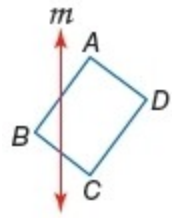
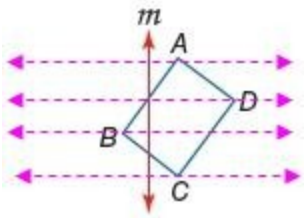
Practice Test - Chapter 9

Copy the figure and the given line of reflection. Then draw the reflected image in this line using a ruler.

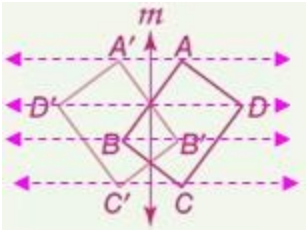
1. 

SOLUTION:

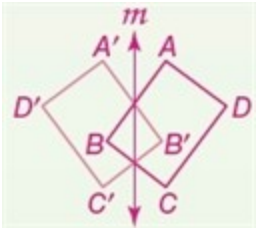
Step 1: Draw a line through each vertex that is perpendicular to line m.



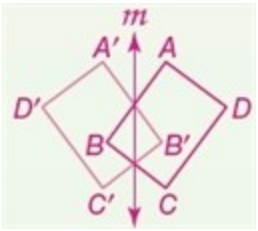
Step 2: Measure the distance from point A to the line m. Then locate A' the same distance from line m on the opposite side.

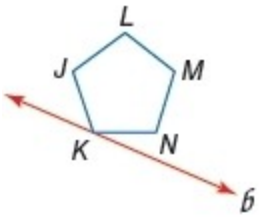


Step 3: Repeat Step 2 to locate points B', C', and D'. Then connect the vertices, A' B', C', and D' to form the reflected image.



ANSWER:

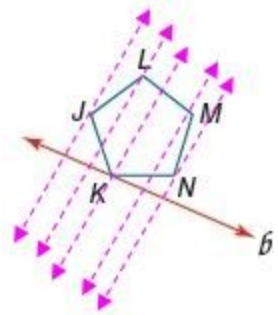




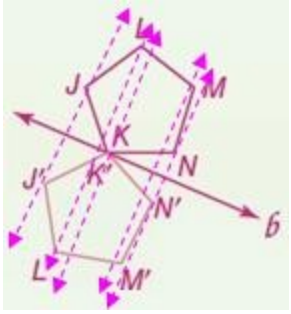
2.

SOLUTION:

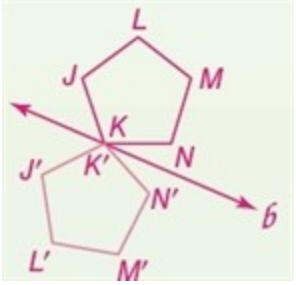
Step 1: Draw a line through each vertex that is perpendicular to line *b*.



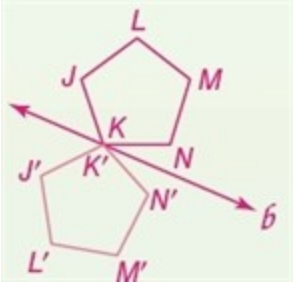
Step 2: Measure the distance from point *J* to the line *b*. Then locate *J'* the same distance from line *b* on the opposite side.



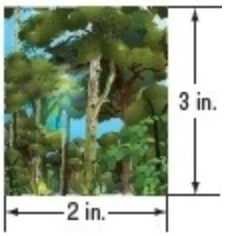
Step 3: Repeat Step 2 to locate points *K'*, *L'*, *M'*, and *N'*. Then connect the vertices, *J'*, *K'*, *L'*, *M'*, and *N*" to form the reflected image.



ANSWER:



3. **PROJECTS** Eduardo wants to enlarge the picture below to 4 inches by 6 inches for a school project. If his school's copy machine can only enlarge up to 150% by whole number percents, find two whole number percents by which he can enlarge the piece and get as close to 4 inches by 6 inches or less.



SOLUTION:

Start by enlarging the picture 2 inches by 3 inches up to 150%. This leads to a 3 inch by 4.5 inch picture. Eduardo wants to enlarge the picture to 4 inches by 6 inches.

$$\frac{4}{3} \approx 1.33$$

$$\frac{6}{4.5} \approx 1.33$$

Therefore, the two whole number percents are 150% and 133%.

