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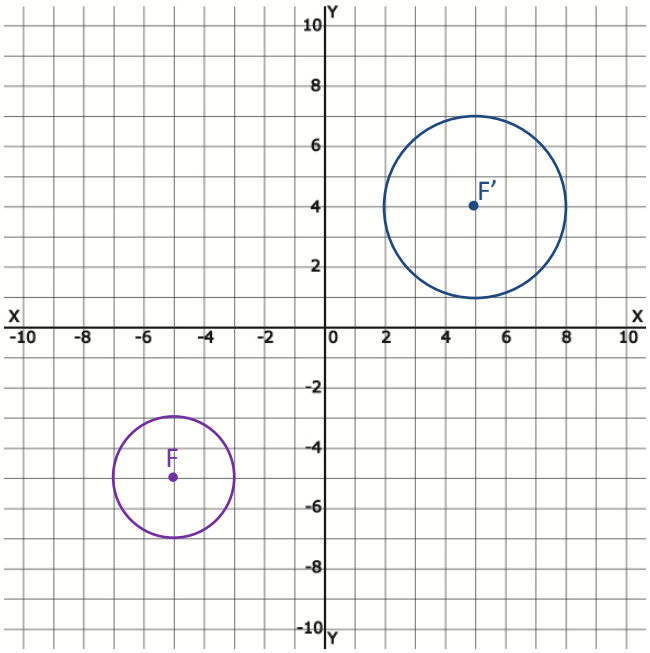
Similarity of Circles - Step-by-Step Lesson

You can transform circle F to circle F' by translating it and then performing a dilation. Find the translation rule and the scale factor of the dilation.



Explanation:

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, 4) and F (-5, -5) is 5-(-5) = 10. The difference in the y-coordinates of F' (5, 4) and F (-5,-5) is 4-(-5) = 9.

So, if you shift F' (-5, -5) 10 units to the right and 9 units up, you arrive at F' (5, 4). In other words, the translation that maps F (-5, -5) to F' (5, 4) is given by the rule (x, y) -> (x+10, y+9).

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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 2. Since you are expanding F onto F', the dilation scale factor is the ratio of 3 to 2, which is 1.5.

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

Translation: (x, y) -> (x+10, y+9)

Scale factor: 1.5