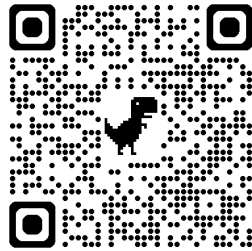**Name:**

Common Core Geometry

Unit 6

Equations of Lines

Mr. Schlansky

Lesson 1: I can determine the slope and y intercept of a line by putting into y = mx + b form and knowing the slope is what is in front of the x and the y intercept is the constant.
To find slope and y intercept:
1) Put into y = mx + b form (add or subtract first, divide last)
2) The slope (m) is the coefficient of the x, the y intercept (b) is the constant

Lesson 2: I can graph lines by beginning at b and applying the slope (rise/run),
1) Find the slope and y intercept (same notes as Lesson 1)
2) Begin at b! Plot the y-intercept on the y axis
3) Apply the slope from the y intercept (rise/run)

Lesson 3: I can determine if lines and parallel or perpendicular using parallel lines have the same slope and perpendicular lines have negative reciprocal slopes.
Put the equation into $y = mx + b$ form. m is the slope.
Parallel lines have the same slope.
Perpendicular lines have negative reciprocal slopes (flip it and negate it).

Lesson 4: I can write the equation of a line through a point using $y - y_1 = m(x - x_1)$.
When asked for the equation of a line and given a point:
1) Find m by using parallel or perpendicular definitions
2) substitute into $y - y_1 = m(x - x_1)$ (Point-slope formula)

   *negate x_1 and y_1 when substituting in
3) If necessary, solve for y to put it into $y = mx + b$ form (Slope-intercept form)

Lesson 5: I can write the equation of a line through a point using $y - y_1 = m(x - x_1)$ multiple choice practice.
Same notes as Lesson 2.

Lessons 6-8:
Line Dilations
The image is parallel. The slope always stays the same!
Centered at origin: $b = kb$ (The new y-int is the scale factor times the original y int)
Centered on the line: $b = b$ (The image is the same as the original line)
Centered off the line: Count using the graph. Multiply the distance by the scale factor

THE CHEAT
The slope is always the same!
If center is origin: multiply scale factor and b
If center is NOT origin: the image is the SAME LINE

If the center and/or scale factor are not given, all we know is that they are parallel which means the slopes are the same. Find the choice that has the same slope by getting y by itself.

Lesson 6: I can write the equation of a line after a dilation centered at the origin by keeping the slope and multiply the y intercept.
The slope stays the same
Multiply b by the scale factor to find the new b

Lesson 7: I can write the equation of a line after a dilation centered not at the origin by keeping the slope and determining if the center is on the line.
The slope stays the same
If the center is on the line, the image is the same line
If the center is not on the line:
1) Dilate one of the points by counting from the center and applying that the scale factor number of times
2) Apply the slope to find the y-intercept

Lesson 8: I can write equations of lines after dilations by keeping the slope and determining if the center is on the line.
Notes listed above

Lesson 9: I can graph a circle by finding the center (negating what's inside the parenthesis) and the radius (taking the square root of the right hand side).
To find the center:
Negate (change the sign) what's in the parenthesis.
*If there are no parenthesis, the coordinate is 0.

To find the radius:
Take the square root of the right hand side.
*If the right hand side is not a perfect square, leave it as a radical.
*If the right hand side is a fraction, take the square root of the top and bottom individually.

To graph the circle:
1) Plot the center
2) Count the radius from the center in all 4 directions
3) Connect the four points with a circle

Lesson 10: I can complete the square by following its procedure
1) $x^2 + bx = c$
2) Add $\left(\dfrac{b}{2}\right)^2$ to both sides
3) Factor the trinomial, combine the right hand side
4) Re-write as a binomial squared

Lesson 11: I can determine the center and radius of a circle by completing the square, negating what's in the parenthesis, and taking the square root of the right hand side.

Center and radius are key pieces of information for circles
To find center: Negate what is in the parenthesis. If there are no parentheses, the coordinate is 0.
Radius is the square root of the right hand side
$(x-a)^2 + (y-b)^2 = r^2$ where (a,b) is the center and r is the radius
To put into center-radius form: COMPLETE THE SQUARE TWICE
Completing the Square
1) Write the x's together, y's together, and move constant to the other side
$$x^2 + bx + y^2 + by = c$$

2) Add $\left(\dfrac{b}{2}\right)^2$ to both sides for each variable

3) Factor each trinomial (Both factors must be the same)
4) Rewrite the factors as a binomial squared

Lesson 12: I can determine the center and radius of a circle using the conics app!
CALCULATOR STRATEGY
Use the conics app!
Make sure the equation is equal to zero
A = 1
B = coefficient of x
C = coefficient of y
D = constant (MAKE SURE IT IS EQUAL TO ZERO. Move the constant if necessary)
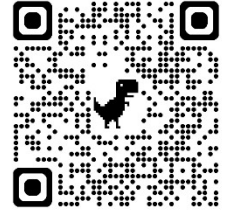ALPHA ENTER to get the center and radius

If the radius is a decimal, match it up to the radical in each choice.

Lesson 13: I can prepare for my equations of lines and circle test by practicing.

