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FLAGGING Down Angles

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Topic
Geometry: Angles

Key Question
What angles are used when we form the letters for the initials in our names using the semaphore alphabet?

Learning Goals
Students will:
1. write their initials using the semaphore flag signaling system;
2. look for patterns in the flag signaling system; and
3. relate the positions of the flags to acute, right, obtuse, and straight angles.

Guiding Document
*NCTM Standards 2000**
- *Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes*
- *Recognize geometric ideas and relationships ad apply them to other disciplines and to problems that arise in the classroom or in everyday life*

Math
Geometry
angles
right, acute, obtuse, straight

Integrated Processes
Observing
Comparing and contrasting
Communicating
Interpreting data

Materials
Flagger figure
Paper fasteners
Yellow and red paper squares, 5 cm^2
Glue or tape
Student pages

Background Information
The semaphore flag signaling system is used when auditory communication is not possible. Students might relate to a catcher's signal to a pitcher as a way to secretly send messages. The semaphore flag signaling system uses the position of the flags to denote letters. There is a distinct pattern in the position of the arms when representing the 26 letters of the alphabet. By relating the positions of the flagger's arms to acute, right, obtuse, and straight angles, students can spell out their initials and send messages to each other.

In this activity, there are clear distinctions between the angles. The acute angle is approximately 45 degrees, right (the standard to which others are compared) is 90 degrees, the obtuse angle is 135 degrees, and the straight angle is 180 degrees. There will also be situations in which the angle is zero degrees—no angle at all. Students will relate each flag to the hand that holds it and the side of the body on which it appears. The base ray will be a line running from the paper fastener down the leg of the flagger figure.

Management
1. Copy the flagger figures onto cardstock.
2. Each student will need two flaggers, four paper fasteners, and three yellow squares and three red squares.
3. Prepare two flags that are large squares of construction paper to be used to demonstrate the semaphore system.

Procedure
1. Ask the *Key Question* and state the *Learning Goals*.
2. Demonstrate a letter of your choice. Tell the students that they will be studying the angles used to make up this signaling system. Discuss the need for this type of communication—privacy, failure of other technology, etc.
3. Distribute the student pages. Be sure to tell students that the flagger icon is facing them so the flagger's right arm actually appears on the left side of the icon. Give them the example of the letter A. The flag in the flagger's right hand is held at an acute angle (as measured from the flag to the shoulder and the shoulder down the leg). The other flag held in the left hand is at zero degrees, or at no angle.
4. Ask the students to look for patterns in the positions of the flags as they relate to the letters of the alphabet. [They should note that the right hand is the only hand to move for letters A, B, C, and D.

The right hand follows a progression of "around the clock." Once it reaches the straight angle, the hands switch roles and the left hand continues. The letters E, F, and G are completed this way. The "around the clock" progression continues with the left hand flag beginning at a different starting point with each sequence. Note that for the letter O, the left hand crosses over the body and for the letters W and X the right hand crosses over the body. If students use these letters, come to a class consensus as to how to describe those angles.]

5. Distribute the cardstock flaggers, paper fasteners, and the colored squares.
6. Have students make the two-colored flags as directed on the student page.
7. Direct them to cut out and assemble the flaggers. Have them glue or tape the flags onto the arms of the flaggers.
8. Encourage students to write R for right side and L for left side on their flaggers. This will help them as they describe the angles used to form their initials.
9. Tell students to position the arms of their flaggers to make the initials of their first and last name.
10. Have them describe the angles of the arms for each of the letters.

Connecting Learning

1. What is an acute angle?
2. Name a letter made from two acute angles. [N]
3. Which letters have a zero-degree angle (no angle) for one of the flags? [A, B, C, D, E, F, G]
4. Which letters are made from an acute angle and a right angle? [H, M, S, and Z]
5. How can you determine if something is an acute angle? [It is less than a right.]
6. How can you determine if something is an obtuse angle? [It is greater than a right angle.]
7. What angle do the letters D, I, K, P, T, and V have in common? [a straight angle]
8. What are you wondering now?

