- B May 28, Class 11B, Week 5, Lesson B

- The following students should complete this assignment Lesson B: Federman, Perlow, Schecter.
  Read pages 103 and 104 attached

- Do the attached problems pages 1 throuh 6

Rotations

Rotations of 90° will result in a line perpendicular to the original, so the slope will be the negative reciprocal. To write the equation of a line after a 90° rotation, use the same procedure for translations and dilations, except use the negative reciprocal of the slope.

EQUATION OF THE CIRCLE

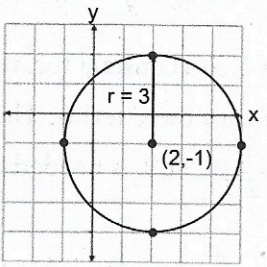
Center Radius Form of the Equation of a Circle

$(x - h)^2 + (y - k)^2 = r^2$ where the center has coordinates (h, k) and radius has length r.

- To graph a circle, first identify the center and radius from the equation. Plot a point at the center. Then plot points up, down, left, and right a distance r from the center.

Example:

Graph the equation $(x - 2)^2 + (y + 1)^2 = 9$.



The center is located at (2, –1), and $r^2 = 9$, so $r = 3$. We plot the center point at (2, –1); then plot points up, down, right, and left 3 units from the center. Use these four points as a guide to complete the circle.

General Form of the Equation of a Circle

$$x^2 + y^2 + Cx + Dy + E = 0$$

To find the coordinates of the center and the radius from the general form of the equation, you will need to convert it to the center–radius form using the following procedure:

1. Group the x-terms and y-terms on one side of the equation, and the constant on the other side of the equation.
2. Complete the square with the x-terms, and then complete the square with the y-terms.

Example:

- Find the coordinates of the center and the length of the radius of a circle whose equation is $x^2 + 4x + y^2 - 6y + 7 = 0$.

Solution:

Bring the constant term to the right.

$$x^2 + 4x + y^2 - 6y = -7$$

The coefficient of x is 4, so a constant term of $\left(\frac{4}{2}\right)^2$, or 4, is needed to complete the square with the x-terms. The coefficient of y is –6, so a constant term of $\left(\frac{-6}{2}\right)^2$, or 9, is needed to complete the square with the y-terms.

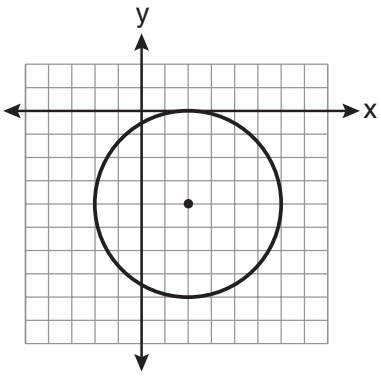
$$x^2 + 4x + 4 + y^2 - 6y + 9 = -7 + 4 + 9$$

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

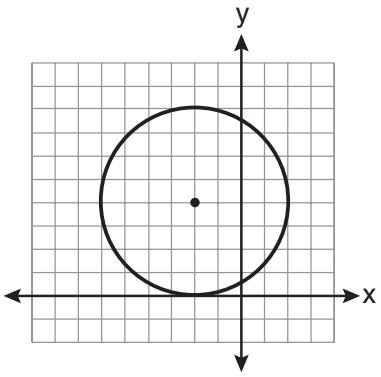
The center has coordinates (–2, 3) and the radius has a length of $\sqrt{6}$.

Use this space for computations.

1. The equation of a circle is $(x - 2)^2 + (y + 4)^2 = 4$. Which diagram is the graph of the circle?



(1)



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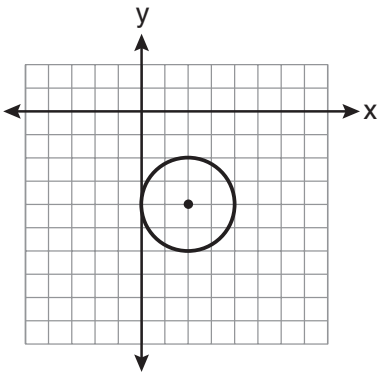

