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## Honors Geometry

DATE: 5/15

Target 9E. Derive the equation of a circle and apply it to problems involving coordinate geometry

A **circle** is the set of all points in a plane that are a given distance from the center.

### Standard Equation of a Circle

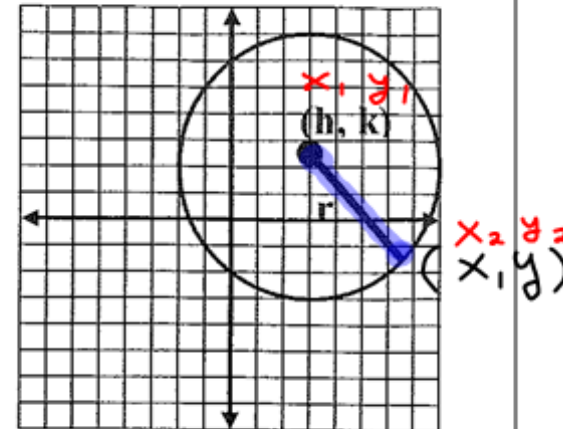
In the coordinate plane, the standard equation of a circle with center  $(h, k)$  and radius  $r$  is:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

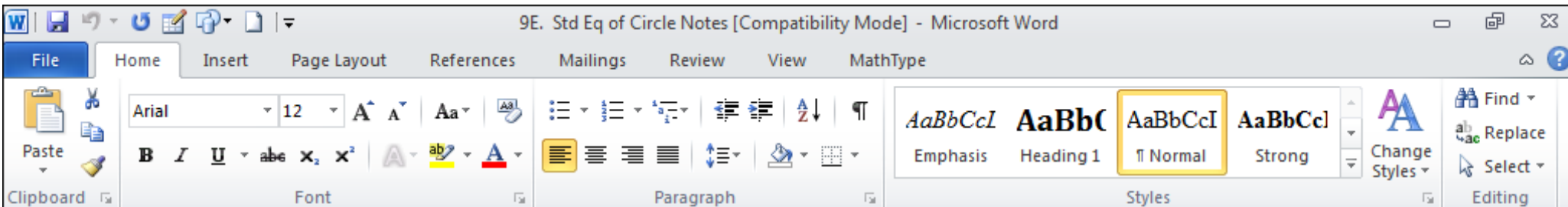
$$(r)^2 = \left( \sqrt{(x-h)^2 + (y-k)^2} \right)^2$$

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

stand. Eq. of  $\odot$



$(h, k) = \text{center}$   
 $r = \text{radius}$



Write the equation of the circle.

1. <sup>Center</sup>  $(-3, 6)$  and radius 6      2. <sup>Center</sup>  $(1, 2)$  and diameter 14      3. <sup>Center</sup> center at the origin and radius 9

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

$$(x-(-3))^2 + (y-(6))^2 = 6^2$$

$$(x+3)^2 + (y-6)^2 = 36$$

$$(x-1)^2 + (y-2)^2 = 7^2$$

$$(x-1)^2 + (y-2)^2 = 49$$

$$(x-0)^2 + (y-0)^2 = 9^2$$

$$x^2 + y^2 = 81$$

Determine the coordinates of the center and the radius.

