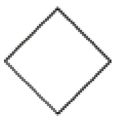
Date: ______________________________ Name: ____.

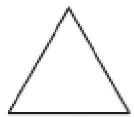
A figure has a **line of symmetry,** if it can be folded along a line so that the two halves match.
A figure has a **point of symmetry**, if it is a midpoint of all segments between the preimage and image points

Determine how many lines of symmetry each figure has. Then determine whether the figure has point symmetry.

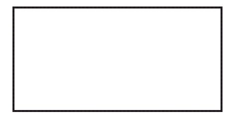
1.



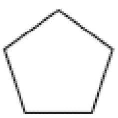
2.



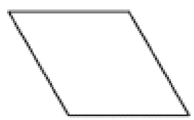
3.



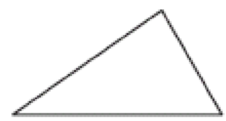
4.



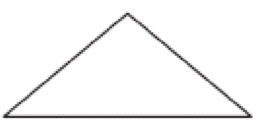
5.



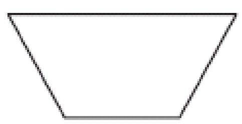
6.



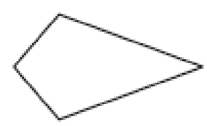
7.



8.



9.

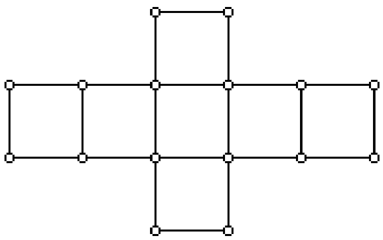


An image has **Reflectional Symmetry** if there exists a line that can be drawn such that the image on one side of the line coincides with the image on the other side of the line. Sometimes reflectional symmetry is referred to as a **FLIP.**

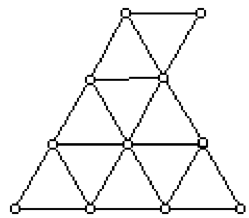
Symmetry

Draw all lines of symmetry on each figure below. If the figure does not have a line of symmetry, state that.

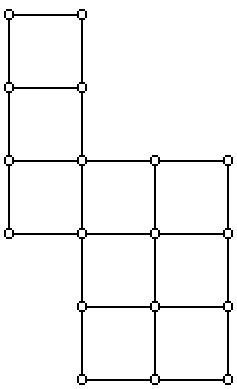
1.



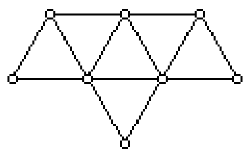
2.



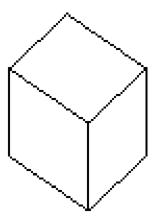
3.



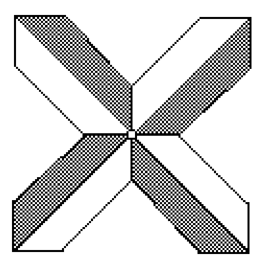
4.



5.



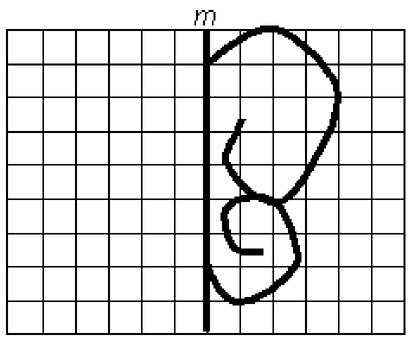
6.



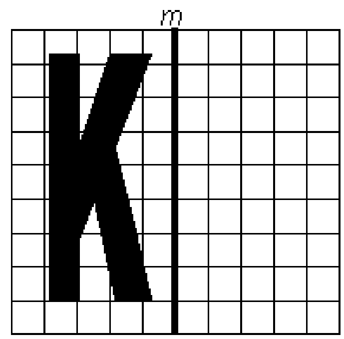
SYMMETRY

1. Complete the pictures below, by reflecting them in the mirror lines (m) given. Some pictures have more than one mirror line.