Extension

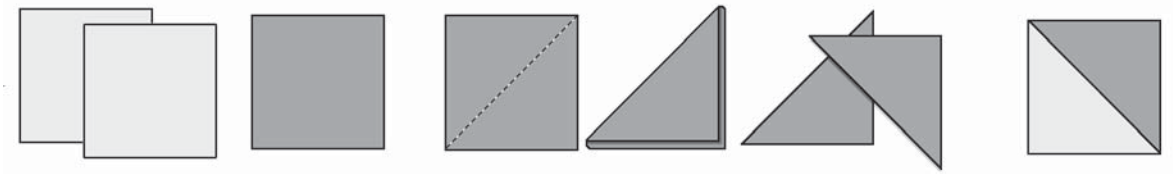
Have students make flags and signal messages to each other.

Internet Connection

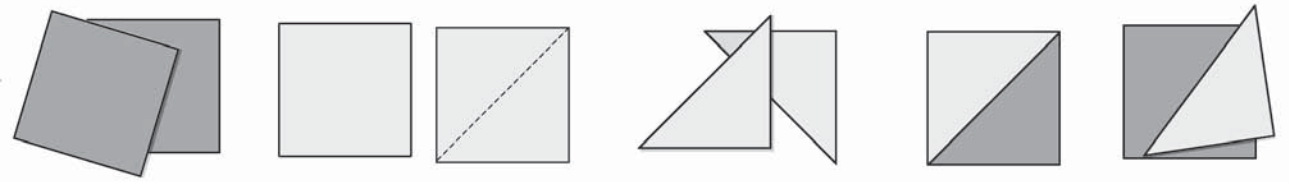
http://www.marinewaypoints.com
Select the *Learning Center* link *Flags*.

FLAGGING Down Angles

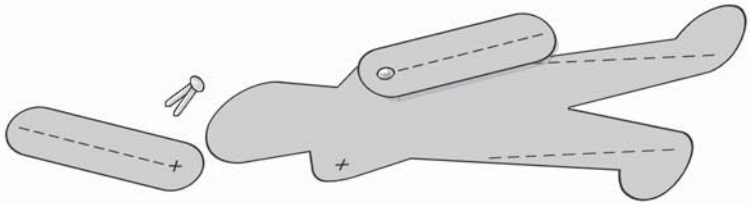
1. Make two small flags.
   Fold one red square along the diagonal. Cut along the fold line to make two triangles. Glue one red triangle on top of each of two yellow squares.

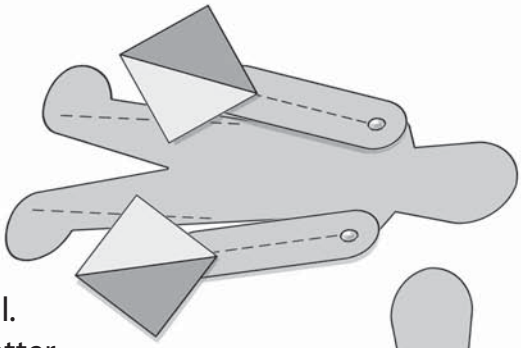


   Fold a yellow square along the diagonal. Cut along the fold line to make triangles. Glue one yellow triangle on top of each of two red squares.



2. Cut out your two flaggers. Cut out their four arms. Use paper fasteners to attach two arms to each flagger. Match the +s on the arms to the +s on the flaggers' bodies.



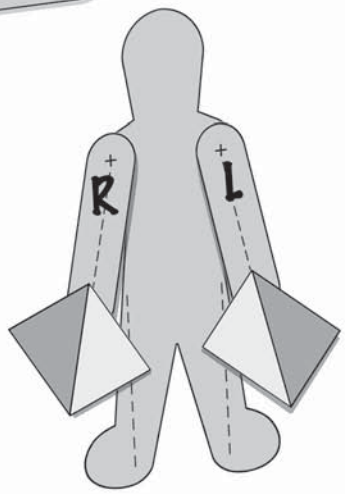


3. Glue or tape the flags to the flaggers' arms.

4. Write the letter R on the flaggers' right arms. (Be careful. Watch which way the flaggers are facing.) Write the letter L on the flaggers' left arms.