ANSWER:

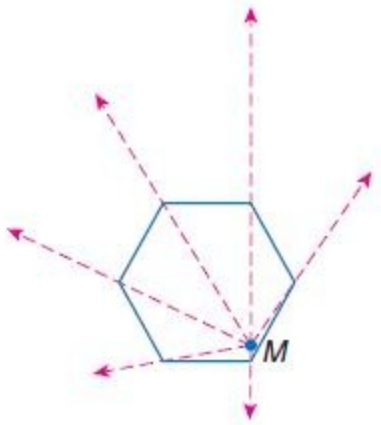
150% and 133%

Copy the figure and point *M*. Then use a ruler to draw the image of the figure under dilation with center *M* and the scale factor *r* indicated.

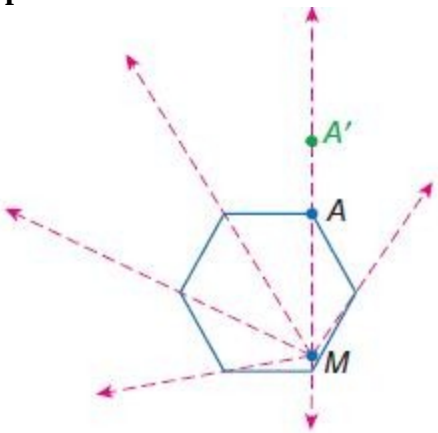
4. $r = 1.5$

SOLUTION:

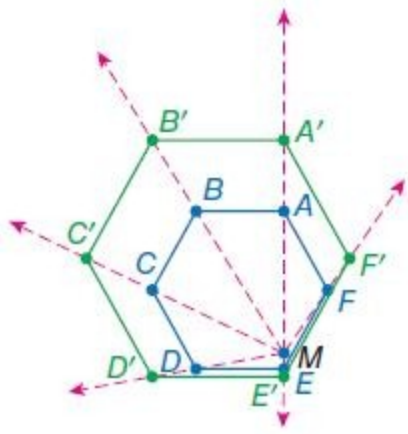
Step 1: Draw rays from *M* though each vertex.



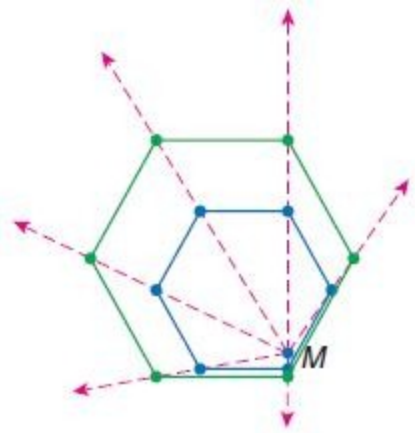
Step 2: Locate A' on $\overrightarrow{MA}$ such that $MA' = 1.5MA$.



Step 3: Locate B' on $\overrightarrow{MB}$, C' on $\overrightarrow{MC}$, D' on $\overrightarrow{MD}$, E' on $\overrightarrow{ME}$, and F' on $\overrightarrow{MF}$ in the same way. Then draw $A'B'C'D'E'F'$.



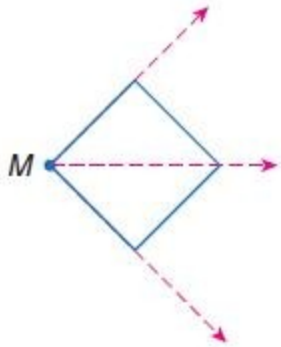
ANSWER:



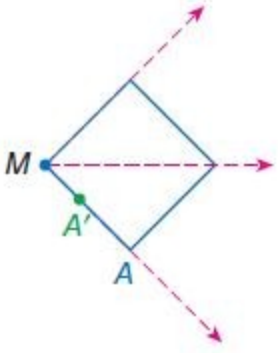
5. $r=\frac{1}{3}$

SOLUTION:

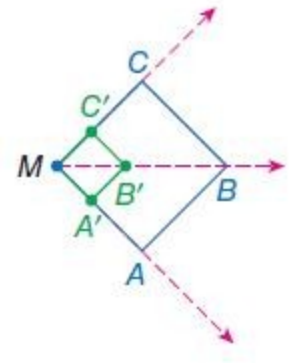
Step 1: Draw rays from *M* though each vertex.



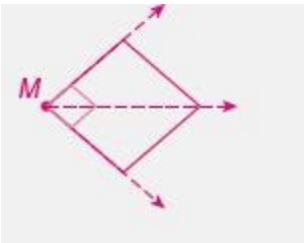
Step 2: Locate *A'* on $\overrightarrow{MA}$ such that $MA' = \frac{1}{2}MA$.