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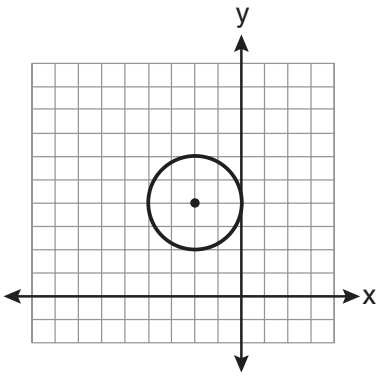
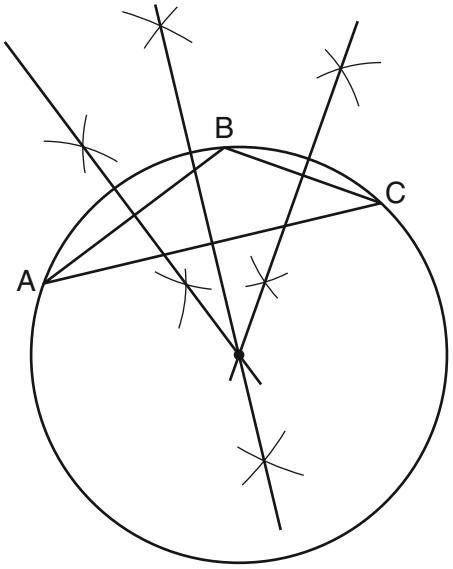


(4)

[1]

Use this space for computations.

2. The diagram below shows the construction of the center of the circle circumscribed about $\triangle ABC$.



This construction represents how to find the intersection of

(1) the angle bisectors of $\triangle ABC$

(2) the medians to the sides of $\triangle ABC$

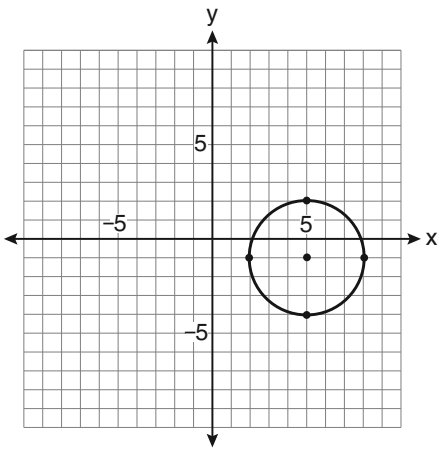
(3) the altitudes to the sides of $\triangle ABC$

(4) the perpendicular bisectors of the sides of $\triangle ABC$

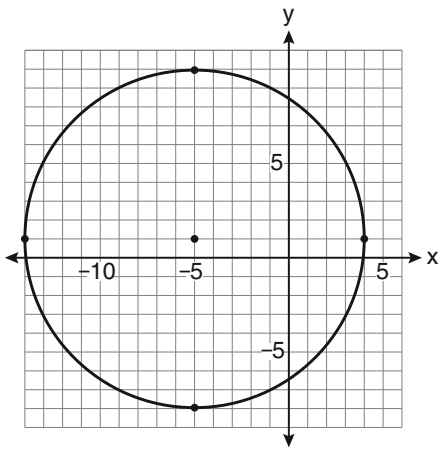
[2]

Use this space for computations.

3 Which graph represents a circle with the equation $(x - 5)^2 + (y + 1)^2 = 9$?



(1)



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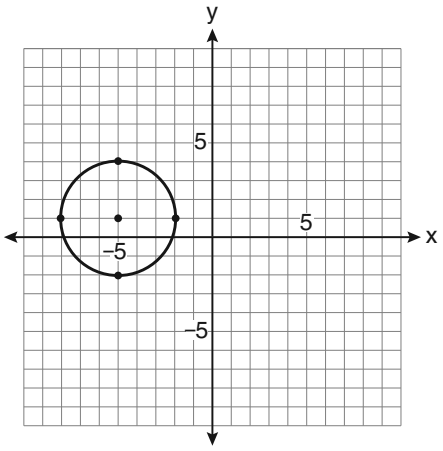

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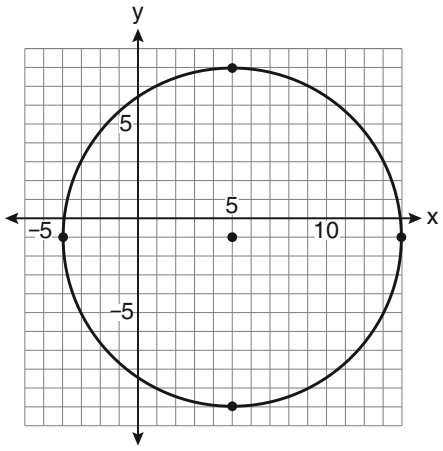


(4)

Use this space for computations.