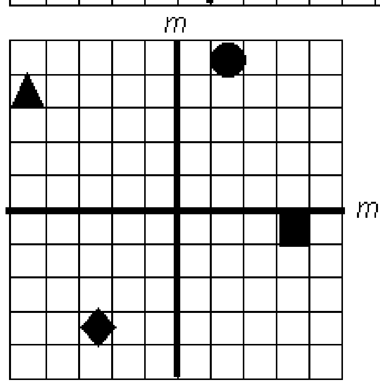
a)



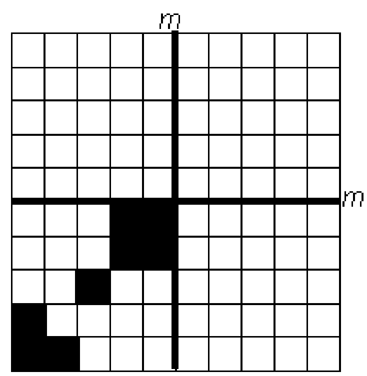
b)



c)

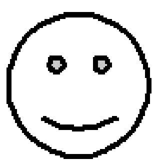


d)



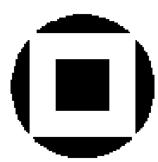
2. For the pictures below draw in the axes of symmetry (mirror line).

a)

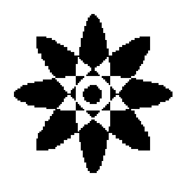


b)

c)



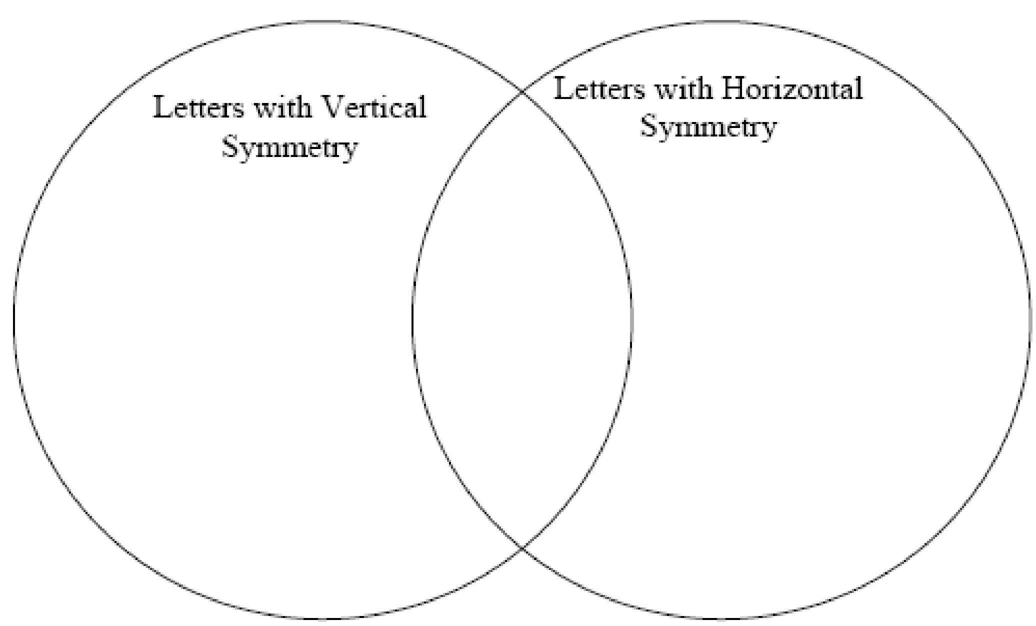
d)



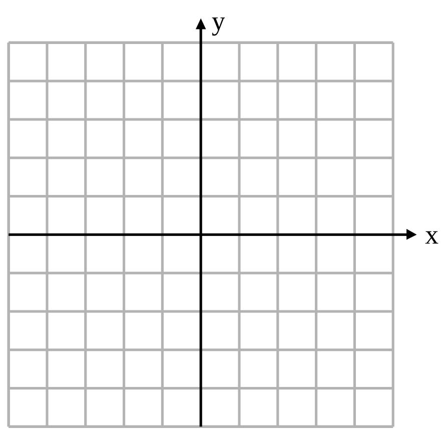
3. In the box below design a pattern to decorate the spine of a book. The pattern must have 2 axes of symmetry.

Look at the letters of our alphabet below. Organize the letters according to which ones have reflection symmetry into three groups: the letters that have reflection symmetry with a vertical line of symmetry (like the letter A), those with a horizontal line of symmetry, and those with both vertical and horizontal lines of symmetry.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z



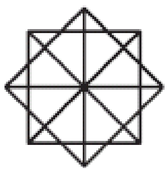
Triangle ABC has vertices A(0, 4), B(2, 1), and C(4, 3). Find the coordinates of the vertices of ABC after a reflection over the x-axis. **Do this first.** Then graph the figure and its reflected image.



