Homework: Transformations

1. Trapezoid OPQR is drawn on a coordinate grid where O(-1,2), P(1,2), Q(2,-1), and R(0,-3). Pedro draws its image, trapezoid O'P'Q'R, on the same coordinate grid using the rule $(x,y) \rightarrow (x+2, y-4)$. Describe the transformation that took place. What would the new coordinates be for O'P'Q'R'? Are the figures similar or congruent?

O'(1,-2)
P'(3,-2)
Q'(4,-5)
R'(2,-7)

Two translations took place; one to the right 2 units and one down 4 units. Since shape & size stay the same, the figures are congruent.

2. A quadrilateral has vertices at (-10,-2), (-8, 4), (2, 7), and (4,-9). Its image after a dilation has vertices at (-30, -6), (-24, 12), (6, 21), and (12, -27). What is the scale factor? Was the figure enlarged or reduced? Are the two figures similar or congruent?

$(-10,-2) \rightarrow (-30,-6)$
Scale factor = 3
This was an enlargement, so the figures are similar.

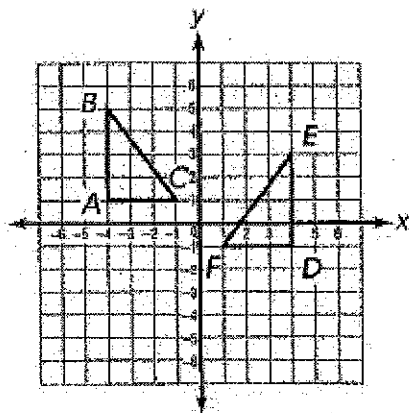3. ΔABC was reflected across the y-axis and dilated to form its image ΔA'B'C'. The length of $\overline{AB}$ is 3 units and the length of $\overline{A'B'}$ is 6 units. Which of the following statements about the triangles is true?

    A. They are neither similar nor congruent.
    B. They are both similar and congruent.
    C. They are similar but not congruent.
    D. They are congruent but not similar.
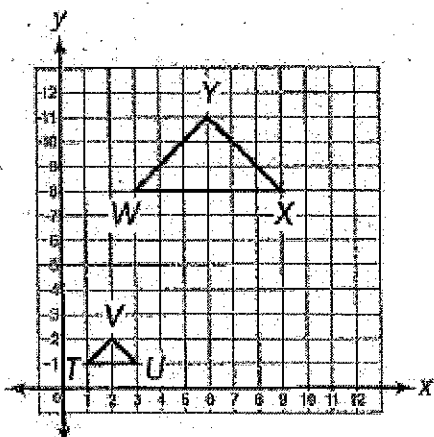
dilation, scale factor = 2

Describe the transformation or sequence of transformations that took place in each picture below. Be sure to use mathematical language and be as specific as possible. Tell whether the figures are congruent or similar.
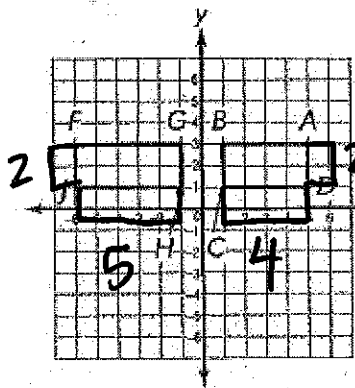
4.

Triangle ABC was reflected over the y-axis and then translated -2 units vertically to become triangle DEF. The two triangles are congruent.

5.

Triangle TUV was dilated with a scale factor of 3 and then translated vertically 5 units. The two triangles are similar, not congruent, since the size changed.
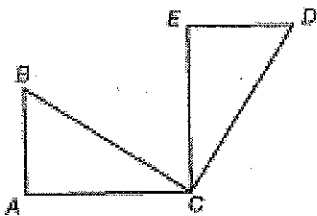
6.

either all 2 sides change or none should!

None of our transformations could take ABCD to FGHJ. The two figures are neither similar nor congruent.

Triangle ABC is rotated 90° clockwise to create triangle EDC. Use this image to answer questions 7 and 8.
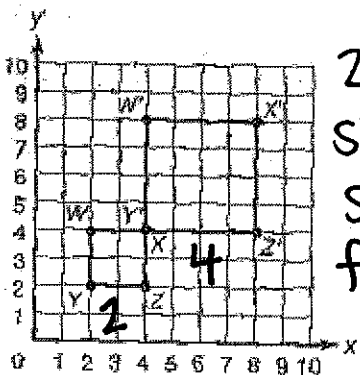

7. Which angle is congruent to $\angle B$?
   A. $\angle BCE$
   B. $\angle ECD$
   C. $\angle E$
   (D.) $\angle D$

8. Which side is congruent to $\overline{AC}$?
   A. $\overline{BC}$
   (B.) $\overline{EC}$
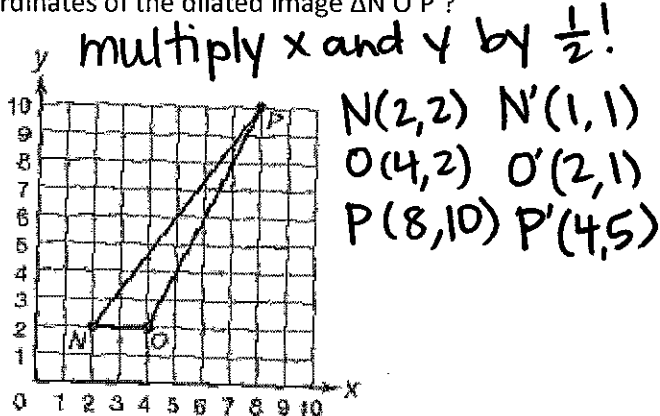   C. $\overline{ED}$
   D. $\overline{DC}$

9. Rectangle W'X'Y'Z' is the image of rectangle WXYZ after a dilation. What is the scale factor?

2 to 4 shows scale factor of 2

10. $\triangle NOP$ was dilated using the following rule: $(x, y) \rightarrow (\frac{1}{2}x, \frac{1}{2}y)$. What would be the new coordinates of the dilated image $\triangle N'O'P'$?

multiply x and y by $\frac{1}{2}$!

N(2,2) N'(1,1)
O(4,2) O'(2,1)
P(8,10) P'(4,5)

Big Picture: 11. Which transformations lead to congruent figures? Which lead to similar figures?

congruent: translations, reflections, rotations   similar: dilation

12. Is there any case in which a dilation can be made and the figures be congruent? Explain why or why not?

yes, only if it's a dilation with a scale factor of 1 (multiplying by 1 doesn't change it)

13. What happens to the coordinates when you reflect an image over the y-axis? Over the x-axis?

$(-x, y)$ ✓ $(x, -y)$ ✓

14. What would happen to the coordinates if you translated a figure 3 units vertically?

$(x, y+3)$

15. If a figure was translated -4 units horizontally and then reflected over the y-axis and then dilated by a scale factor 2, would the resulting figure be congruent or similar to the original figure? How do you know?

similar, because it was dilated with a scale factor of 2 (it doubled).