Name_____   Date_____
Mr. Schlansky   Algebra I

Slope-Intercept Form

Determine the slope and y intercept of the following equations

1. $y + x = 4$

2. $y + 2 = x$

3. $y - 2x = 3$

4. $y + 3x = 6$

5. $y - 5 = -4x$

6. $y + 6 = -\dfrac{1}{2}x$

7. $y + 2x = 6$

8. $y - \dfrac{2}{3}x = -1$

9. $y + \dfrac{4}{5}x = 6$

10. $2y = 4x - 6$

11. $3y = 9x - 6$

12. $4y = 8x - 4$

13. $3y = -9x - 6$

14. $2y = 3x + 4$

15. $3y = 2x + 3$

16. $5y = 2x + 10$

17. $-2y = 7x + 4$

18. $-3y = 4x - 12$

19. $2x + 3y = 9$

20. $-3x + 2y = 8$

21. $5x + 3y = 12$

22. $3x - 2y = 6$

23. $-4x + 5y = 15$

24. $x + 3y = 15$

Graphing Lines
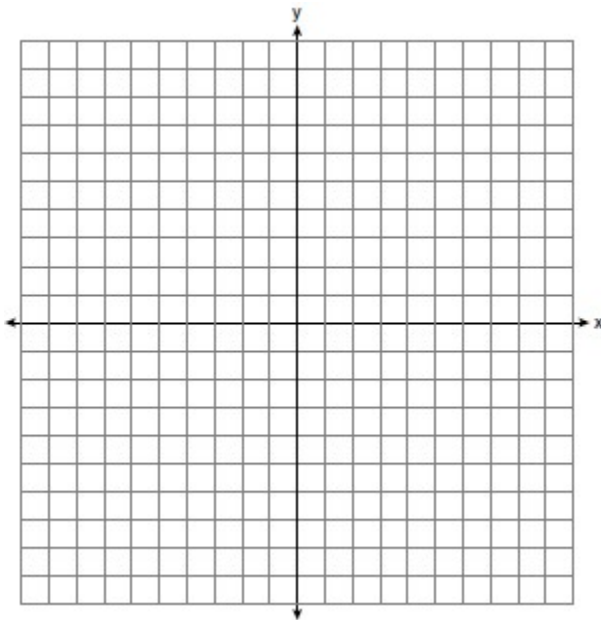
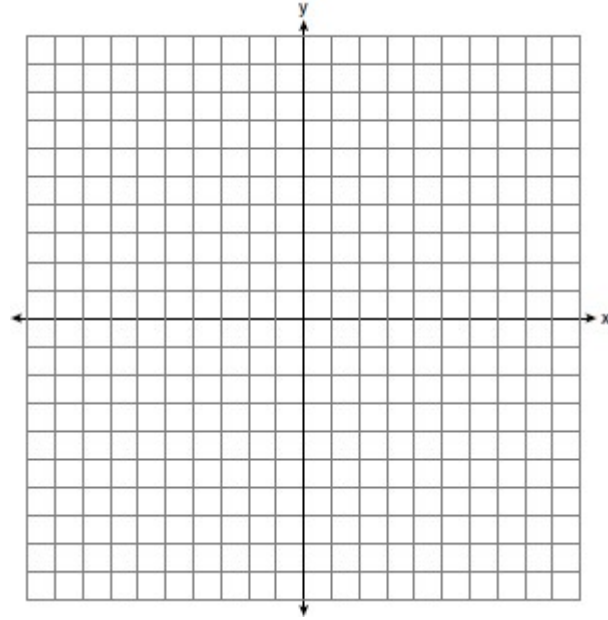**Graph each of the following lines on the axis provided**
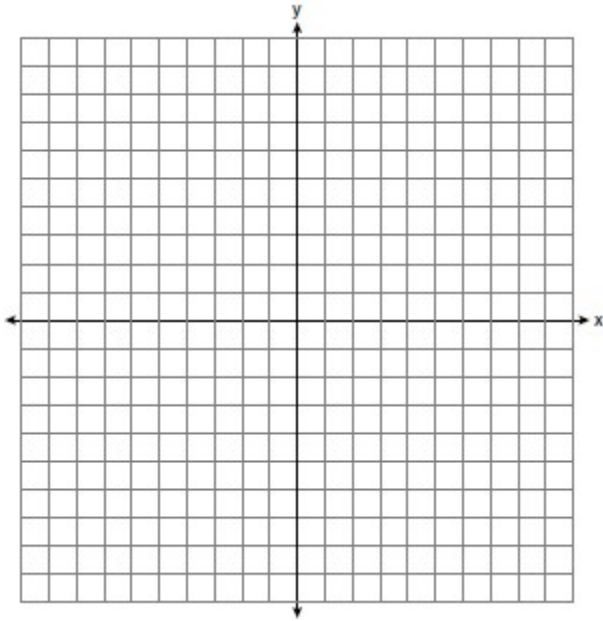
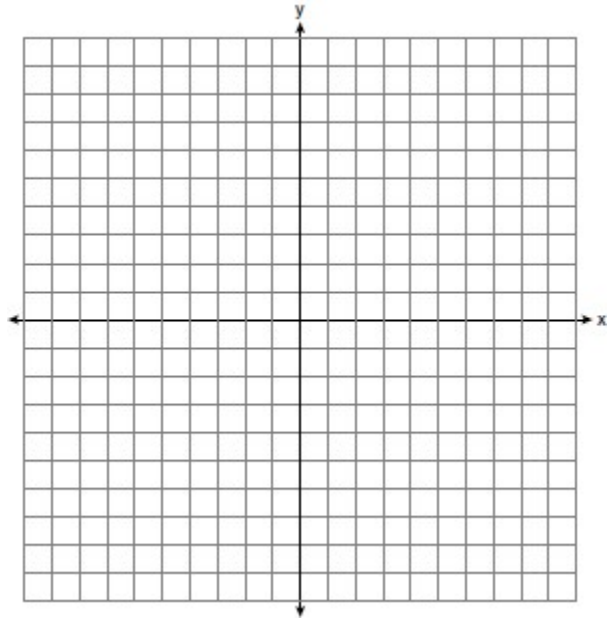1. $y = \dfrac{1}{2}x - 2$
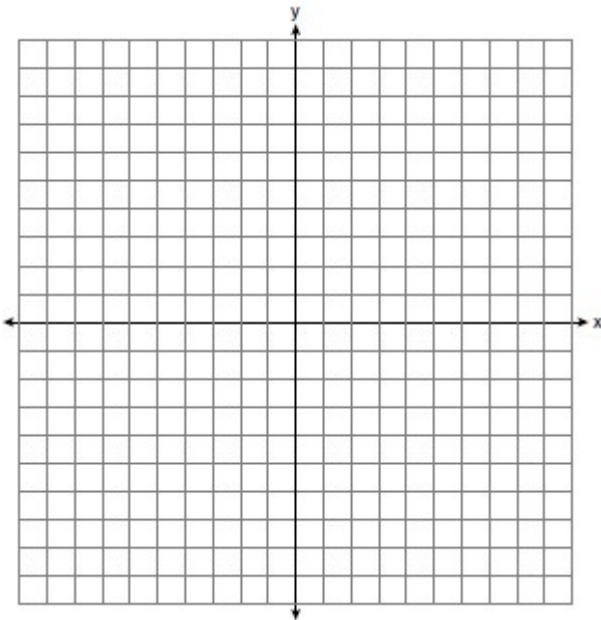
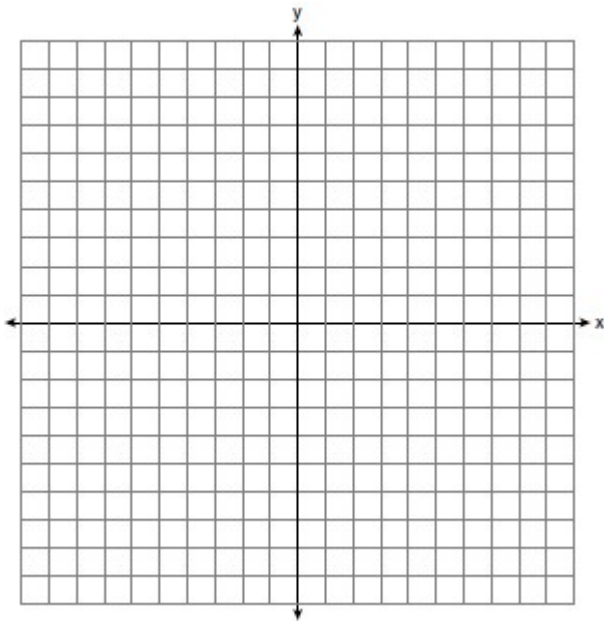2. $y = -x + 5$
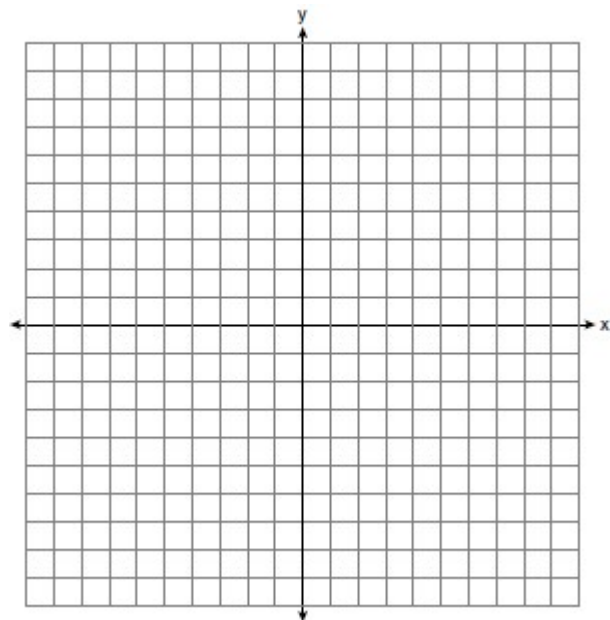
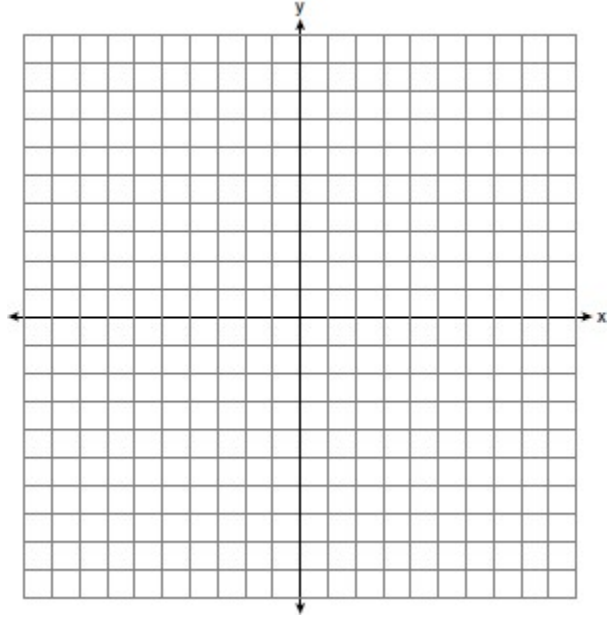3. $y = \dfrac{2}{3}x - 1$

4. $y = -\dfrac{5}{2}x + 6$

5. 2y = 4x + 6

6. y + 4x = 1

7. $2y = 3x + 4$

8. $2y + 2x = 6$

Parallel and Perpendicular Slopes

What is the slope of the line:

1. Parallel to $y = 3x - 6$?

2. Perpendicular to $y = 3x - 6$?

3. Parallel to $y = -2x + 1$?

4. Perpendicular to $y = -2x + 1$?

5. Parallel to $y = -\dfrac{2}{3}x - 7$?

6. Perpendicular to $y = -\dfrac{2}{3}x - 7$?

7. Parallel to $y = \dfrac{1}{4}x + 3$?

8. Perpendicular to $y = \dfrac{1}{4}x + 3$?

9. Parallel to $2x + 3y = 12$?

10. Perpendicular to $2x + 3y = 12$?

11. Parallel to $-2x + 5y = 15$?

12. Perpendicular to $-2x + 5y = 15$?

13. What is the slope of a line perpendicular to the line whose equation is $y = -\frac{2}{3}x - 5$?

1) $-\frac{3}{2}$

2) $-\frac{2}{3}$

3) $\frac{2}{3}$

4) $\frac{3}{2}$

14. What is the slope of a line perpendicular to the line whose equation is $y = 3x + 4$?
1) $\frac{1}{3}$

2) $-\frac{1}{3}$

3) 3
4) -3

15. What is the slope of a line parallel to the line whose equation is $2y = -6x + 8$?
1) -3
2) $\frac{1}{6}$

3) $\frac{1}{3}$

4) -6

16. What is the slope of a line that is parallel to the line whose equation is $3x + 4y = 12$?

1) $\frac{3}{4}$

2) $-\frac{3}{4}$

3) $\frac{4}{3}$

4) $-\frac{4}{3}$

17. What is the slope of a line perpendicular to the line whose equation is $5x + 3y = 8$?

1) $\frac{5}{3}$

2) $\frac{3}{5}$

3) $-\frac{3}{5}$

4) $-\frac{5}{3}$

18. What is the equation of a line that is parallel to the line whose equation is $y = 3x - 1$?

1) $y = -\dfrac{1}{3}x + 2$ 3) $y = -3x + 6$

2) $y = \dfrac{1}{3}x - 7$ 4) $y = 3x + 4$

19. What is the equation of a line that is perpendicular to the line whose equation is $y = \dfrac{1}{2}x + 4$?

1) $y = -\dfrac{1}{2}x + 1$ 3) $y = 2x + 2$

2) $y = \dfrac{1}{2}x + 6$ 4) $y = -2x - 3$

20. What is the equation of a line that is perpendicular to the line whose equation is $2x + 3y = 6$?

1) $y = -\dfrac{3}{2}x - 2$ 3) $y = -\dfrac{2}{3}x + 7$

2) $y = \dfrac{3}{2}x - 5$ 4) $y = \dfrac{2}{3}x + 1$

21. What is the equation of a line that is parallel to the line whose equation is $4x - 3y = 9$?

1) $y = -\dfrac{3}{4}x + 1$ 3) $y = -\dfrac{4}{3}x + 6$

2) $y = \dfrac{3}{4}x - 8$ 4) $y = \dfrac{4}{3}x - 7$

22. What is the equation of a line that is parallel to the line whose equation is $y = x + 2$?
1) $x + y = 5$ 3) $y - x = -1$
2) $2x + y = -2$ 4) $y - 2x = 3$

23. Which equation represents a line perpendicular to the line whose equation is $2x + 3y = 12$?
1) $6y = -4x + 12$ 3) $2y = -3x + 6$
2) $2y = 3x + 6$ 4) $3y = -2x + 12$

24. Which equation represents a line parallel to the line whose equation is $2y - 5x = 10$?
1) $5y - 2x = 25$ 3) $4y - 10x = 12$
2) $5y + 2x = 10$ 4) $2y + 10x = 8$

25. The lines $4x + 2y = 8$ and $y + 2x = 4$ are
1) parallel
2) perpendicular
3) the same line
4) neither parallel nor perpendicular

26. The lines $-3y = x + 9$ and $y + 2 = -\dfrac{1}{3}x$ are

1) parallel
2) perpendicular
3) the same line
4) neither parallel nor perpendicular

27. The lines $2x + 4y = 12$ and $4x - 2y = 12$ are
1) parallel
2) perpendicular
3) the same line
4) neither parallel nor perpendicular

28. The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are
1) parallel
2) perpendicular
3) the same line
4) neither parallel nor perpendicular

29. The lines represented by the equations $y + \dfrac{1}{2}x = 4$ and $3x + 6y = 12$ are

1) the same line
2) parallel
3) perpendicular
4) neither parallel nor perpendicular

Name _____   Date _____
Mr. Schlansky   Geometry

Linear Equations Through a Point

1. What is the equation of a line that passes through the point $(1, 5)$ and is parallel to the line whose equation is $y = 2x - 6$?

