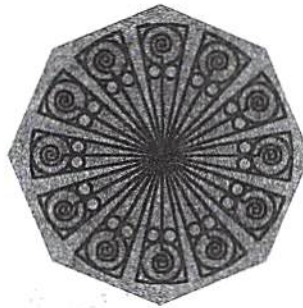
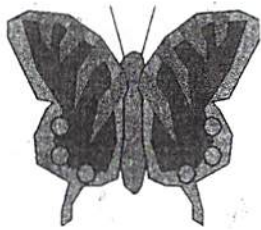


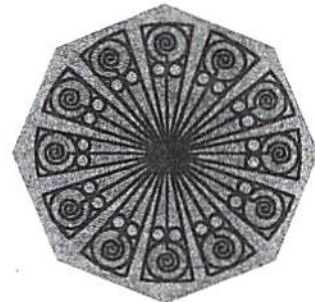
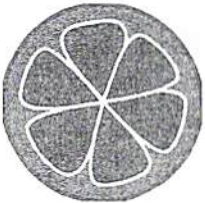
Symmetries
Honor's Geometry

Name _____
Period _____ Date _____

When a figure undergoes an isometry and the resulting image coincides with the original, then the figure has a **transformational symmetry**. If the figure can be reflected across a line to coincide with itself, it has **reflectional symmetry** (or line symmetry or mirror symmetry) and that line is called the **axis of symmetry** or line of symmetry.



If the figure can be rotated about some angle and can then be mapped onto itself, then the figure has **rotational symmetry** and the smallest angle for which this works is the **fundamental angle of rotation**. If a figure has rotational symmetry of 180° , we say that figure has **point symmetry**.



Identify the types of symmetry in each design. If there is line symmetry, draw all axes of symmetry. If there is rotational symmetry, state the fundamental angle of rotation.

1.

2.

3.

4.

5.

6.

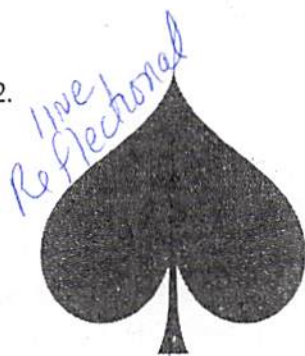
EXERCISES

Identify any symmetry of the figures.

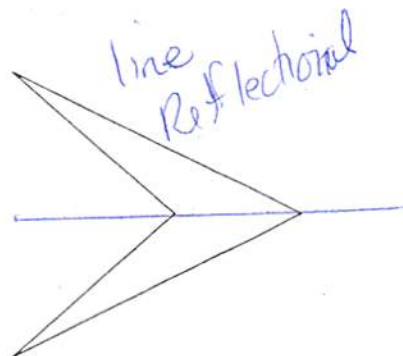
1.



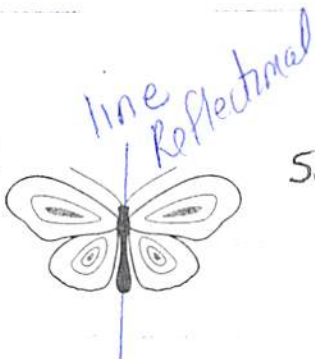
2.



3.



4.



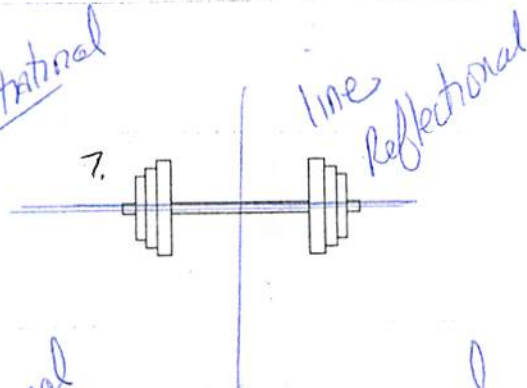
5.



6.



7.



8.



9.



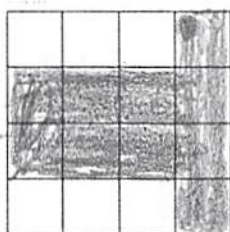
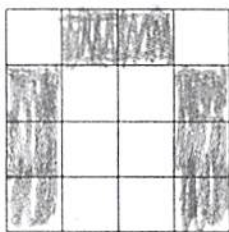
10.



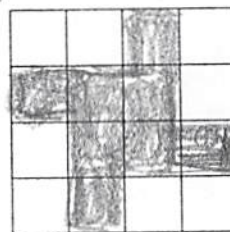
11.



In 12–14, copy the grid of 16 squares shown on a piece of paper. Then shade the unit squares so that the resulting figure has the indicated symmetry.



examples



12. A vertical line of symmetry, but no horizontal line of symmetry and no rotational symmetry.
13. A horizontal line of symmetry, but no vertical line of symmetry, and no rotational symmetry.
14. A rotational symmetry of 90° , but no line of symmetry.

Mixed Practice with Transformations

A C E H O R S T W X Z

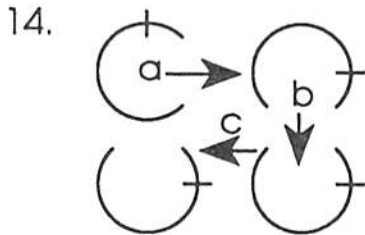
1-5. Sketch each letter which is point symmetric and mark the point of symmetry.