A figure has **rotational symmetry** when it can be rotated less than 360° about a point and the preimage and image appear to be the same.

A figure has a rotational symmetry of **order 3** when it can rotate 3 rotations less than 360° that can produce an image that is the same as the original.

The **magnitude** of the rotational symmetry for a figure is 360° divided by the order.

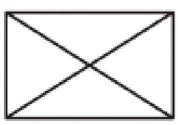
Example 

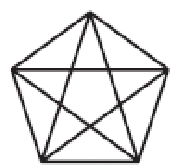
This design has rotation symmetry about the center point for rotations of 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315°. There are eight rotations less that 360°, so the order is 8, and the magnitude is 360 ÷ 8 = 45°.

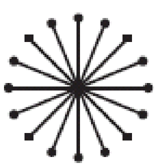
Identify the order and magnitude of the rotational symmetry of each figure.

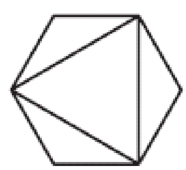
1. a square

2. a regular 40-gon

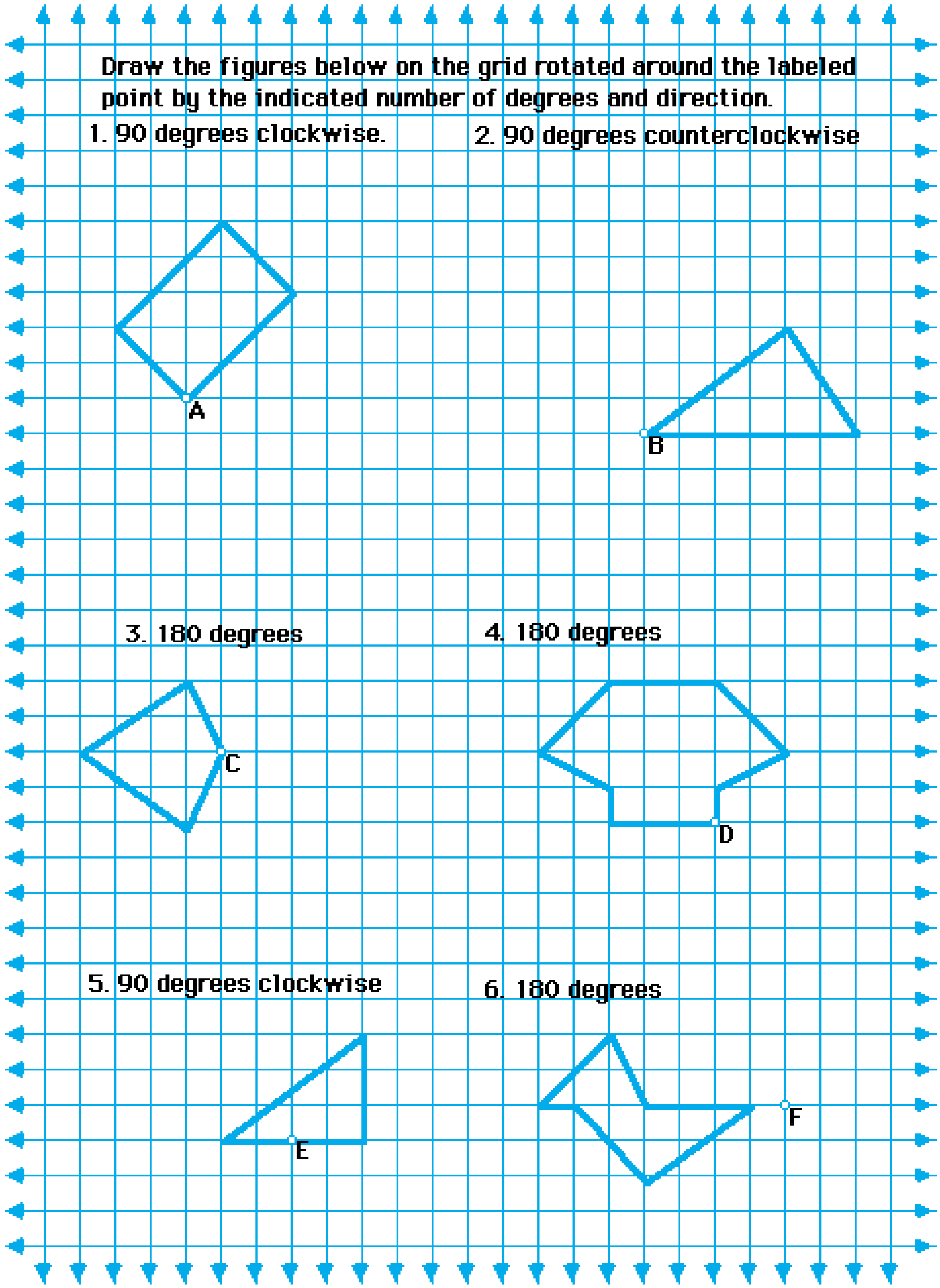
3. 