2. What is the equation of a line that passes through the point $(-3, -11)$ and is perpendicular to the line whose equation is $y = -\dfrac{1}{2}x - 4$?

3. What is the equation of a line that passes through the point $(-2, 5)$ and is parallel to the line whose equation is $y = -2x + 4$?

4. What is the equation of a line that passes through the point $(5, 4)$ and is perpendicular to the line whose equation is $y = -\dfrac{1}{3}x$?

5. What is the equation of a line that passes through the point $(6, -5)$ and is perpendicular to the line whose equation is $y + x = 5$?

6. Find an equation of the line passing through the point $(5, 4)$ and parallel to the line whose equation is $2x + y = 3.$

7. Find an equation of the line passing through the point $(6, 5)$ and perpendicular to the line whose equation is $2y + 3x = 6.$

8. Write an equation of the line that passes through the point $(6, -5)$ and is parallel to the line whose equation is $2x - 3y = 11.$

Name _____   Date _____
Mr. Schlansky   Geometry

Linear Equations Through a Point Multiple Choice

1. What is the equation of a line that passes through the point $(-3, -11)$ and is parallel to the line whose equation is $2x - y = 4$?

1) $y = 2x + 5$

2) $y = 2x - 5$

3) $y = \dfrac{1}{2}x + \dfrac{25}{2}$

4) $y = -\dfrac{1}{2}x - \dfrac{25}{2}$

2. What is an equation of the line that passes through the point $(-2, 5)$ and is perpendicular to the line whose equation is $y = \dfrac{1}{2}x + 5$?

1) $y - 5 = \dfrac{1}{2}(x + 2)$

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

3) $y + 5 = \dfrac{1}{2}(x - 2)$

4) $y + 5 = -2(x - 2)$

3. What is an equation of the line that contains the point $(3, -1)$ and is perpendicular to the line whose equation is $y = -3x + 2$?

1) $y = -3x + 8$

2) $y = -3x$

3) $y = \dfrac{1}{3}x$

4) $y = \dfrac{1}{3}x - 2$

4. An equation of the line that passes through $(2, -1)$ and is parallel to the line $2y + 3x = 8$ is

1) $y + 1 = -\dfrac{3}{2}(x - 2)$

2) $y + 1 = \dfrac{2}{3}(x - 2)$

3) $y - 1 = -\dfrac{3}{2}(x + 2)$

4) $y - 1 = \dfrac{2}{3}(x + 2)$

15

5. What is an equation of the line that is perpendicular to the line whose equation is $y = \frac{3}{5}x - 2$ and that passes through the point $(3, -6)$?

1) $y = \frac{5}{3}x - 11$

2) $y = -\frac{5}{3}x + 11$

3) $y = -\frac{5}{3}x - 1$

4) $y = \frac{5}{3}x + 1$

6. The equation of a line is $y = \frac{2}{3}x + 5$. What is an equation of the line that is perpendicular to the given line and that passes through the point $(4, 2)$?

1) $y = \frac{2}{3}x - \frac{2}{3}$

2) $y = \frac{3}{2}x - 4$

3) $y = -\frac{3}{2}x + 7$

4) $y = -\frac{3}{2}x + 8$

7. What is an equation of the line that passes through the point $(6, 8)$ and is perpendicular to a line with equation $y = \frac{3}{2}x + 5$?

1) $y - 8 = \frac{3}{2}(x - 6)$

2) $y - 8 = -\frac{2}{3}(x - 6)$

3) $y + 8 = \frac{3}{2}(x + 6)$

4) $y + 8 = -\frac{2}{3}(x + 6)$

8. What is an equation of a line which passes through $(6, 9)$ and is perpendicular to the line whose equation is $4x - 6y = 15$?

1) $y - 9 = -\frac{3}{2}(x - 6)$

2) $y - 9 = \frac{2}{3}(x - 6)$

3) $y + 9 = -\frac{3}{2}(x + 6)$

4) $y + 9 = \frac{2}{3}(x + 6)$

9. What is an equation of a line that is perpendicular to the line whose equation is $2y = 3x - 10$ and passes through $(-6, 1)$?

1) $y = -\dfrac{2}{3}x - 5$

2) $y = -\dfrac{2}{3}x - 3$

3) $y = \dfrac{2}{3}x + 1$

4) $y = \dfrac{2}{3}x + 10$

10. Which equation represents the line that passes through the point $(-2, 2)$ and is parallel to $y = \dfrac{1}{2}x + 8$?

1) $y = \dfrac{1}{2}x$

2) $y = -2x - 3$

3) $y = \dfrac{1}{2}x + 3$

4) $y = -2x + 3$

11. What is an equation of the line that passes through the point $(7, 3)$ and is parallel to the line $4x + 2y = 10$?

1) $y - 3 = \dfrac{1}{2}(x - 7)$

2) $y - 3 = -2(x - 7)$

3) $y + 3 = \dfrac{1}{2}(x + 7)$

4) $y + 3 = -2(x + 7)$

12. What is an equation of the line that passes through the point $(-2, 3)$ and is parallel to the line whose equation is $y = \dfrac{3}{2}x - 4$?

1) $y = \dfrac{-2}{3}x$

2) $y = \dfrac{-2}{3}x + \dfrac{5}{3}$

3) $y = \dfrac{3}{2}x$

4) $y = \dfrac{3}{2}x + 6$

13. Write the equation of a line perpendicular to $4y + 3x = 10$ that passes through $(-1, 0)$.

1) $y = -\dfrac{3}{4}(x+1)$

2) $y = \dfrac{4}{3}(x+1)$

3) $y + 1 = -\dfrac{3}{4}x$

4) $y + 1 = \dfrac{4}{3}x$

14. Given $\overline{MN}$ shown below, with $M(-6, 1)$ and $N(3, -5)$, what is an equation of the line that passes through point $P(6, 1)$ and is parallel to $\overline{MN}$?
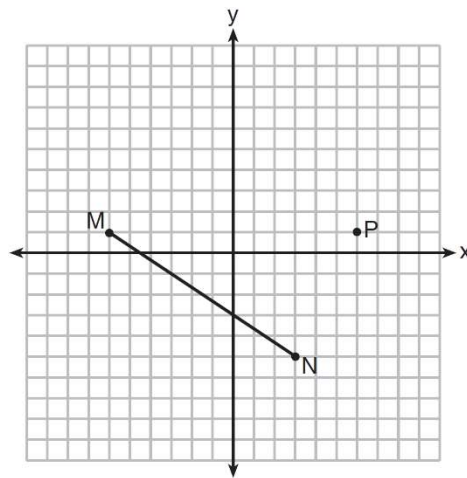
1) $y = -\dfrac{2}{3}x + 5$

2) $y = -\dfrac{2}{3}x - 3$

3) $y = \dfrac{3}{2}x + 7$

4) $y = \dfrac{3}{2}x - 8$

Line Dilations Centered at the Origin

1. The line $y = 2x - 6$ is dilated by a scale factor of 3 and centered at the origin. Write an equation of the line that represents the image of the line after the dilation.

   1) $y = 6x - 6$

   2) $y = 6x - 18$

   3) $y = 2x - 6$

   4) $y = 2x - 18$

2. The line $y = \dfrac{1}{2}x - 2$ is dilated by a scale factor of 5 and centered at the origin. Write an equation that represents the image of the line after the dilation.

   1) $y = \dfrac{1}{2}x - 2$

   2) $y = \dfrac{1}{2}x - 10$

   3) $y = \dfrac{5}{2}x - 2$

   4) $y = \dfrac{5}{2}x - 10$

3. The line $y = 4x - 1$ is dilated by a scale factor of $\dfrac{1}{2}$ and centered at the origin. Write an equation that represents the image of the line after the dilation.

   1) $y = 2x - \dfrac{1}{2}$

   2) $y = 2x - 1$

   3) $y = 4x - \dfrac{1}{2}$

   4) $y = 4x - 1$

4. The line $y = -2x + 4$ is dilated by a scale factor of $\dfrac{5}{2}$ and centered at the origin. Write an equation that represents the image of the line after the dilation.

   1) $y = -2x + 4$

   2) $y = -2x + 10$

   3) $y = -5x + 4$

   4) $y = -5x + 10$

5. The line $y = 2x - 4$ is dilated by a scale factor of $\frac{3}{2}$ and centered at the origin. Which equation represents the image of the line after the dilation?
1) $y = 2x - 4$
2) $y = 2x - 6$
3) $y = 3x - 4$
4) $y = 3x - 6$

6. The equation of line h is $2x + y = 1$. Line m is the image of line h after a dilation of scale factor 4 with respect to the origin. What is the equation of the line m?
1) $y = -2x + 1$
2) $y = -2x + 4$
3) $y = 2x + 4$
4) $y = 2x + 1$

7. The equation of line a is given by the equation $y - 3x = 4$. Line b is the image of line a after a dilation with a scale factor of 3 with respect to the origin. Write an equation for line b.