Step 3: Locate *B'* on $\overrightarrow{MB}$ and *C'* on $\overrightarrow{MC}$ in the same way. Then draw $\Delta A'B'C'$.



ANSWER:



6. **PARKS** Isabel is on a ride at an amusement park that slides the rider to the right, and then rotates counterclockwise about its own center 60° every 2 seconds. How many seconds pass before Isabel completes one full rotation?

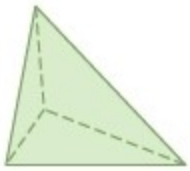
SOLUTION:

In every 2 seconds the ride rotates 60º. So, it takes 6 turns to rotate 6 × 60º or 360º. Therefore, the time it takes Isabel to complete one full rotation is 12 seconds.

ANSWER:

12 seconds

State whether each figure has *plane* symmetry, *axis* symmetry, *both*, or *neither*.

7. 

SOLUTION:

A three-dimensional figure has plane symmetry if the figure can be mapped onto itself by a reflection in a plane.
A three-dimensional figure has axis symmetry if the figure can be mapped onto itself by a rotation between 0° and 360° in a line.
There is no such plane or line for this figure. Therefore, the figure has neither plane symmetry nor axis symmetry.

ANSWER:

neither

8. 

SOLUTION:

A three-dimensional figure has plane symmetry if the figure can be mapped onto itself by a reflection in a plane. A plane parallel to the bases that passes through the mid points of the sides of the lateral faces will divide the figure into two congruent parts. So, it has plane symmetry.

A three-dimensional figure has axis symmetry if the figure can be mapped onto itself by a rotation between 0° and 360° in a line. A rotation of 90º through a line joining the midpoints of the bases will be a figure isometric to the given one. So, it has line symmetry.

Therefore, the figure has both line and plane symmetries.

ANSWER:

both

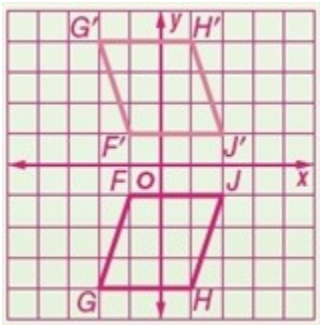
Graph each figure and its image under the given transformation.

9. $\square FGHJ$ with vertices $F(-1, 4)$, $G(4, 4)$, $H(3, 1)$, and $J(-2, 1)$ in the x-axis

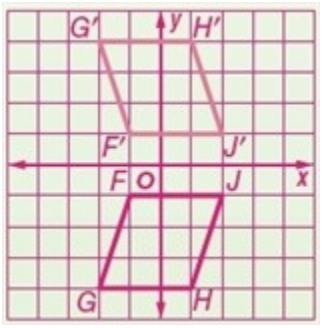
SOLUTION:

This transformation is a reflection in the x-axis, so $(x, y) \rightarrow (x, -y)$.

F $(-1, -1) \rightarrow (-1, 1)$
G $(-2, -4) \rightarrow (-2, 4)$
H $(1, -4) \rightarrow (1, 4)$
J $(2, -1) \rightarrow (2, 2)$



ANSWER:

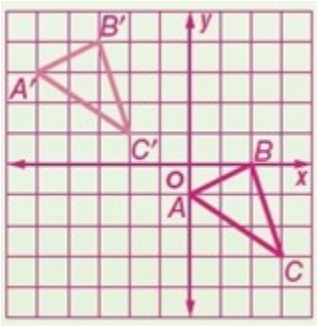


10. ΔABC with vertices $A(0, -1)$, $B(2, 0)$, $C(3, -3)$; $\langle -5, 4 \rangle$

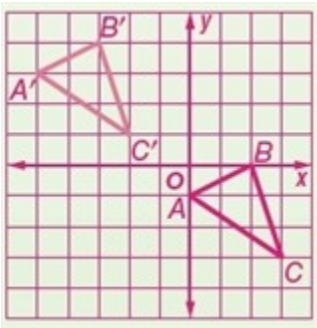
SOLUTION:

This transformation is a translation using $\langle -5, 4 \rangle$, so $(x, y) \rightarrow (x - 5, y + 4)$.