4. 

5. 

6. 

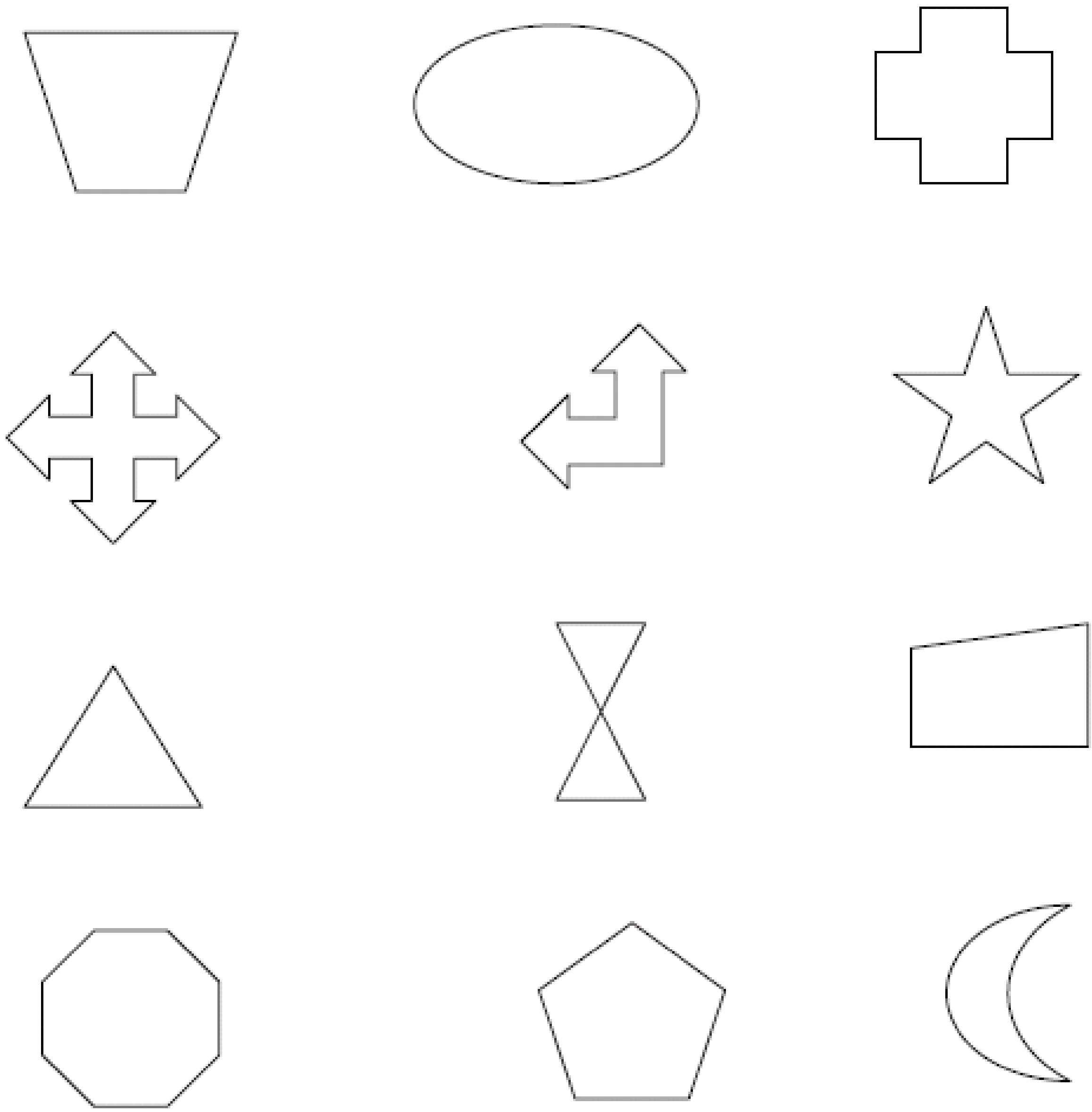
An image has **Rotational Symmetry** if there is a center point where an object is turned a certain number of degrees and still looks the same. Sometimes a rotation is referred to as a **TURN.**



ROTATIONAL SYMMETRY

A shape has **rotational symmetry** if it fits onto itself two or more times in one turn.
The **order** of rotational symmetry is the number of times the shape fits onto itself in one turn. A 2D shape has a line of symmetry if the line divides the shape into two halves – one being the mirror image of the other.