8. Line ℓ is mapped onto line m by a dilation centered at the origin with a scale factor of 2. The equation of line ℓ is $3x - y = 4$. Determine and state an equation for line m.

9. Line $y - 4 = 2(x - 2)$ is transformed by a dilation with a scale factor of 4 centered at the origin. What is the equation of the line's image?

Line Dilations Centered at a Point

If the point is on the line, the equation does not change
If the point is not on the line, use a graph

1. Dilate $y = 2x - 1$ by a scale factor of 2 centered at $(2,3)$
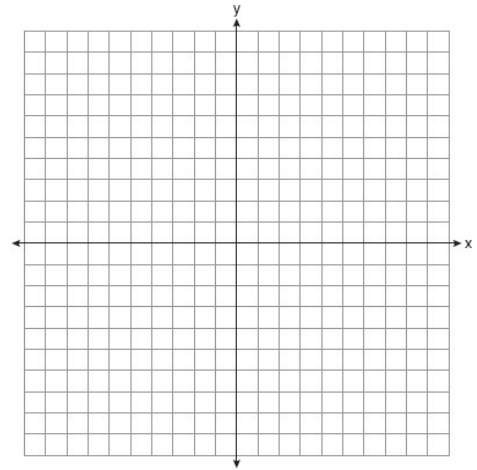
2. Dilate $y = 2x - 1$ by a scale factor of 2 centered at $(2,2)$
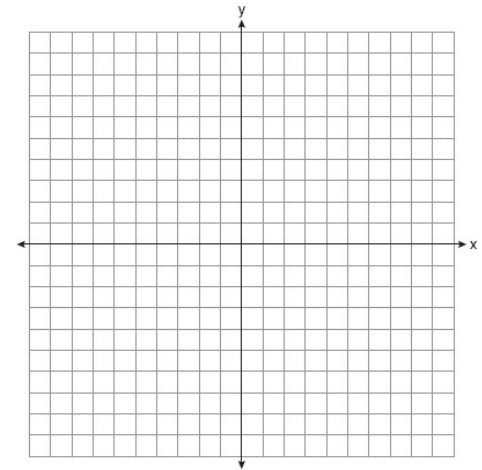
3. Dilate $y = \dfrac{1}{2}x + 4$ by a scale factor of 3 centered at $(1,6)$
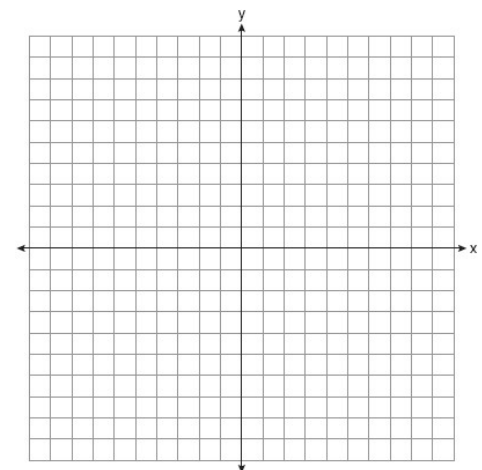
4. Dilate $y = 3x - 2$ by a scale factor of 4 centered at $(-1, -5)$
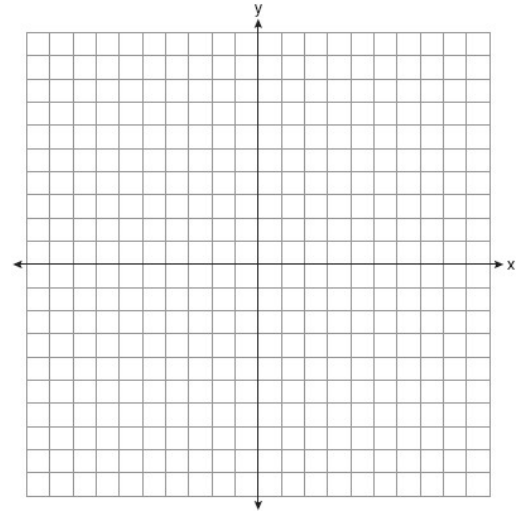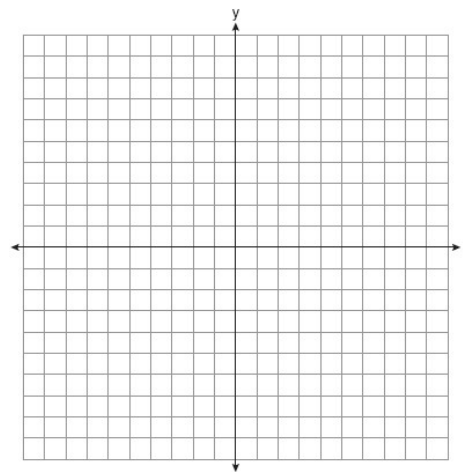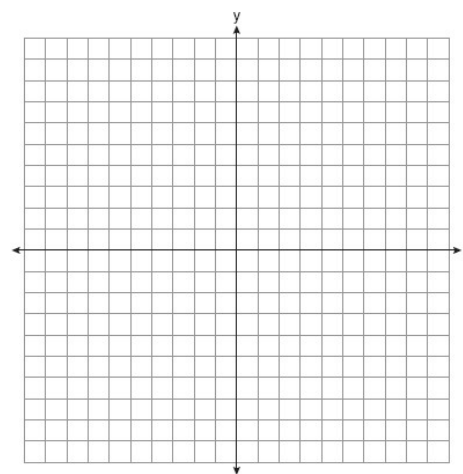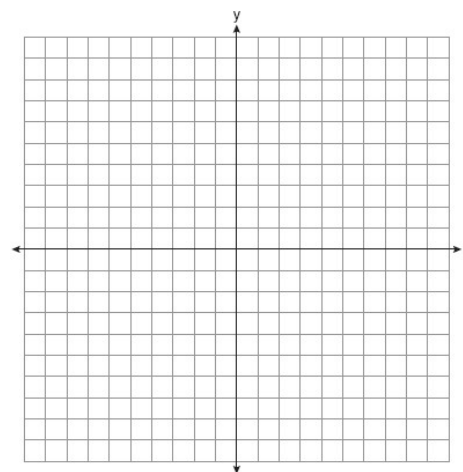
5. Dilate $y = -x + 3$ by a scale factor of 2 centered at $(-1, 6)$
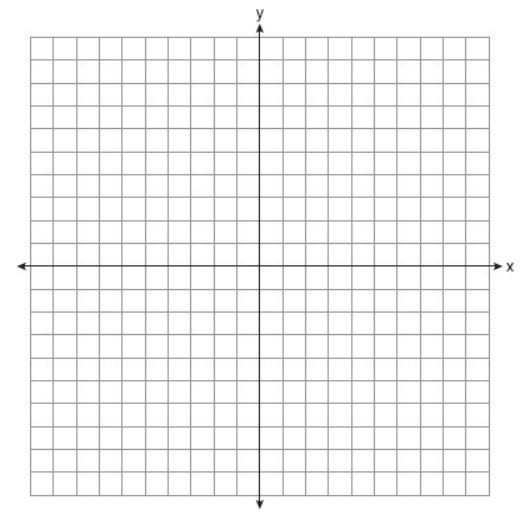
6. Dilate $y = -3x + 4$ by a scale factor of $\dfrac{1}{2}$ centered at $(0, 6)$
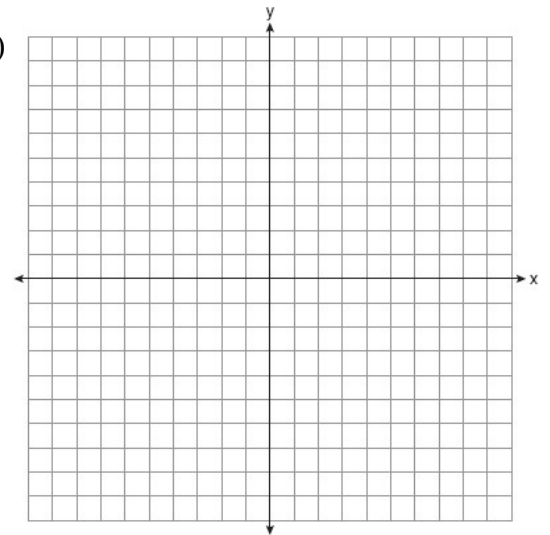
7. Dilate $2y = 4x + 2$ by a scale factor of 4 centered at $(-1, 4)$

8. Dilate $y + 3x = -2$ by a scale factor of 3 centered at $(2, -8)$

9. Dilate $2y = 5x + 4$ by a scale factor of 2 centered at $(1, -1)$

10. The line $y = 2x - 6$ is dilated by a scale factor of 3 and centered at (1,-4). Write an equation of the line that represents the image of the line after the dilation.
1) $y = 6x - 6$
2) $y = 6x - 18$
3) $y = 2x - 6$
4) $y = 2x - 18$

11. The line $y = \dfrac{1}{2}x - 2$ is dilated by a scale factor of 5 and centered at (4,0). Write an equation that represents the image of the line after the dilation.
1) $y = \dfrac{1}{2}x - 2$
2) $y = \dfrac{1}{2}x - 10$
3) $y = \dfrac{5}{2}x - 2$
4) $y = \dfrac{5}{2}x - 10$

12. The line $y = 4x - 1$ is dilated by a scale factor of $\dfrac{1}{2}$ and centered at (-2,-9). Write an equation that represents the image of the line after the dilation.
1) $y = 2x - \dfrac{1}{2}$
2) $y = 2x - 1$
3) $y = 4x - \dfrac{1}{2}$
4) $y = 4x - 1$

13. The line $y = -2x + 4$ is dilated by a scale factor of $\dfrac{5}{2}$ and centered at (-1,6). Write an equation that represents the image of the line after the dilation.
1) $y = -2x + 4$
2) $y = -2x + 10$
3) $y = -5x + 4$
4) $y = -5x + 10$