5. Form your first and last initial using the flaggers.

6. Record what angles you had to use in order to form the letters.



First initial:

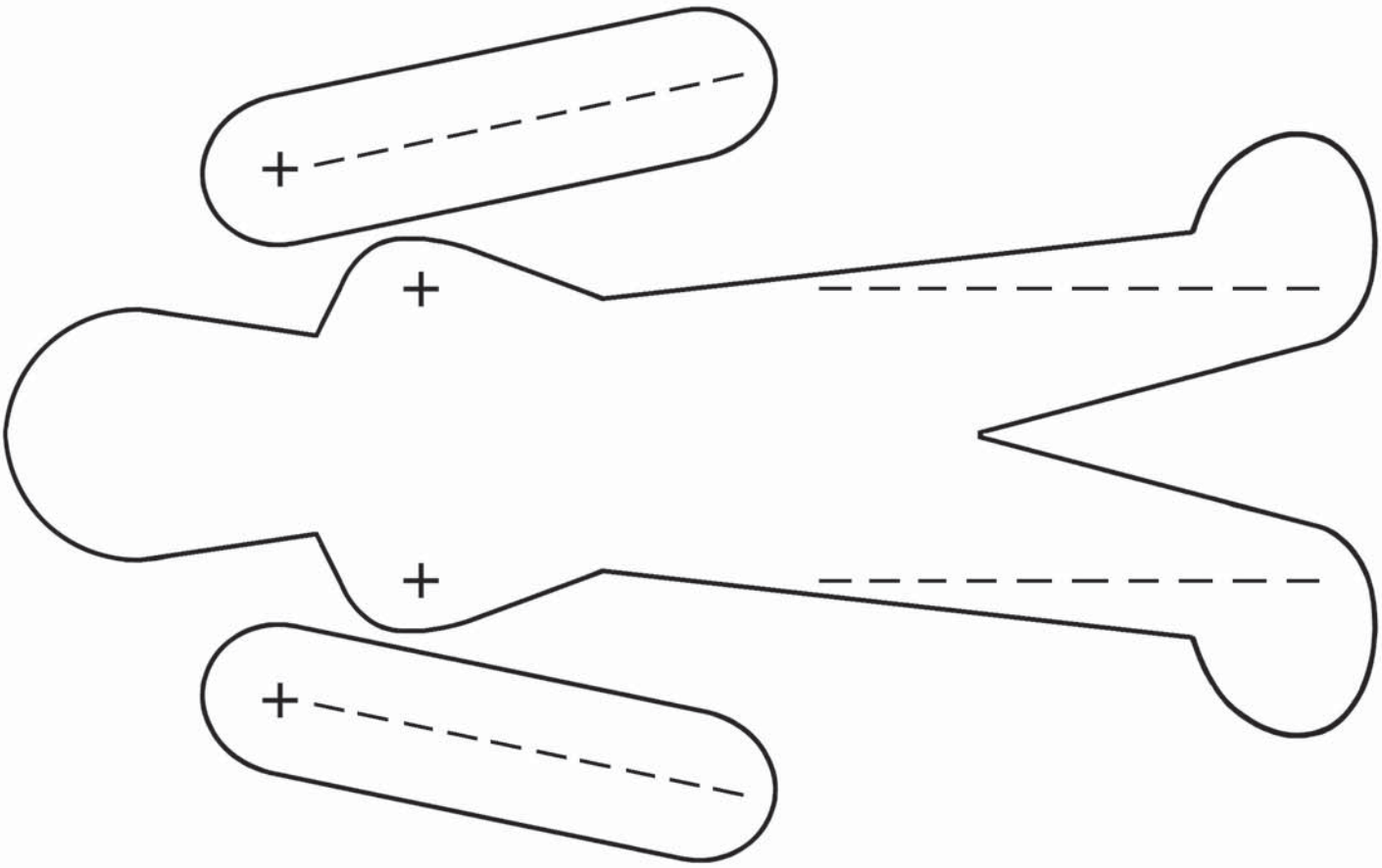
Right arm angle:

