Names: ____________________ ____________________ ____________________

Activity #2: Some Geometry (Solutions) **College Algebra**

1. Find an equation for the line passing through the point $(-1, -5)$ and having slope -2/3.

   Solution: Remember that to uniquely identify a line in the plane, we need two pieces of information. In this case we know two things about this line: its slope, and a point on the line. The simplest linear equation form to use here is the point-slope form: the line with slope m and passing through the point (h, k) is given by the equation
   $$\frac{y-k}{x-h} = m.$$
   Here we have $m = -2/3$ and $(h, k) = (-1, -5)$. So this line is given by the equation
   $$\frac{y+5}{x+1} = \frac{-2}{3}.$$
   We can solve this equation for y to find the slope-intercept form; this yields
   $$\boxed{y = -\frac{2}{3}x - \frac{17}{3}}$$
   .

2. Find the slope between the points $(4, 7)$ and $(-1, -5)$.

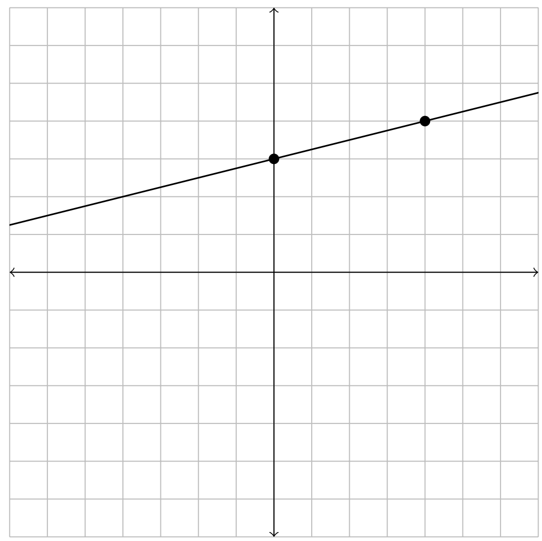
   Solution: Remember that the slope between the points (x_1, y_1) and (x_2, y_2) is
   $$\frac{y_2 - y_1}{x_2 - x_1}.$$
   Here, we have $(x_1, y_1) = (4, 7)$ and $(x_2, y_2) = (-1, -5)$, so that the slope between them is
   $$\frac{y_2 - y_1}{x_2 - x_1} = \frac{(-5) - (7)}{(-1) - (4)} = \frac{-12}{-5}.$$
   So the slope between these points is $\boxed{12/5}$.

3. Find the distance between the points $(-4, -3)$ and $(1, -5)$.

   Solution: Remember that the formula for the distance between (x_1, y_1) and (x_2, y_2) is
   $$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$
   Here we have $(x_1, y_1) = (-4, -3)$ and $(x_2, y_2) = (1, -5)$, so that the formula gives
   $$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{((1) - (-4))^2 + ((-5) - (-3))^2} = \sqrt{(5)^2 + (-2)^2} = \sqrt{29}.$$
   So the distance between these points is $\boxed{\sqrt{29}}$.

4. Plot the graph of the linear equation $y = \frac{1}{4}x + 3$ on the plane below.

   Solution: This line as slope $1/4$ and y-intercept 3. We can use this information to find two points on the line and sketch as follows.



5. Find the slope between the points $(2, 7)$ and $(2, -1)$.

   Solution: Remember that the slope between the points (x_1, y_1) and (x_2, y_2) is

$$\frac{y_2 - y_1}{x_2 - x_1}.$$

   Here, we have $(x_1, y_1) = (2, 7)$ and $(x_2, y_2) = (2, -1)$, so that the slope between them is

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{(-1) - (7)}{(2) - (2)} = \frac{-8}{0}.$$

   We have a problem: the denominator of this fraction is zero. So the slope between these points is $\boxed{\text{undefined}}$.

6. Find the midpoint of the points $(7, -2)$ and $(-4, -3)$.

   Solution: Remember that the midpoint of the points (x_1, y_1) and (x_2, y_2) is

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right).$$

   Here, we have $(x_1, y_1) = (7, -2)$ and $(x_2, y_2) = (-4, -3)$, so that the midpoint is

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{(7) + (-4)}{2}, \frac{(-2) + (-3)}{2}\right) = \left(\frac{3}{2}, \frac{-5}{2}\right).$$

   So the midpoint is $\boxed{(3/2, -5/2)}$.

7. Find an equation for the circle centered at $(6, -5)$ and having radius 6.

   Solution: Remember that the standard form equation of a circle centered at the point (h, k) and with radius r is
$$(x-h)^2 + (y-k)^2 = r^2.$$
   Here we have $(h, k) = (6, -5)$ and $r = 6$; so this circle is given by the equation
$$\boxed{(x-6)^2 + (y+5)^2 = 36}.$$

8. Find an equation for the circle centered at $(1, -1)$ and passing through $(-3, -3)$.

   Solution: The radius of this circle is the distance from the center, $(1, -1)$, to the point $(-3, -3)$. That distance is
$$\sqrt{20}.$$
   Now the circle with center at (h, k) and radius r is given by the equation
$$(x-h)^2 + (y-k)^2 = r^2.$$
   Thus this circle is given by the equation
$$\boxed{(x-1)^2 + (y+1)^2 = 20}.$$

9. Find an equation for the line passing through the points $(5, 5)$ and $(-1, 5)$.

   Solution: We will find the point-slope form of this line. First, using the slope formula, we find that the slope of this line is
$$m = \frac{(5) - (5)}{(-1) - (5)} = 0.$$
   Since we know this line passes through (for instance) $(5, 5)$, using the point-slope formula, an equation for this line is
$$\frac{y-5}{x-5} = 0.$$
   We can solve for y to get this equation in slope-intercept form as follows:
$$\boxed{y = 0 + 5}$$

10. Convert the standard form linear equation
$$7y + x = -1$$
    to slope-intercept form.

    Solution: To convert to slope-intercept form, we simply solve this equation for y to get
$$\boxed{y = -\frac{1}{7}x - \frac{1}{7}}$$

11. Find an equation in slope-intercept form for the line passing through the point $(4, 4)$ and parallel to $y = \frac{1}{2}x + 4$.

Solution: Let ℓ be the unknown line. Since ℓ is known to be parallel to $y = \frac{1}{2}x + 4$, the slope of ℓ is $m = 1/2$. We also know that ℓ passes through the point $(4, 4)$. So ℓ is given by the point-slope form equation

$$\frac{y-4}{x-4} = 1/2.$$

Solving for y yields the slope-intercept equation

$$\boxed{y = \frac{1}{2}x + 2}$$