4.  $(x-4)^2 + (y+1)^2 = 121$       5.  $(x-6)^2 + (y-4)^2 = 9$

$$(h, k) = (4, -1)$$

$$r^2 = 121 \Rightarrow r = 11$$

$$(h, k) = (6, 4)$$

$$r^2 = 9 \Rightarrow r = 3$$

6.  $(x+5)^2 + (y+3)^2 = 49$

$$(h, k) = (-5, -3)$$

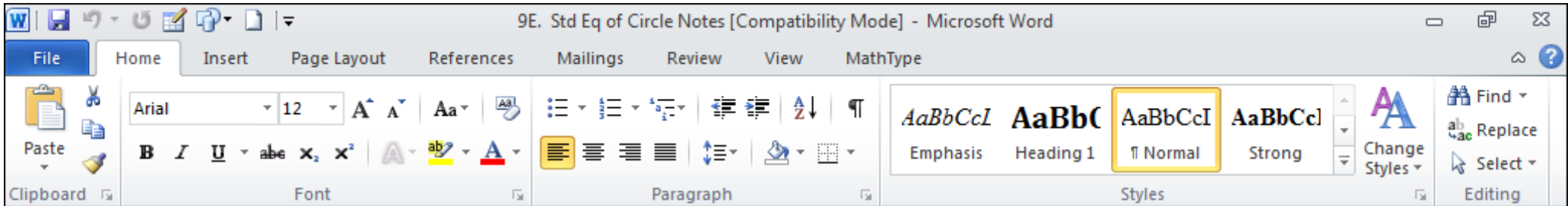
$$r^2 = 49 \Rightarrow r = 7$$

7.  $x^2 + y^2 = 64$

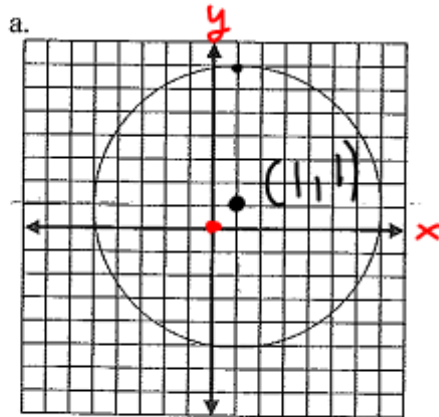
$$(h, k) = (0, 0)$$

$$r^2 = 64 \Rightarrow r = 8$$

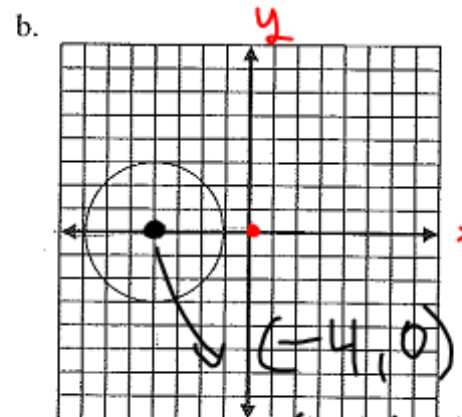
Given the graph, write the equation of the circle in standard form.



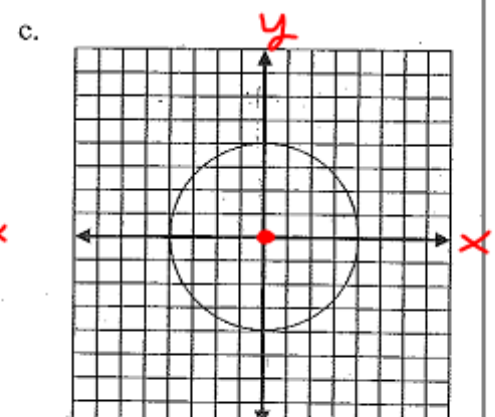
8. Given the graph, write the equation of the circle in standard form.



$r = 6$ ,  $(h, k) = (1, 1)$   
 $(x - 1)^2 + (y - 1)^2 = 6^2 = 36$



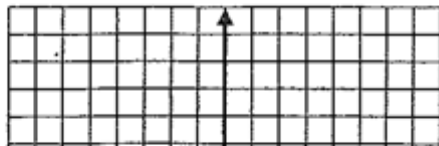
$r = 3$ ,  $(h, k) = (-4, 0)$   
 $(x + 4)^2 + y^2 = 9$



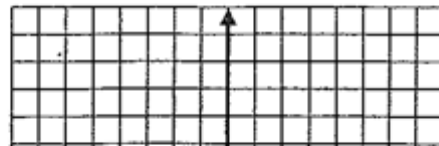
center  $(0, 0)$   
 $r = 4$   
 $x^2 + y^2 = 16$