Line Dilations Practice

1. The line $y = 3x - 2$ is dilated by a scale factor of 2 and centered at the origin. Write an equation that represents the image of the line after the dilation.
1) $y = 3x - 2$
2) $y = 3x - 4$
3) $y = 6x - 2$
4) $y = 6x - 4$

2. The line $y = 3x - 2$ is dilated by a scale factor of 2 and centered at (-1,-5). Write an equation that represents the image of the line after the dilation.
1) $y = 3x - 2$
2) $y = 3x - 4$
3) $y = 6x - 2$
4) $y = 6x - 4$

3. The line $y = -\frac{1}{2}x + 6$ is dilated by a scale factor of 4 and centered at (2,5). Write an equation that represents the image of the line after the dilation.
1) $y = -\frac{1}{2}x + 6$
2) $y = -\frac{1}{2}x + 24$
3) $y = -2x + 6$
4) $y = -2x + 24$

4. The line $y = -\frac{1}{2}x + 6$ is dilated by a scale factor of 4 and centered at the origin. Write an equation that represents the image of the line after the dilation.
1) $y = -\frac{1}{2}x + 6$
2) $y = -\frac{1}{2}x + 24$
3) $y = -2x + 6$
4) $y = -2x + 24$

5. Line $y = 3x - 1$ is transformed by a dilation with a scale factor of 2 and centered at $(3, 8)$. The line's image is
1) $y = 3x - 8$
2) $y = 3x - 4$
3) $y = 3x - 2$
4) $y = 3x - 1$

6. The line $y = 2x - 4$ is dilated by a scale factor of $\frac{3}{2}$ and centered at the origin. Which equation represents the image of the line after the dilation?
1) $y = 2x - 4$
2) $y = 2x - 6$
3) $y = 3x - 4$
4) $y = 3x - 6$

7. Line MN is dilated by a scale factor of 2 centered at the origin. If $\overleftrightarrow{MN}$ is represented by $y = -3x + 6$, which equation can represent $\overleftrightarrow{M'N'}$, the image of $\overleftrightarrow{MN}$?
1) $y = -3x + 12$
2) $y = -3x + 6$
3) $y = -6x + 12$
4) $y = -6x + 6$

8. Line MN is dilated by a scale factor of 2 centered at the point $(0, 6)$. If $\overleftrightarrow{MN}$ is represented by $y = -3x + 6$, which equation can represent $\overleftrightarrow{M'N'}$, the image of $\overleftrightarrow{MN}$?
1) $y = -3x + 12$
2) $y = -3x + 6$
3) $y = -6x + 12$
4) $y = -6x + 6$

9. The line $y = 4x - 2$ is dilated by a scale factor of 3 and centered at the point (-1,-6). Which equation represents the image of the line after the dilation?
1) $y = 4x - 2$ 3) $y = 12x - 2$
2) $y = 4x - 6$ 4) $y = 12x - 6$

10. The line $y = \frac{1}{2}x + 5$ is dilated by a scale factor of 4 and centered at the point (4,7). Which equation represents the image of the line after the dilation?
1) $y = \frac{1}{2}x + 20$ 3) $y = 2x + 20$

2) $y = \frac{1}{2}x + 5$ 4) $y = 2x + 5$

11. The equation of line h is $2x + y = 1$. Line m is the image of line h after a dilation of scale factor 4 with respect to the origin. What is the equation of the line m?
1) $y = -2x + 1$
2) $y = -2x + 4$
3) $y = 2x + 4$
4) $y = 2x + 1$

12. The line $2x + 3y = 8$ is dilated by a scale factor of 3 and centered at the point (1,2). Which equation represents the image of the line after the dilation?
1) $y = -\dfrac{2}{3}x + \dfrac{8}{3}$ 3) $y = -2x + \dfrac{8}{3}$

2) $y = -\dfrac{2}{3}x + 8$ 4) $y = -2x + 8$

13. Line $y - 2x = 4$ is transformed by a dilation with a scale factor of 2 centered at the origin. What is the equation of the line's image?

14. The equation of a line is given by the equation $2x + 2y = 6$. Write an equation for the image of the line after a dilation of 2 centered at (3,0).

15. The equation of line l is $y + 2x = 1$. Line m is the image of line l after a dilation of 3 centered at the origin. What is the equation of line m.

16. The line $y = 2x - 1$ is dilated centered at (4,1). Which linear equation could be its image?

1) $y = -2x + 3$
3) $y = -\dfrac{1}{2}x - 4$

2) $y = 2x + 7$
4) $y = \dfrac{1}{2}x$

17. The line $y = \dfrac{2}{3}x + 3$ is dilated centered at the origin. Which linear equation could be its image?

1) $2x + 3y = 7$
3) $3x - 2y = 7$

2) $2x - 3y = 7$
4) $3x + 2y = 7$

18. The line $3y = -2x + 8$ is transformed by a dilation centered at the origin. Which linear equation could be its image?

1) $2x + 3y = 5$
2) $2x - 3y = 5$
3) $3x + 2y = 5$
4) $3x - 2y = 5$

19. The line represented by the equation $4y = 3x + 7$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?

1) $3x - 4y = 9$
3) $4x - 3y = 9$

2) $3x + 4y = 9$
4) $4x + 3y = 9$

20. The line $-3x + 4y = 8$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?

1) $y = \dfrac{4}{3}x + 8$
3) $y = -\dfrac{3}{4}x - 8$

2) $y = \dfrac{3}{4}x + 8$
4) $y = -\dfrac{4}{3}x - 8$

21. Line l is represented by the equation $y = 4x - 1$. Emely says that the equation of line l after a dilation with a scale factor of 3 centered at (2,7) is $y = 4x - 3$. Is Emely correct? Explain your answer.

22. Josue believes that the image of $y = \dfrac{2}{3}x + 2$ after a dilation of scale factor 2 centered at the origin is $3y = 2x + 6$. Is Josue correct? Explain your answer.

23. Line n is represented by the equation $3x + 4y = 20$. Determine and state the equation of line p, the image of line n, after a dilation of scale factor $\dfrac{1}{3}$ centered at the point $(4, 2)$. [The use of the set of axes below is optional.] Explain your answer.

24. Aliyah says that when the line $4x + 3y = 24$ is dilated by a scale factor of 2 centered at the point $(3, 4)$, the equation of the dilated line is $y = -\dfrac{4}{3}x + 16$. Is Aliyah correct? Explain why. [The use of the set of axes below is optional.]
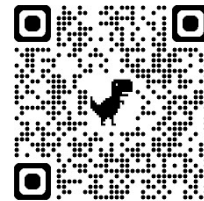
Graphing Circles

1. What are the center and the radius of the circle whose equation is $(x+5)^2 + (y-1)^2 = 4$
1) center = $(5,-1)$; radius = 4
2) center = $(-5,1)$; radius = 4
3) center = $(5,-1)$; radius = 2
4) center = $(-5,1)$; radius = 2

2. What are the center and the radius of the circle whose equation is $(x-3)^2 + (y+4)^2 = 36$
1) center = $(3,-4)$; radius = 6
2) center = $(-3,4)$; radius = 6
3) center = $(3,-4)$; radius = 36
4) center = $(-3,4)$; radius = 36

3. The equation of a circle is $x^2 + (y-7)^2 = \dfrac{25}{16}$. What are the center and radius of the circle?
1) center = $(0,7)$; radius = $\dfrac{5}{4}$
2) center = $(0,7)$; radius = $\dfrac{25}{16}$
3) center = $(0,-7)$; radius = $\dfrac{5}{4}$
4) center = $(0,-7)$; radius = $\dfrac{25}{16}$

4. What are the center and the radius of the circle whose equation is $(x-3)^2 + (y+3)^2 = 36$
1) center = $(3,-3)$; radius = 6
2) center = $(-3,3)$; radius = 6
3) center = $(3,-3)$; radius = 36
4) center = $(-3,3)$; radius = 36

5. What are the center and the radius of the circle whose equation is $(x-5)^2 + (y+3)^2 = 16$?
1) $(-5,3)$ and 16
2) $(5,-3)$ and 16
3) $(-5,3)$ and 4
4) $(5,-3)$ and 4

6. The equation of a circle is $(x-4)^2 + (y-5)^2 = \dfrac{49}{4}$. What are the center and radius of the circle?

1)   center = $(-4,-5)$; radius = $\dfrac{49}{4}$

2)   center = $(-4,-5)$; radius = $\dfrac{7}{2}$

3)   center = $(4,5)$; radius = $\dfrac{49}{4}$

4)   center = $(4,5)$; radius = $\dfrac{7}{2}$

7. A circle is represented by the equation $x^2 + (y+3)^2 = 13$. What are the coordinates of the center of the circle and the length of the radius?
1) $(0,3)$ and 13
2) $(0,3)$ and $\sqrt{13}$
3) $(0,-3)$ and 13
4) $(0,-3)$ and $\sqrt{13}$

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

1)   3)