H O S X Z

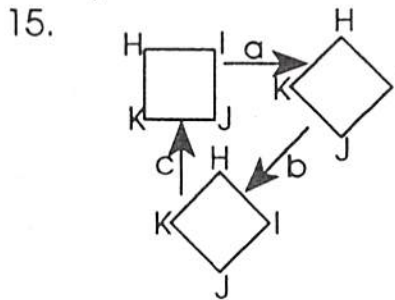
6-13. Sketch each letter that is line symmetric and draw all lines of symmetry.

A C E H O T W X

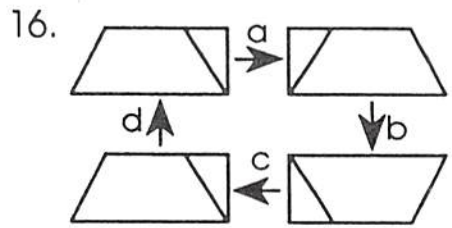
Each of these figures have been moved in a series of basic motions. Name the motion indicated by the lettered arrow.



- a. Rotate 90° CW
- b. Reflect over "x"
- c. Translate left

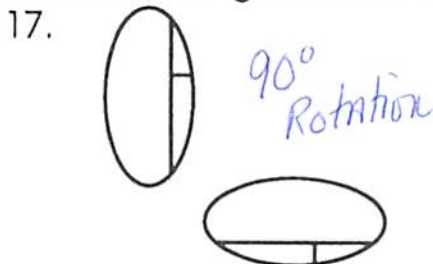


- a. Rotate 45° CW
- b. Translate down left
- c. Rotate 45° CCW

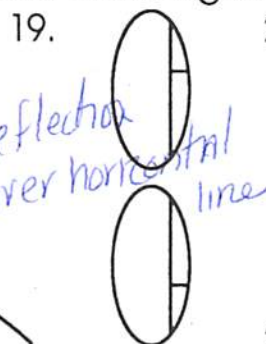


- a. Reflect over "y"
- b. Reflect over "x"
- c. Rotate 180°
- d. Translate up

Tell which single basic motion will make these figures coincide?



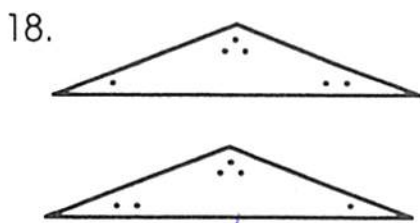
90° Rotation



Reflection over horizontal line



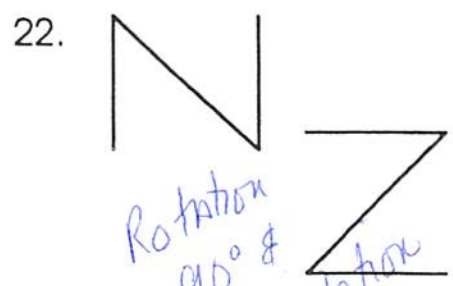
Reflection over "y=x"



Reflected over vertical line - & translated down.

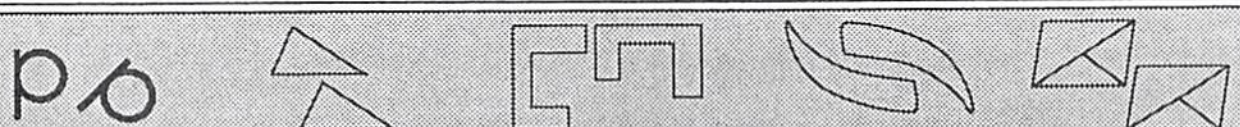


translation down & right

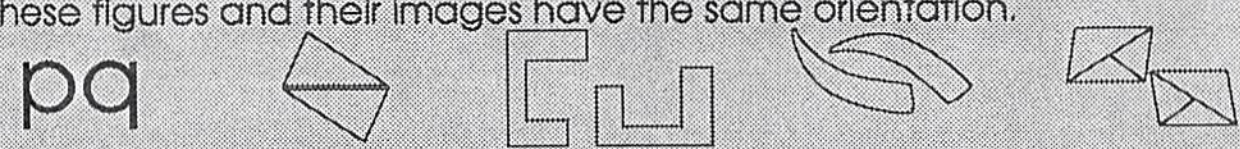


Rotation 90° & translation

Orientation

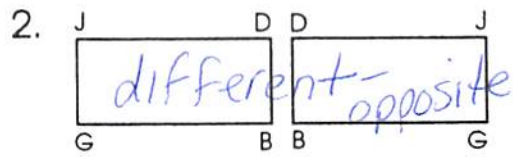
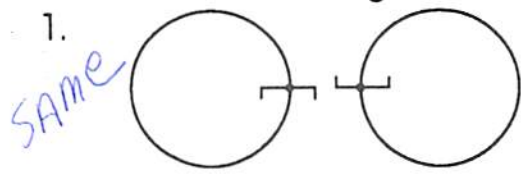


 These figures and their images have the same orientation.



 These figures and their images have opposite orientations.

Tell whether these figures have the same or opposite orientations.



Identify the image with opposite orientation from the original figure.