9. Graph the circle for the given equation.

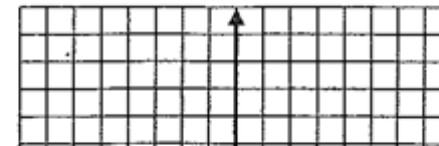
a.  $(x - 3)^2 + (y + 2)^2 = 16$



b.  $(x - 1)^2 + (y - 2)^2 = 4$



c.  $(x + 2)^2 + (y - 4)^2 = 25$



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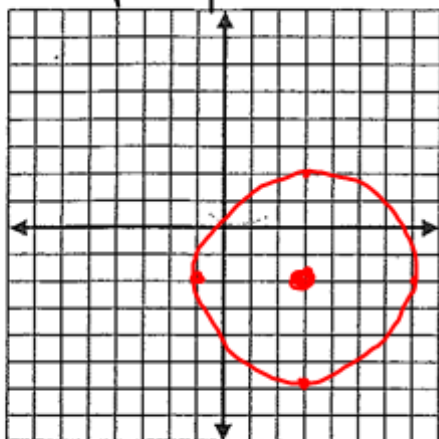
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9. Graph the circle for the given equation.

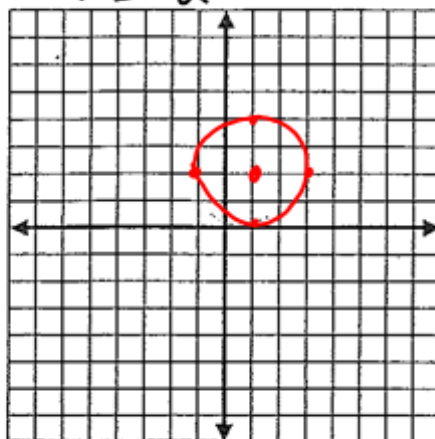
a.  $(x - 3)^2 + (y + 2)^2 = 16$

Center (3, -2)  
 $r = 4$



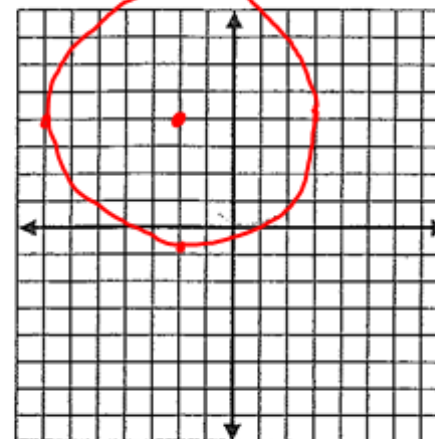
b.  $(x - 1)^2 + (y - 2)^2 = 4$

Center (1, 2)  
 $r = 2$



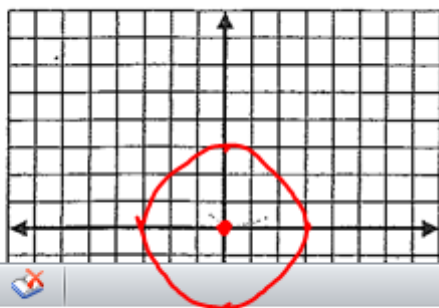
c.  $(x + 2)^2 + (y - 4)^2 = 25$

Center (-2, 4)  
 $r = 5$



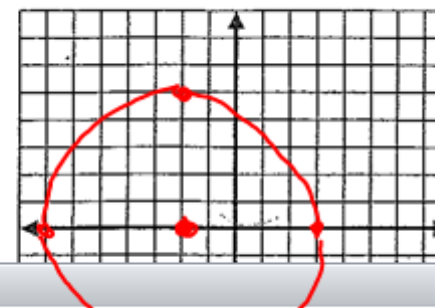
d.  $x^2 + y^2 = 9$

Center (0, 0)  
 $r = 3$



e.  $(x + 2)^2 + y^2 = 25$

Center (-2, 0)  
 $r = 5$



f.  $x^2 + (y - 1)^2 = 9$

Center (0, 1)  
 $r = 3$