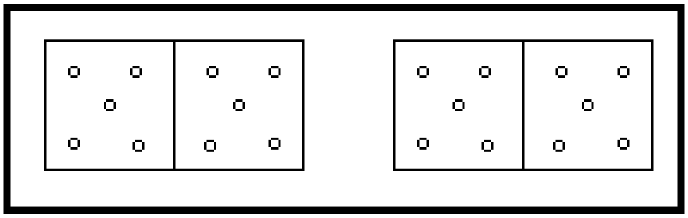
Write the order of rotational symmetry under each shape & letter. Also draw dotted lines to indicate lines of symmetry.



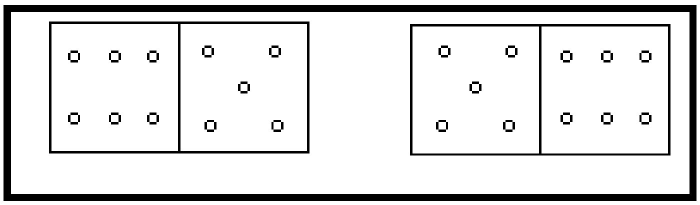
M A T H S

Examine the pairs of dominoes below. Using the definitions for vertical lines of symmetry, horizonatal lines of symmetry, and rotational symmetry described earlier, identify all symmetries demonstrated below:

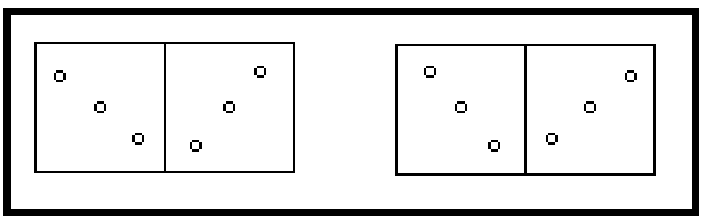
1.



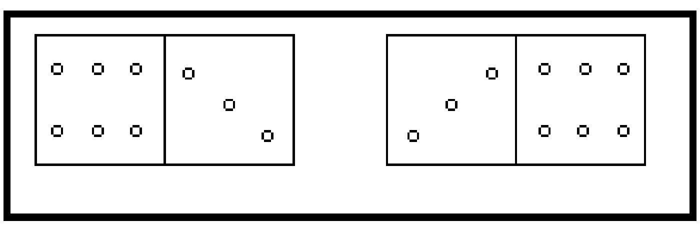
2.



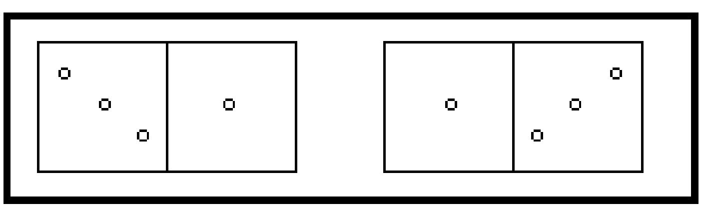
3.



4.



5.



Which of the above have vertical lines of symmetrty ?__________________________

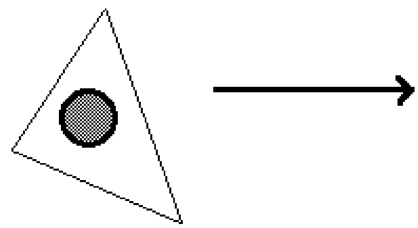
Which of the above have horizontal lines of symmetrty ?__________________________

Which of the above have rotational symmetrty?__________________________

An image has **Translational Symmetry** if the distance between each point and its image is the same. Sometimes a translation is referred to as a **SLIDE. A translation may be shown by using a vector arrow. The arrow shows the distance and the direction.**
Translation may also be represented by ordered pairs. The first coordinate represents the horizontal movement and the second coordinate represents the vertical movement.

The arrow below is a translation vector. Use it to create a translated image. Does the image change?

1.



2.