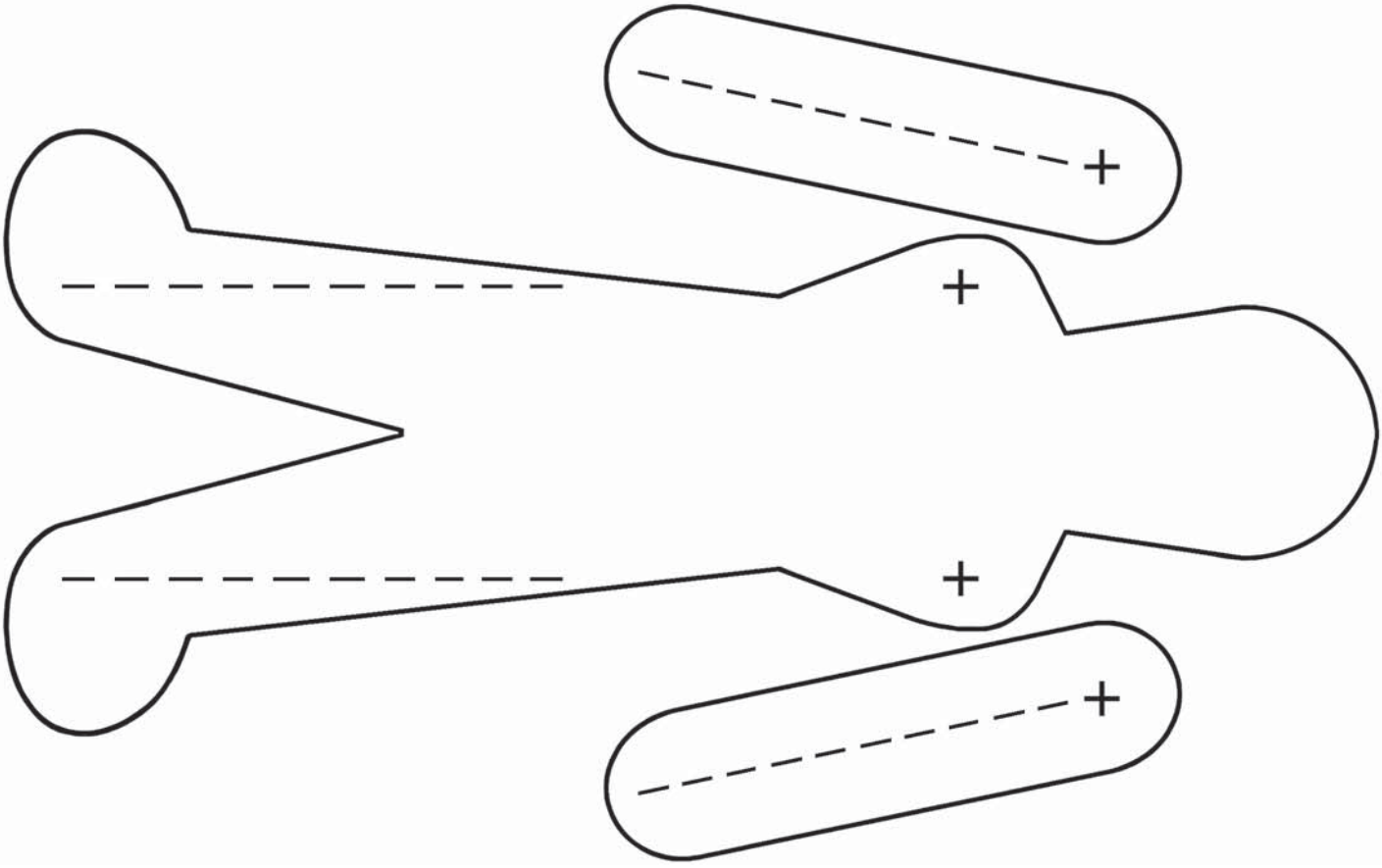
Left arm angle:

Last initial:

Right arm angle:

Left arm angle:





Semaphore Alphabet