2)   4)
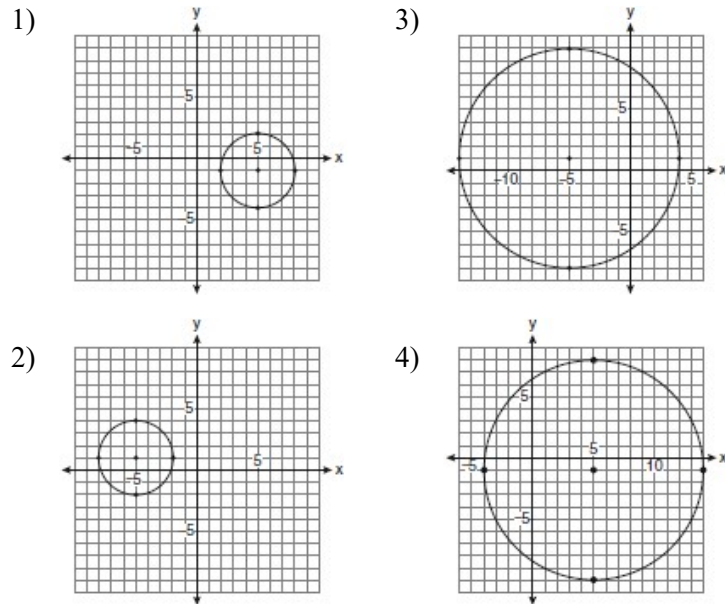
9. The equation of a circle is $(x-2)^2 + (y+4)^2 = 4$. Which diagram is the graph of the circle?
1)   2)   3)   4)
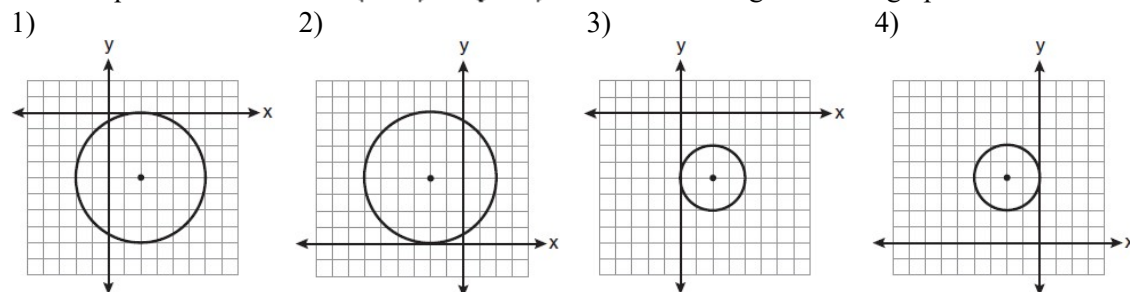
10. Which graph represents a circle with the equation $(x-3)^2 + (y+1)^2 = 4$?
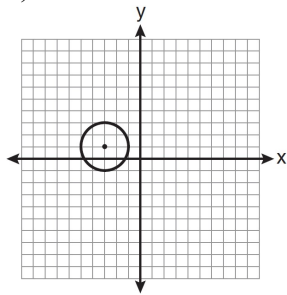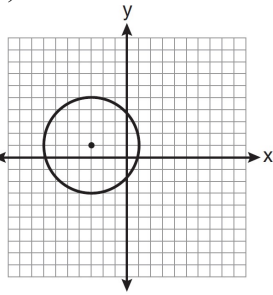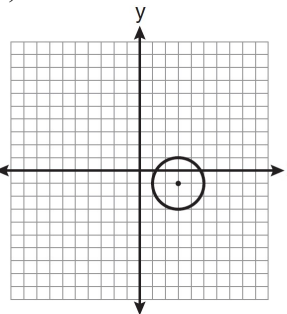
1)   2)   3)   4)
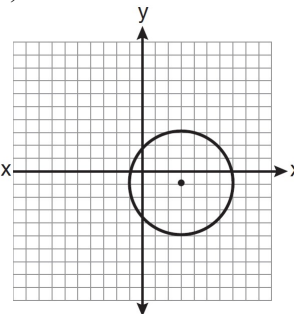
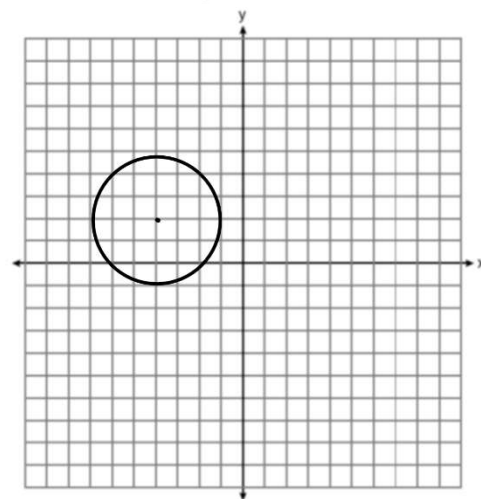11. Which of the following is the equation of the given circle?

$(x-5)^2 + (y-2)^2 = 16$

$(x+5)^2 + (y+2)^2 = 16$
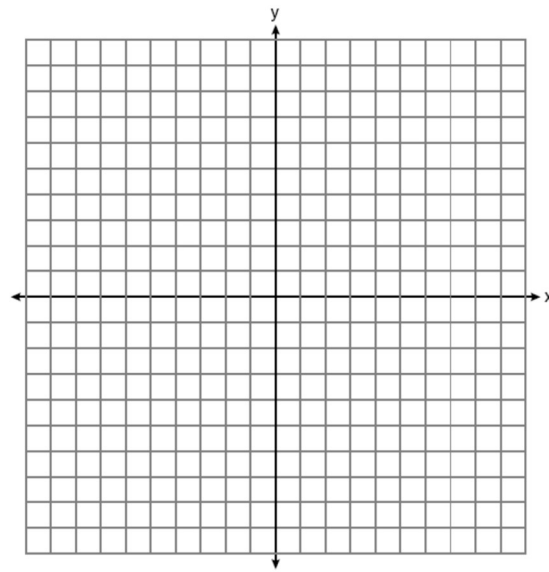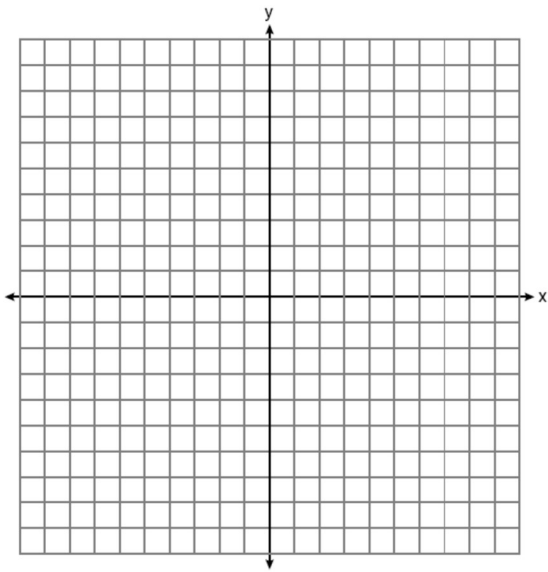
$(x-5)^2 + (y-2)^2 = 4$

$(x+5)^2 + (y+2)^2 = 4$
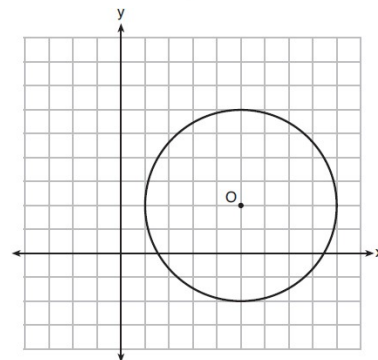
12. Which of the following is the equation of the given circle?

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

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

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

$(x+3)^2 + (y+2)^2 = 5$
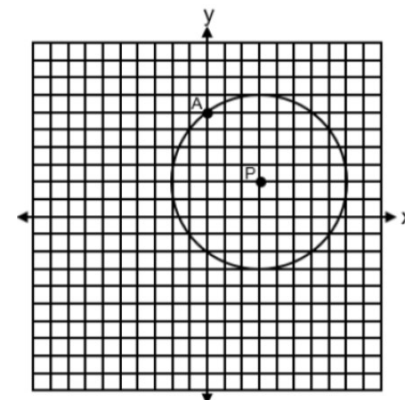
13. Which of the following is the equation of the given circle?

$(x-4)^2 + (y+2)^2 = 9$

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

$(x+4)^2 + (y-2)^2 = 9$

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

Graph the following circles on the provided graphs
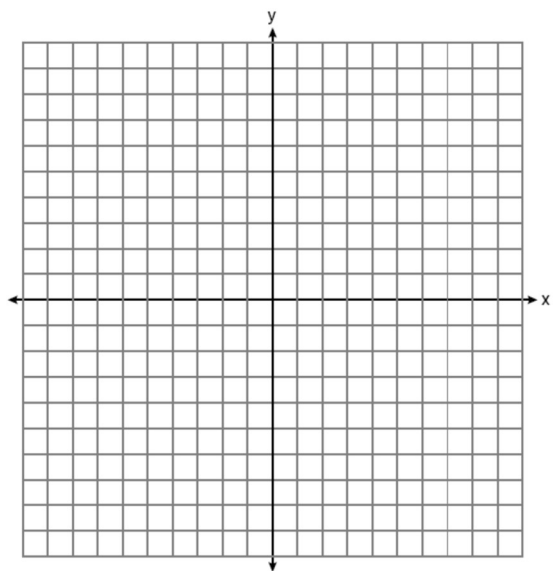
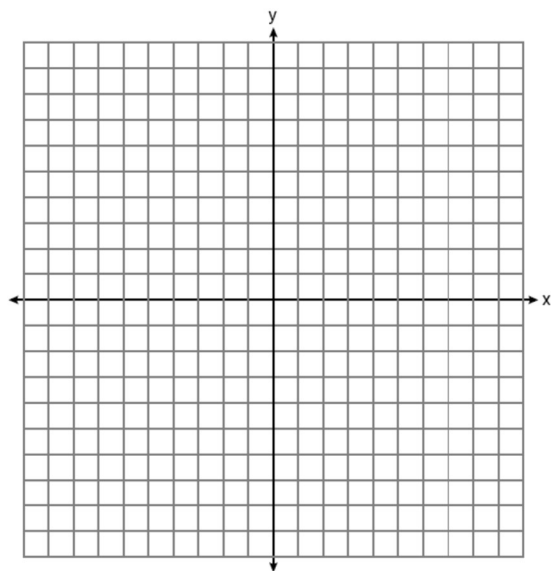14. $(x-4)^2+(y+1)^2=9$

