What is the approximate degree measure of ∠AVB? Of ∠BVA?

Problem 1.3

Use what you know about measurement and naming of rotation angles to complete the Problem.

Ⓐ Estimate the measure of each angle in degrees. Name each angle with the ∠ symbol.

1.

2.

3.

4.

Problem **1.3** *continued*

B Sketch a rotation angle with approximately the given measure.

1. 220°
2. 270°
3. 150°
4. 300°

C Sketch each angle described. Find its measure in degrees.

1. one third of a right angle
2. one and a half times a right angle
3. three times a right angle
4. three and a half times a right angle
5. two thirds of a straight angle
6. one and two thirds times a right angle
7. one and a sixth times a straight angle
8. twice a straight angle

D For each rotation described, find its measure in degrees.

1. 1.5 turns
2. 2 turns
3. 1.25 turns

A C E Homework starts on page 24.

Investigation 1   The Family of Polygons   **17**

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1.1 1.2 **1.3** 1.4 1.5

Did You Know?

Honeybees live in colonies. Each colony has a single queen and thousands of worker bees. The worker bees find flowers to get nectar. The nectar is used to make honey. Worker bees build the honeycomb and keep the beehive clean. They feed and groom the queen bee and take care of the young. They also guard the hive against intruders.

Scientific observation has shown that honeybees give each other directions to flowers by performing a lively dance!

Honeybee Dance
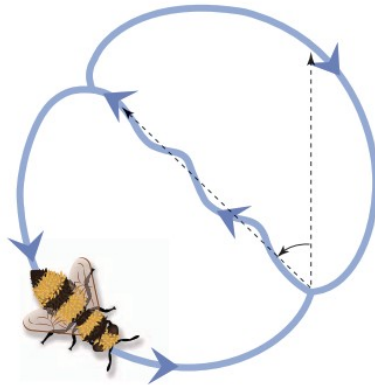
Direction of Flowers
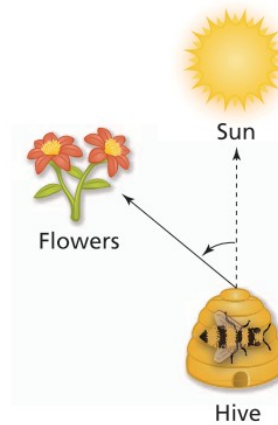
The messenger bee in the center shows the other bees the direction and distance from the hive to nectar. The bee does a dance called the figure-eight waggle. Worker bees watching the dance learn where to find nectar to make honey.

The dancing bee communicates the direction and distance to fly from the hive. The bee makes two semi-circles. He waggles along the straight run, the path through the center of his dance.

The angle in the dance made between the straight run and the direction of gravity is the direction. This is because the beehive is oriented vertically, not horizontally. The length of the straight run is proportional to the distance.