Transformations Practice

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)→ (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?

The transformation was a translation (since something was added/subtracted from x/y). The figures are congruent.

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

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?

The scale factor is 3 (that's what you multiply x & y by to get the new points). The figure was enlarged (since the scale factor is greater than 1), and it is similar to the original.

3. △ABC was reflected across the y-axis and dilated to form its image △A'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.

✱ 3 units → 6 units means it was dilated, and dilations create similar figures.

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.
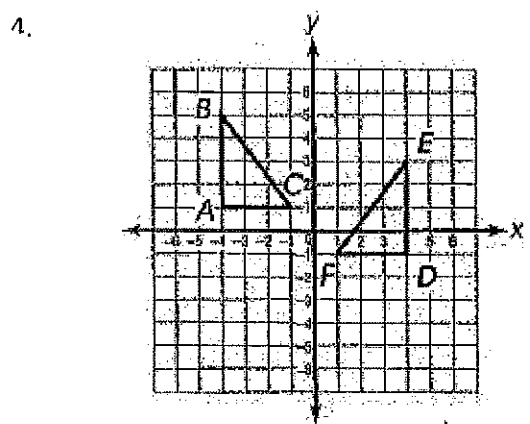
Triangle ABC was reflected over the y-axis and then translated -2 units vertically (down). The two triangles are congruent.

5.
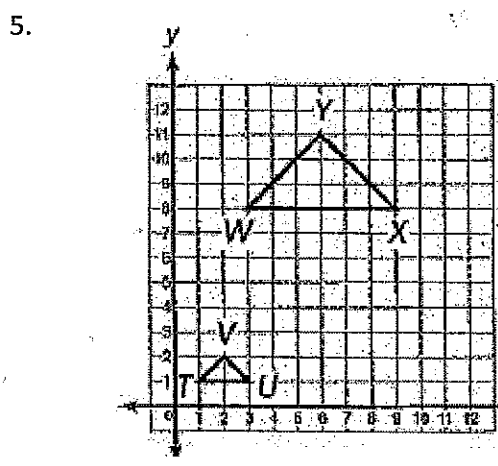
✱ it looks just like a dilation, but look at what the coordinates should be after dilating by 3. That shows it had to be translated too.

Triangle TUV was dilated with a scale factor of 3 and then translated 5 units vertically (up). The two triangles are similar.
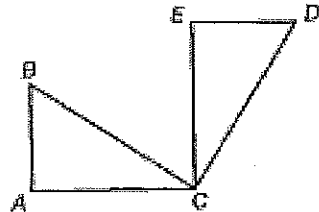
6.
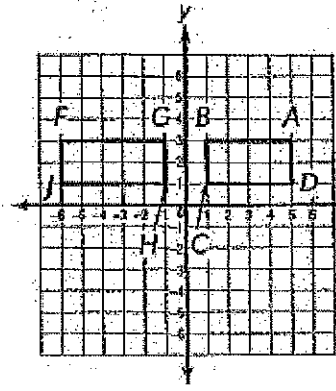
*it looks like a reflection, but the length changed from 4×2 to 5×2, so they're not congruent or similar

Rectangles ABCD and FGHI are neither similar nor congruent. ABCD was not transformed using any of the four types.
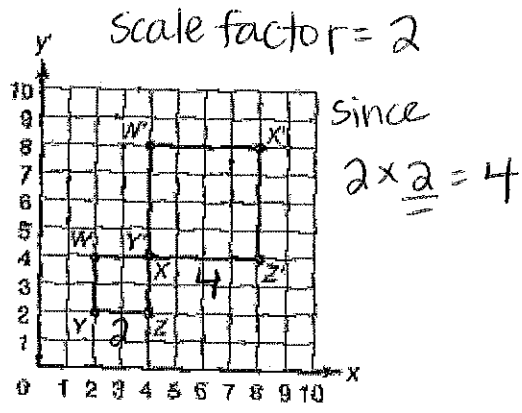
Triangle ABC is rotated 90° clockwise to create triangle EDC. Use this image to answer questions 7 and 8.


7. Which angle is congruent to ∠B?
   A. ∠BCE
   B. ∠ECD
   C. ∠E
   D. ∠D *(circled)*

8. Which side is congruent to $\overline{AC}$?
   A. $\overline{BC}$
   B. $\overline{EC}$ *(circled)*
   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?

Scale factor = 2

since

2 × 2 = 4

10. △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 △N'O'P'?

N(2,2) O(4,2) P(8,10)
*multiply x and y by $\frac{1}{2}$!

N'(1,1)
O'(2,1)
P'(4,5)
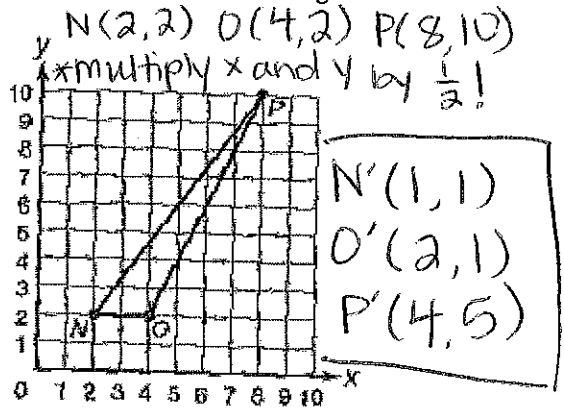
Big Picture: 11. Which transformations lead to congruent figures? Which lead to similar figures?

reflections, rotations, & translations lead to congruence. Dilations lead to similarity.

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

Yes, if the dilation has a scale factor of 1, it would be congruent

13. What happens to the coordinates when you reflect an image over the y-axis? Over the x-axis? *since multiplying by 1 doesn't change it.

over y-axis: keep y; change x to opposite   over x-axis: keep x; change y to opposite

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

y would decrease by 3 and x would stay same.

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 that was not 1.