Integrated Math 2 Date: _____

9A – Similarity

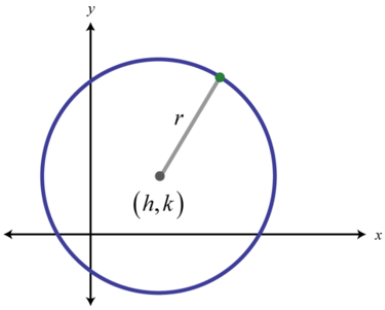
❖ Vocabulary, Formulas, Theories:

- **Circle:** a geometric figure that is made up of a set of points that are a fixed distance from a given point called the center. Circles are denoted by the following symbol: ⊙

Formula

$(x-h)^2+(y-k)^2=r^2$

$center=(h,k)$ $radius=r$



Example

$(x-8)^2+(y+7)^2=64$

$center=(8,-7)$ $radius=8$

- **Similar Figures:** figures that are the same shape but not necessarily the same size.
- **Transformation:** the process of changing the size or location of an original figure to create a new figure.
  - Pre-Image: the original figure, for example $\odot A$.
  - Image: the new figure, for example $\odot A'$.
- **Dilation**: a type of transformation that increases (enlargement) or decreases (reduction) the distance of a figure (pre-image) to create a new figure (image)
- **Scale Factor**: the ratio of corresponding sides of similar figures.

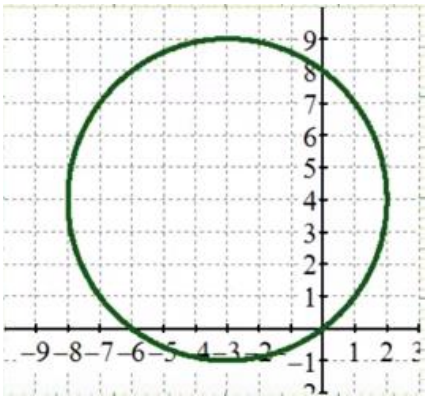
Similar figures can have different sizes, but they must have the same shape. Circles have the same shape, so they'll always be similar. Watch the next video to see how it's proved.

Video - "Similarity of Circles" - Marc Parsons (4:55)

Now that we know how circles are similar, we'll work on transforming them. This means we'll be taking a circle and shifting it across a coordinate system. The circle can also be dilated (enlarged/reduced). However, before we get to that point, lets become more familiar with the equation of circles and graphing them on a coordinate system.

Video - "Ex: Write the Standard Form of a Circle From a Graph" - Mathispower4u (1:38)

EX1) Identify the center and radius of the circle and write the equation that represents it.



Video - "Circles - Graph Given an Equation - Example" - MathontheWeb (5:18)

EX2) Identify the center and radius of the circle and graph it on a coordinate system.

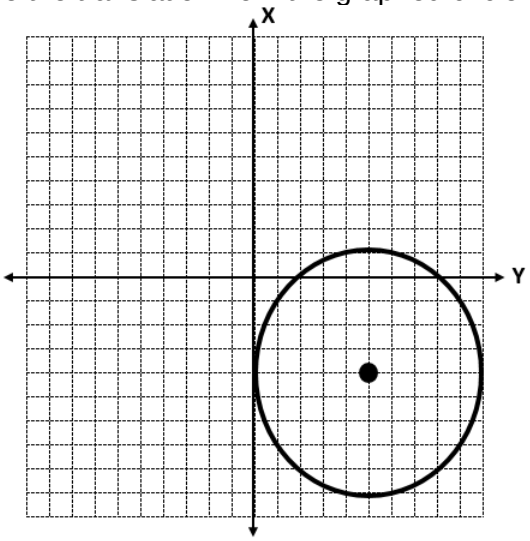
a) $(x-3)^2+(y+2)^2=25$ b) $(x+1)^2+(y-4)^2=20$

Like it was stated above, transforming circles means moving them around the coordinate system and changing their size. Let's work through some examples that involve this concept.

EX3) Describe the transformation from $\odot G$ to $\odot G'$ if $\odot G$ has a center of (-3,4) and radius of 2 and $\odot G'$ has a center of (1,0) and radius of 6.

EX4) Write the equation of a circle that is translated right 2 and down 4 and dilated 3 from $(x+6)^2+(y-5)^2=4$.

EX5) Describe the translation from the graphed circle to $(x-1)^2+(y-8)^2=16$.



As it's been mentioned throughout the lesson, similar figures are the same shape, but might be a different size. Because they are the same, this means that similar figures will have congruent angles. So, a central angle in a circle will be congruent to a corresponding central angle in another circle.

EX6) Given $\odot R$ with a central angle $\measuredangle R = 74°$ and $\odot M$ with a corresponding central angle $\measuredangle M = (2x - 8)°$. Set up an equation that models this situation and solve for x.