Name ____________________ Date ________________________

Similarity of Circles Problems - Guided Lesson Explanation

Explanation#1:

Step 1) The image of the point (x, y) translated h units horizontally and k units vertically is (x + h, y + k). If h is positive the point is translated to the right and if h is negative the point is translated to the left. If k is positive the point is translated up and if k is negative the point is translated down.

Dilating a circle about its center multiplies its radius by the scale factor of the dilation.

Performing a translation and dilation can transform a circle into any other circle. In other words, all circles are similar.

Circle F' is a translation and dilation of circle F.

Step 2) Find the translation that maps the center of F to the center of F'. The difference in x-coordinates of F (5, 7) and F' (-6, -3) and is -6-5 = -11. The difference in the Y-coordinates of F (5, 7) and F' (-6,-3) is -3-7 = -10.

So, if you shift F (5, 7) 11 units to the left and 10 units down, you arrive at F' (-6, -3). In other words, the translation that maps F (5, 7) to F' (-6, -3) is given by the rule (x, y) -> (x-11, y-10).

Step 3) After translating the center of F to the center of F', dilate F about its new center to contract F onto F'. To find the scale factor of this dilation, calculate the radio of the radii. Notice that the radius of F is 3 and the radius of F' is 2. Since you are expanding F onto F', the dilation scale factor is the ratio of 4 to 6, which is 0.67.

Step 4) In summary, the translation and scale factor are:

Translation: (x, y) -> (x-11, y-10)

Scale factor: 0.67

Name ____________________ Date ________________________

Explanation#2:

Step 1) The image of the point (x, y) translated h units horizontally and k units vertically is (x + h, y + k). If h is positive the point is translated to the right and if h is negative the point is translated to the left. If k is positive the point is translated up and if k is negative the point is translated down.

Dilating a circle about its center multiplies its radius by the scale factor of the dilation.

Performing a translation and dilation can transform a circle into any other circle. In other words, all circles are similar.

Circle F' is a translation and dilation of circle F.

Step 2) Find the translation that maps the center of F to the center of F'. The difference in x-coordinates of F (6, -6) and F' (3, 2) and is 3-6 = -3. The difference in the Y-coordinates of F (6, -6) and F' (3, 2) is 2-(-6) = 8.

So, if you shift F' (6, -6) -4 units to the right and 9 units down, you arrive at F' (2, 3). In other words, the translation that maps F (6, -6) to F' (3, 2) is given by the rule (x, y) -> (x-3, y+8).

Step 3) After translating the center of F to the center of F', dilate F about its new center to expand F onto F. To find the scale factor of this dilation, calculate the radio of the radii. Notice that the radius of F is 3 and the radius of F' is 5. Since you are expanding F onto F', the dilation scale factor is the ratio of 5 to 3, which is 1.67.

Step 4) In summary, the translation and scale factor are:

Translation: (x, y) -> (x-3, y+8)

Scale factor: 1.67

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Explanation#3:

Step 1) The image of the point (x, y) translated h units horizontally and k units vertically is (x + h, y + k). If h is positive the point is translated to the right and if h is negative the point is translated to the left. If k is positive the point is translated up and if k is negative the point is translated down.

Dilating a circle about its center multiplies its radius by the scale factor of the dilation.

Performing a translation and dilation can transform a circle into any other circle. In other words, all circles are similar.

Circle F' is a translation and dilation of circle F.

Step 2) Find the translation that maps the center of F to the center of F'. The difference in x-coordinates of F (-4, 4) and F' (5, 1) and is (-4)-5 = 9. The difference in the Y-coordinates of F (-4, 4) and F' (5, 1) is 4-1 = 3.

So, if you shift F' (5, 1) 9 units to the right and 3 units down, you arrive at F' (-4, 4). In other words, the translation that maps F' (-4, 4) to F' (5, 1) is given by the rule (x, y) -> (x+9, y+3).

Step 3) After translating the center of F to the center of F', dilate F about its new center to expand F onto F. To find the scale factor of this dilation, calculate the radio of the radii. Notice that the radius of F' is 3 and the radius of F is 6. Since you are expanding F onto F', the dilation scale factor is the ratio of 3 to 6, which is 0.5.

Step 4) In summary, the translation and scale factor are:

Translation: (x, y) -> (x+9, y+3)

Scale factor: 0.5