4 Which equation represents the circle whose center is $(-2,3)$ and whose radius is 5?

(1) $(x - 2)^2 + (y + 3)^2 = 5$

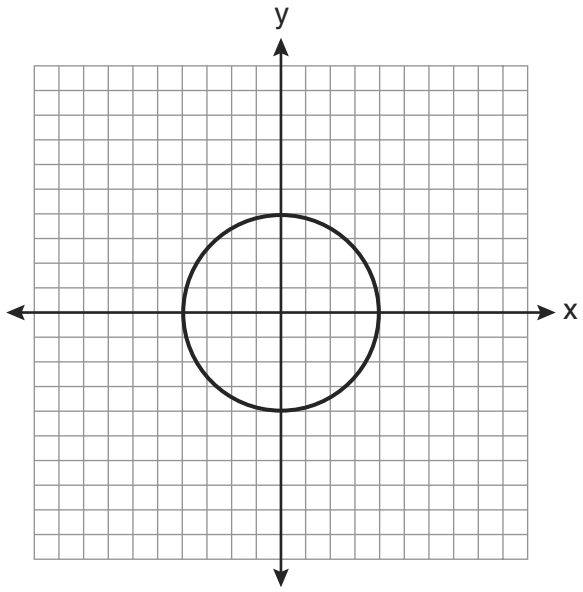
(2) $(x + 2)^2 + (y - 3)^2 = 5$

(3) $(x + 2)^2 + (y - 3)^2 = 25$

(4) $(x - 2)^2 + (y + 3)^2 = 25$

Use this space for computations.

5 What is an equation for the circle shown in the graph below?



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

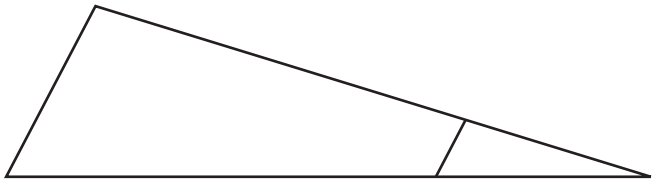
(2) $x^2 + y^2 = 4$

(3) $x^2 + y^2 = 8$

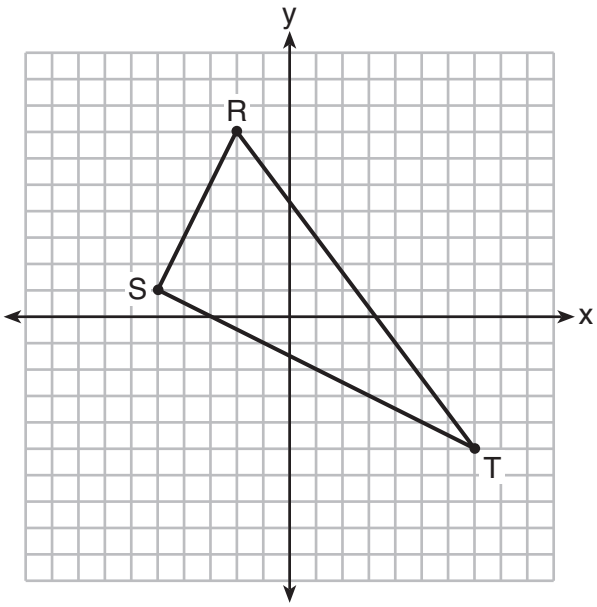
(4) $x^2 + y^2 = 16$

[5]

Use this space for computations.



6 Triangle *RST* is graphed on the set of axes below.



How many square units are in the area of $\triangle RST$?

(1) $9\sqrt{3} + 15$

(2) $9\sqrt{5} + 15$

(3) 45

(4) 90