A $(0, -1) \rightarrow (-5, 3)$
B $(2, 0) \rightarrow (-3, 4)$
C $(3, -3) \rightarrow (-2, 1)$



ANSWER:

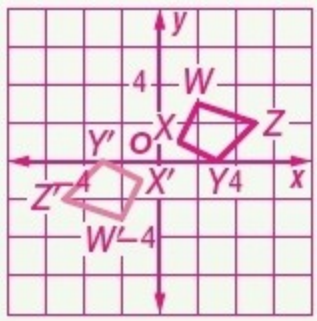


11. quadrilateral *WXYZ* with vertices *W*(2, 3), *X*(1, 1), *Y*(3, 0), *Z*(5, 2); 180° about the origin

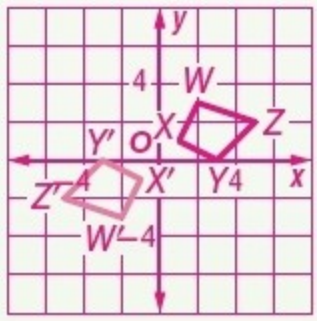
SOLUTION:

This transformation is a 180º rotation about the origin, so $(x, y) \rightarrow (-x, -y)$.

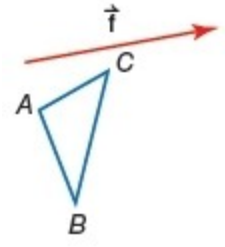
$W(2, 3) \rightarrow (-2, -3)$
$X(1, 1) \rightarrow (-1, -1)$
$Y(3, 0) \rightarrow (-3, 0)$
$Z(5, 2) \rightarrow (-5, -2)$



ANSWER:



Copy the figure and the given translation vector. Then draw the translation of the figure along the translation vector.

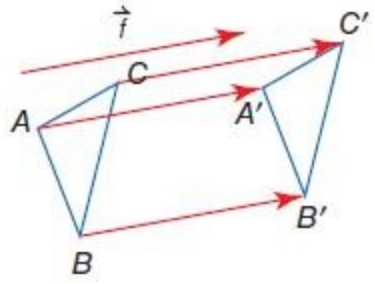
12. 

SOLUTION:

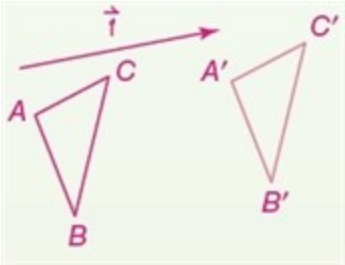
Draw a line through each vertex parallel to the vector.

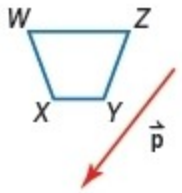
Measure the length of the vector. Locate point *A'* by marking off this distance along the line through vertex *A*, starting at *A* and in the
same direction as the vector.

Do the same with vertices *B* and *C*.



ANSWER:





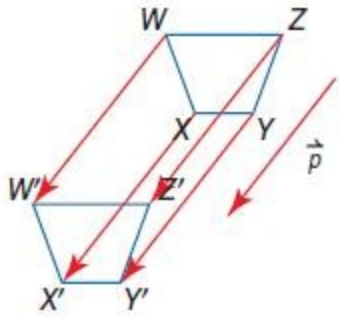
13.

SOLUTION:

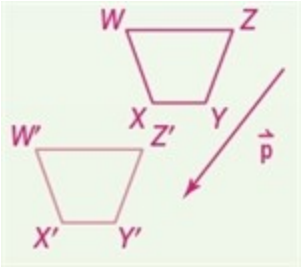
Draw a line through each vertex parallel to the vector.

Measure the length of the vector. Locate point *W'* by marking off this distance along the line through vertex *W*, starting at *W* and in the
same direction as the vector.

Do the same with vertices *X*, *Y*, and *Z*.



ANSWER:



14. **ART** An artist's rendition of what Stonehenge, a famous archeological site in England, would have looked like before the stones fell or were removed, is shown below. What is the order and magnitude of symmetry for the outer ring?

SOLUTION:

The number of times a figure maps onto itself as it rotates from 0° to 360° is called the order of symmetry. The magnitude of symmetry is the smallest angle through which a figure can be rotated so that it maps onto itself. There are 30 stones in the outer ring. So the order of symmetry is 30.

$\frac{360°}{30} = 12°$

The magnitude of symmetry is $12°$.

ANSWER:

30; 12°

15. **MULTPLE CHOICE** What transformation or combination of transformations does the figure below represent?

A dilation
B glide reflection
C rotation
D translation

SOLUTION:

A composition of a translation followed by a reflection in a line parallel to the translation vector is called a glide reflection. The arrow heads have been reflected and then translated. Therefore, the transformation is glide reflection.

ANSWER:

B