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

16. $(x-5)^2+(y+6)^2=4$

17. $(x+5)^2+y^2=25$
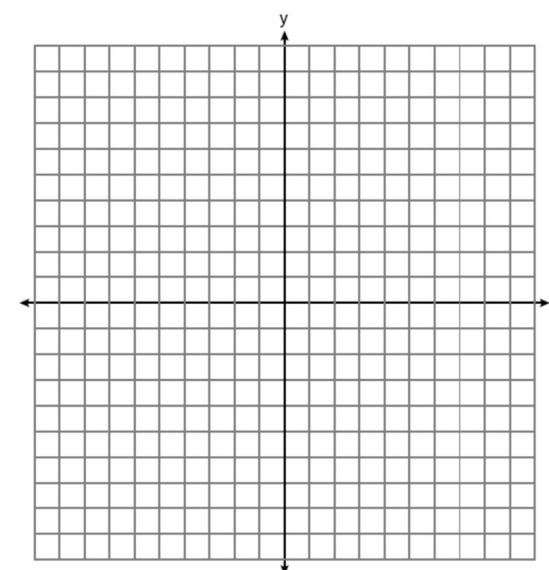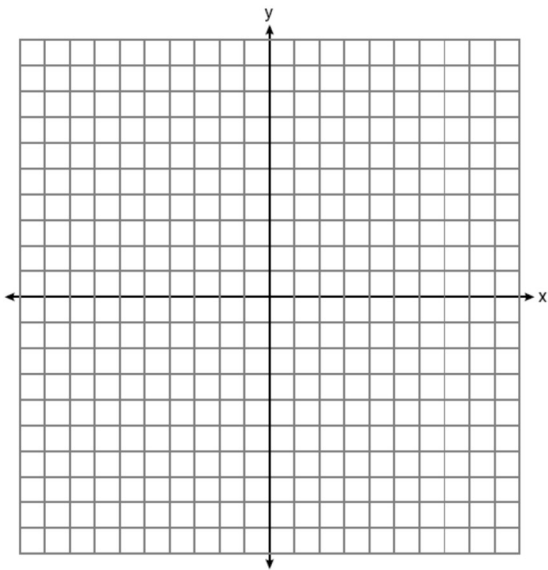
18. $(x-4)^2 + (y+1)^2 = 9$

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

20. $x^2 + (y-3)^2 = 49$
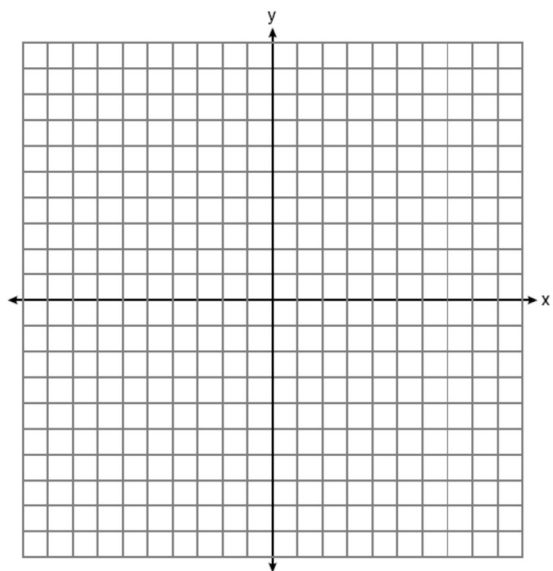
21. $(x-7)^2 + (y+9)^2 = 1$
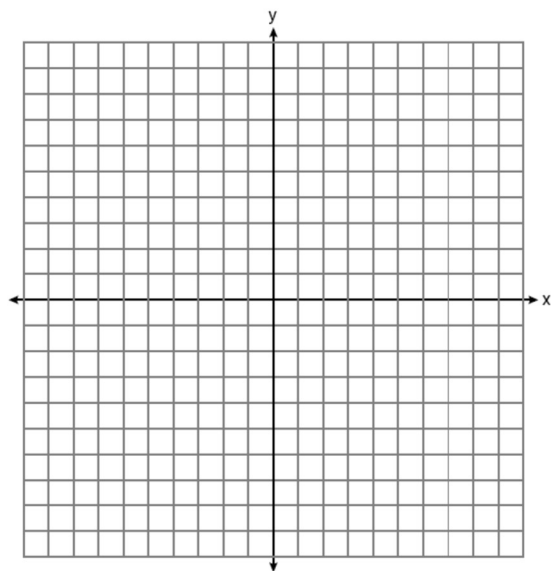
Completing the Square

Complete the square for the following quadratic equations

1. $x^2 + 6x = 2$ 2. $x^2 - 8x + 3 = 0$

3. $x^2 + 4x - 6 = 0$ 4. $x^2 - 2x = 5$

5. $x^2 - 10x = 3$ 6. $x^2 + 4x + 1 = 0$

7. $x^2 + 12x = 5$ 8. $x^2 - 16x + 10 = 0$

Name _____   Date _____
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Finding Center/Radius of a Circle Using Completing the Square

What is the center and radius of the circle with the following equations:

1. $x^2 + y^2 + 6x - 8y = 0$

2. $x^2 + y^2 + 10x - 4y - 7 = 0$

3. $x^2 + y^2 + 16x + 6y + 1 = 0$

4. $x^2 + y^2 - 12x - 14y = 15$

5. $x^2+y^2-4x+8y+\dfrac{31}{4}=0$

6. $x^2+4x+y^2-2y=3$

7. $x^2+y^2+6x-2y=\dfrac{31}{9}$

8. $x^2+y^2+6x-10y+4=0$

Finding Center/Radius of a Circle Using Conics App

1. What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + 6x + y^2 - 4y = 23$?
1) $(3, -2)$ and 36
2) $(3, -2)$ and 6
3) $(-3, 2)$ and 36
4) $(-3, 2)$ and 6

2. The equation of a circle is $x^2 + y^2 + 12x = -27$. What are the coordinates of the center and the length of the radius of the circle?
1) center $(6, 0)$ and radius 3   3) center $(-6, 0)$ and radius 3
2) center $(6, 0)$ and radius 9   4) center $(-6, 0)$ and radius 9

3. Find the center and radius of a circle whose equation is $x^2 + y^2 - 16x + 6y + 53 = 0$?
1) center $(-8, 3)$ and radius 20
2) center $(-8, 3)$ and radius $2\sqrt{5}$
3) center $(8, -3)$ and radius 20
4) center $(8, -3)$ and radius $2\sqrt{5}$

4. Find the center and radius of a circle whose equation is $x^2 + y^2 - 2x + 6y + \dfrac{15}{4} = 0$?

1)
     center $= (-1, 3)$; radius $= \dfrac{25}{4}$

2)
     center $= (-1, 3)$; radius $= \dfrac{5}{2}$

3)
     center $= (1, -3)$; radius $= \dfrac{25}{4}$

4)
     center $= (1, -3)$; radius $= \dfrac{5}{2}$

5. An equation of circle M is $x^2 + y^2 + 6x - 2y + 1 = 0$. What are the coordinates of the center and the length of the radius of circle M?
1) center $(3, -1)$ and radius 9   3) center $(-3, 1)$ and radius 9
2) center $(3, -1)$ and radius 3   4) center $(-3, 1)$ and radius 3

6. The equation of a circle is $x^2 + y^2 + 6y = 7$. What are the coordinates of the center and the length of the radius of the circle?
1) center $(0, 3)$ and radius 4
2) center $(0, -3)$ and radius 4
3) center $(0, 3)$ and radius 16
4) center $(0, -3)$ and radius 16

7. What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + y^2 + 2x - 16y + 49 = 0$?
1) center $(1, -8)$ and radius 4
2) center $(-1, 8)$ and radius 4
3) center $(1, -8)$ and radius 16
4) center $(-1, 8)$ and radius 16

8. What are the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 - 12y - 20.25 = 0$?
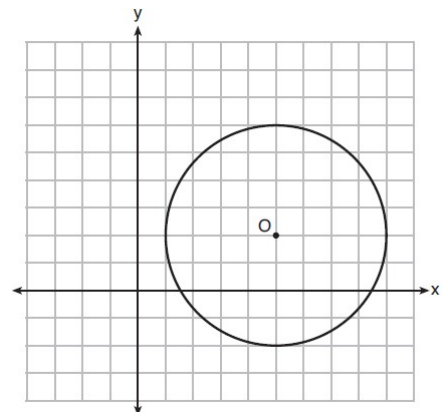1) center $(0, 6)$ and radius 7.5
2) center $(0, -6)$ and radius 7.5
3) center $(0, 12)$ and radius 4.5
4) center $(0, -12)$ and radius 4.5

9. What is an equation of a circle whose center is $(1, 4)$ and diameter is 10?
1) $x^2 - 2x + y^2 - 8y = 8$
2) $x^2 + 2x + y^2 + 8y = 8$
3) $x^2 - 2x + y^2 - 8y = 83$
4) $x^2 + 2x + y^2 + 8y = 83$

10. What is an equation of circle O shown in the graph below?
1) $x^2 + 10x + y^2 + 4y = -13$
2) $x^2 - 10x + y^2 - 4y = -13$
3) $x^2 + 10x + y^2 + 4y = -25$
4) $x^2 - 10x + y^2 - 4y = -25$

Name _____   Date _____
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Equations of Lines and Circles Review Sheet

1. What is an equation of the line that is perpendicular to the line whose equation is $y = \frac{3}{5}x - 2$
and that passes through the point $(3, -6)$?

1) $y = \frac{5}{3}x - 11$ 3) $y = -\frac{5}{3}x - 1$

2) $y = -\frac{5}{3}x + 11$ 4) $y = \frac{5}{3}x + 1$

2. The equation of a line is $y = \frac{2}{3}x + 5$. What is an equation of the line that is perpendicular to
the given line and that passes through the point $(4, 2)$?

1) $y = \frac{2}{3}x - \frac{2}{3}$ 3) $y = -\frac{3}{2}x + 7$

2) $y = \frac{3}{2}x - 4$ 4) $y = -\frac{3}{2}x + 8$

3. What is an equation of the line that passes through the point $(6, 8)$ and is perpendicular to a line
with equation $-3x + 2y = 10$?

