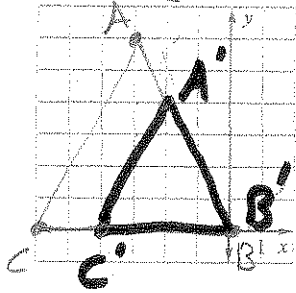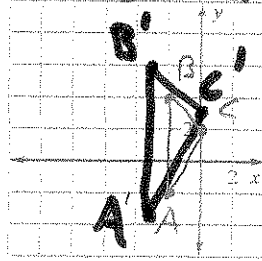# Adv. Geometry 6.7 - Similarity Transformations ~key~

Draw the dilation of the polygon with the given vertices using the given scale factor k.
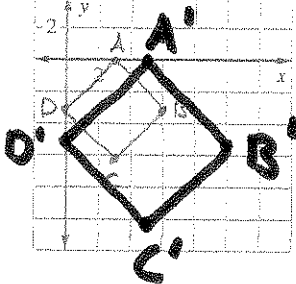
1. $A(-3, 6), B(0, 0), C(-6, 0); k = \frac{2}{3}$
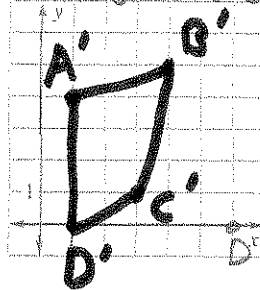
$A'(-2, 4)\ B'(0,0)\ C'(-4,0)$

2. $A(-2, -2), B(-2, 4), C(0, 2); k = \frac{3}{2}$
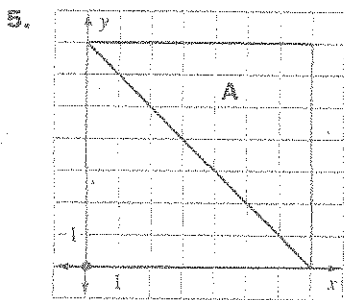
$A'(-3,-3)\ B'(-3,6)\ C'(0,3)$

3. $A(3, 0), B(6, -3), C(3, -6), D(0, -3); k = \frac{5}{3}$

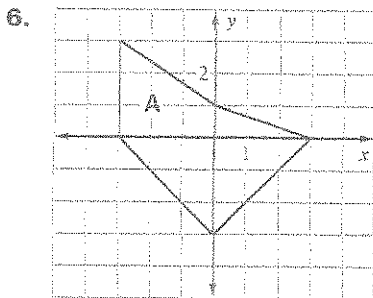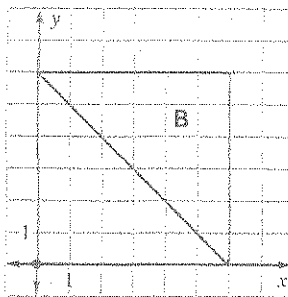$A'(5,0)\ B'(10,-5)\ C'(5,-10)\ D'(0,-5)$

4. $A(6, 24), B(24, 30), C(18, 6), D(6, 0); k = \frac{1}{6}$

$A'(1,4)\ B'(4,5)\ C'(3,1)\ D'(1,0)$

Determine whether the dilation from Figure A to Figure B is a *reduction* or an *enlargement*. Then find its scale factor.

5.

reduction
S.F. $= \frac{6}{7}$

6.

enlargement
S.F. $= \frac{4}{3}$

Use the given point coordinates to determine whether $\triangle DEF$ is a dilation of $\triangle ABC$. If so, state the scale factor of the dilation.

7. $A(42, 28), B(35, 14), C(14, 21); D(36, 24), E(30, 12), F(12, 16)$ NO y-coordinate of F is wrong

8. $A(-54, 108), B(45, 36), C(-27, -18); D(-72, 144), E(60, 48), F(-96, -24)$ No x-coordinate of F is wrong

The polygon shown is the image of a polygon after a dilation using the scale factor k. Find the coordinates of the vertices of the original polygon.
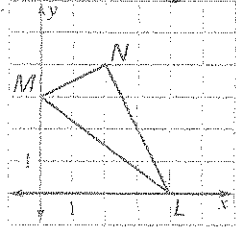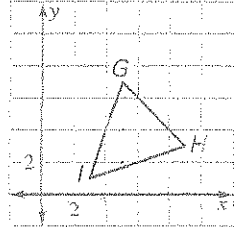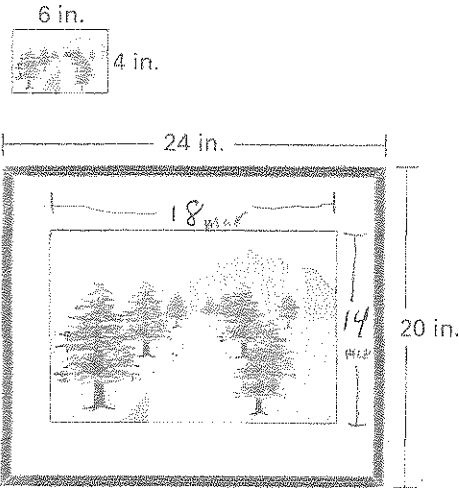
11. $k = \frac{1}{3}$ $M(0,3)$ $N(2,4)$ $L(4,0)$