1) $y - 8 = \frac{3}{2}(x - 6)$ 3) $y + 8 = \frac{3}{2}(x + 6)$

2) $y - 8 = -\frac{2}{3}(x - 6)$ 4) $y + 8 = -\frac{2}{3}(x + 6)$

4. What is an equation of a line which passes through $(6, 9)$ and is perpendicular to the line whose
equation is $4x - 6y = 15$?

1) $y - 9 = -\frac{3}{2}(x - 6)$ 3) $y + 9 = -\frac{3}{2}(x + 6)$

2) $y - 9 = \frac{2}{3}(x - 6)$ 4) $y + 9 = \frac{2}{3}(x + 6)$

5. The line $y = \dfrac{1}{2}x - 2$ is dilated by a scale factor of 2 centered at the origin. Write an equation that represents the image of the line after the dilation.

1) $y = \dfrac{1}{2}x - 4$ 3) $y = x - 4$

2) $y = \dfrac{1}{2}x - 2$ 4) $y = x - 2$

6. The line $y = \dfrac{1}{2}x - 2$ is dilated by a scale factor of 2 and centered at (0,-2). Write an equation that represents the image of the line after the dilation.

1) $y = \dfrac{1}{2}x - 4$ 3) $y = x - 4$

2) $y = \dfrac{1}{2}x - 2$ 4) $y = x - 2$

7. The line $y = 2x - 4$ is dilated by a scale factor of $\dfrac{3}{2}$ and centered at (1,-2). Write an equation that represents the image of the line after the dilation.

1) $y = 2x - 4$
2) $y = 2x - 6$
3) $y = 3x - 4$
4) $y = 3x - 6$

8. The line $y = 2x - 4$ is dilated by a scale factor of $\dfrac{3}{2}$ and centered at the origin. Which equation represents the image of the line after the dilation?
1) $y = 2x - 4$
2) $y = 2x - 6$
3) $y = 3x - 4$
4) $y = 3x - 6$

9. The line $y = 2x - 1$ is dilated centered at (4,1). Which linear equation could be its image?
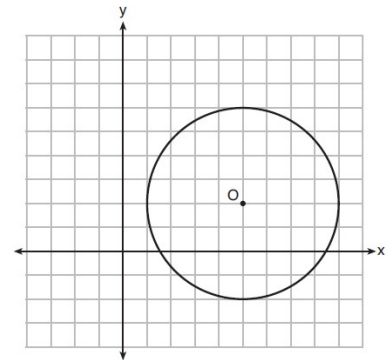1) $-2x + y = 3$ 3) $-x + 2y = 5$
2) $-2x - y = 7$ 4) $-x - 2y = 6$

10. The line $y = \dfrac{2}{3}x + 3$ is dilated centered at the origin. Which linear equation could be its image?

1) $2x + 3y = 7$ 3) $3x - 2y = 7$
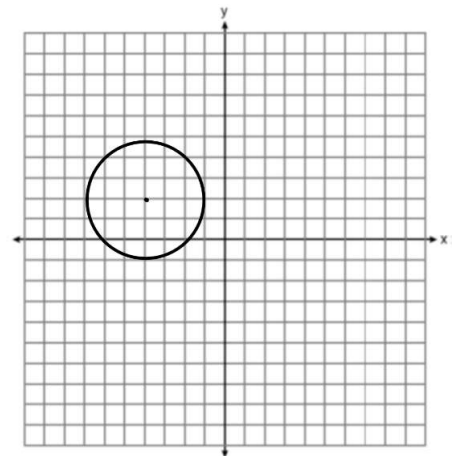
2) $2x - 3y = 7$ 4) $3x + 2y = 7$

11. Which of the following is the equation of the given circle?

$(x - 5)^2 + (y - 2)^2 = 16$

$(x + 5)^2 + (y + 2)^2 = 16$

$(x - 5)^2 + (y - 2)^2 = 4$

$(x + 5)^2 + (y + 2)^2 = 4$

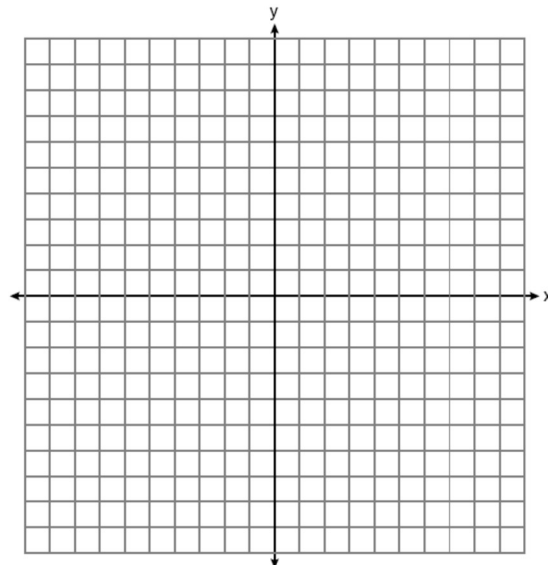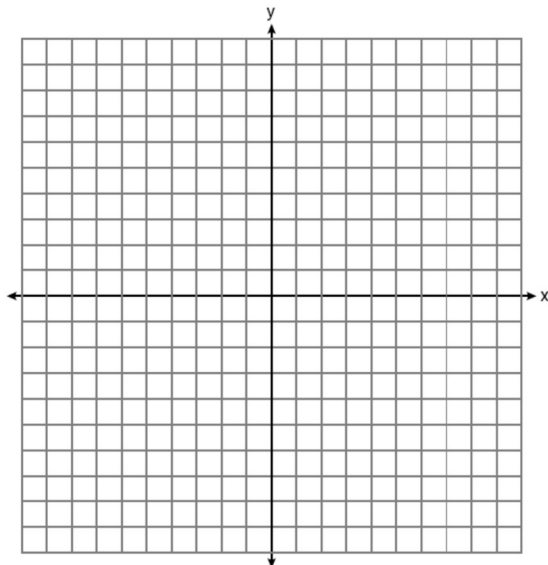12. Which of the following is the equation of the given circle?

$(x - 4)^2 + (y + 2)^2 = 9$

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

$(x + 4)^2 + (y - 2)^2 = 9$

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

Graph the following circles on the provided graphs

13. $(x - 4)^2 + (y + 1)^2 = 9$ 14. $(x + 3)^2 + (y - 2)^2 = 16$

42

15. Find the center and radius of a circle whose equation is $x^2+y^2-2x+6y+\dfrac{15}{4}=0$?

1) center $= (-1,3)$; radius $= \dfrac{25}{4}$

2) center $= (-1,3)$; radius $= \dfrac{5}{2}$

3) center $= (1,-3)$; radius $= \dfrac{25}{4}$

4) center $= (1,-3)$; radius $= \dfrac{5}{2}$

16. Find the center and radius of a circle whose equation is $x^2+y^2-16x+6y+53=0$?
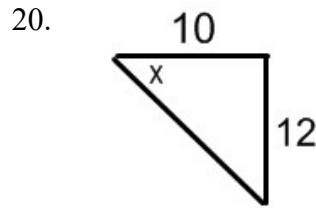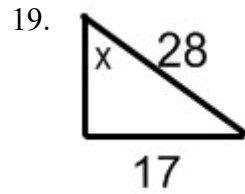1) center $(-8,3)$ and radius 20
2) center $(-8,3)$ and radius $2\sqrt{5}$
3) center $(8,-3)$ and radius 20
4) center $(8,-3)$ and radius $2\sqrt{5}$

Find the center and radius of the following circles:

17. $x^2+y^2+16x+6y+1=0$

18. $x^2+y^2-4x+6y=15$

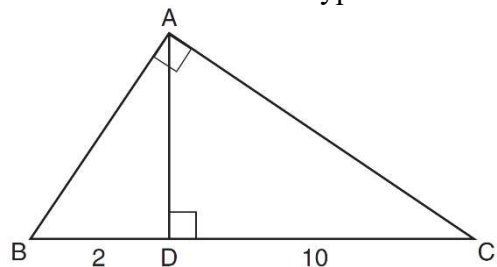**Find x in each of the following pictures rounding to the *nearest integer***

19.

20.

21. Triangle ABC shown below is a right triangle with altitude $\overline{AD}$ drawn to the hypotenuse $\overline{BC}$.

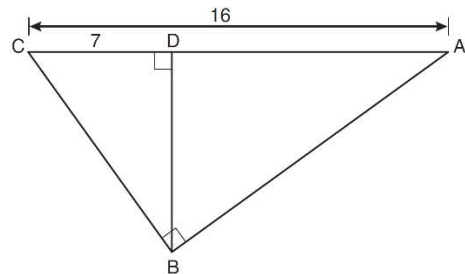If $BD = 2$ and $DC = 10$, what is the length of $\overline{AB}$?

1) $2\sqrt{2}$
2) $2\sqrt{5}$
3) $2\sqrt{6}$
4) $2\sqrt{30}$
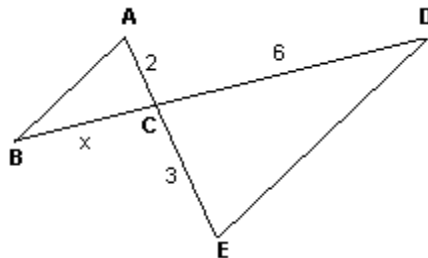

22. In the diagram below of right triangle ABC, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$, $AC = 16$, and $CD = 7$.

What is the length of $\overline{BD}$?

1) $3\sqrt{7}$
2) $4\sqrt{7}$
3) $7\sqrt{3}$
4) 12

23. In the diagram below, $\overline{AB} \parallel \overline{DE}$. If $AC = 2$, $CD = 6$, and $CE = 3$, what is BC?

24. In the diagram below, $\overline{AD}$ intersects $\overline{BE}$ at C, and $\overline{AB} \parallel \overline{DE}$.

If $CD = 6.6$ cm, $DE = 3.4$ cm, $CE = 4.2$ cm, and $BC = 5.25$ cm, what is the length of $\overline{AC}$, to the *nearest hundredth of a centimeter*?