Original Coordinates are
$M'(0,9)$
$N'(6,12)$
$L'(12,0)$

12. $k = 3$ $G(5,7)$ $H(9,3)$ $I(3,1)$

Original coordinates
$G\left(\frac{5}{3}, \frac{7}{3}\right)$
$H(3,1)$
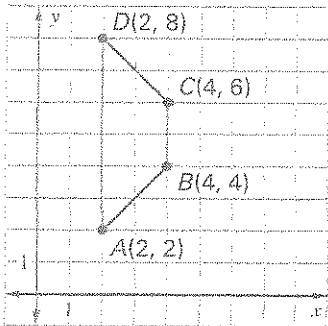$I\left(1, \frac{1}{3}\right)$

13. **Picture Frame** You are going to enlarge a 4-inch by 6-inch photograph to the largest size that can be centered within a 20-inch by 24-inch picture frame with a matte border of at least 3 inches on all four sides.

6 in.
4 in.

24 in.

18 in.

14

20 in.

a. What size do you need to make the enlarged photo? $12'' \times 18''$

b. What scale factor should you use for the enlargement? 3

c. How wide should the matte border be on each side? $3''$ on Vertical parts $4''$ on Horizontal parts
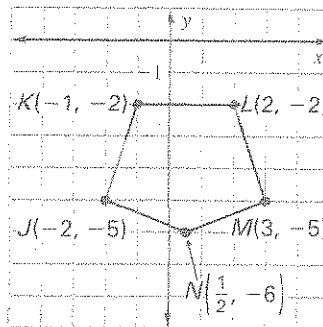
Determine the coordinates of the final image after the given transformations.

1. Dilate $ABCD$ using a scale factor of $k = 0.25$. Reflect the image in the y-axis, then translate using the rule $(x, y) \rightarrow (x - 5, y)$.

$D(2, 8)$
$C(4, 6)$
$B(4, 4)$
$A(2, 2)$

2. Translate $JKLMN$ using the rule $(x, y) \rightarrow (x + 3, y - 2)$. Reflect the image in the x-axis, then dilate using a scale factor of 3.

$K(-1, -2)$ $L(2, -2)$
$J(-2, -5)$ $M(3, -5)$
$N\left(\frac{1}{2}, -6\right)$

Original	Dilation, $k=\frac{1}{4}$	reflect over y	Translate
$A(2,2)$	$A'\left(\frac{1}{2},\frac{1}{2}\right)$	$A''\left(-\frac{1}{2},\frac{1}{2}\right)$	$A'''\left(-5\frac{1}{2},\frac{1}{2}\right)$
$B(4,4)$	$B'(1,1)$	$B''(-1,1)$	$B'''(-6,1)$
$C(4,6)$	$C'\left(1,\frac{3}{2}\right)$	$C''\left(-1,\frac{3}{2}\right)$	$C'''\left(-6,\frac{3}{2}\right)$
$D(2,8)$	$D'\left(\frac{1}{2},2\right)$	$D''\left(-\frac{1}{2},2\right)$	$D'''\left(-5\frac{1}{2},2\right)$

Original	Translate	reflect x-axis	dilations
$J(-2,-5)\rightarrow$	$(1,-7)\longrightarrow$	$(1,7)\longrightarrow$	$J'(3,21)$
$K(-1,-2)\rightarrow$	$(2,-4)\longrightarrow$	$(2,4)\longrightarrow$	$K'(6,12)$
$L(2,-2)\rightarrow$	$(5,-4)\longrightarrow$	$(5,4)\longrightarrow$	$L'(15,12)$
$M(3,-5)\rightarrow$	$(6,-7)\longrightarrow$	$(6,7)\longrightarrow$	$M'(18,21)$
$N\left(\frac{1}{2},-6\right)\rightarrow$	$\left(3\frac{1}{2},-8\right)\longrightarrow$	$\left(3\frac{1}{2},8\right)\longrightarrow$	$N'\left(10\frac{1}{2},24\right)$