QUESTION: How can you make an equation for a line when you are given two points, but no slope?

ANSWER: Use those two points to find the slope!

<u>Example 1</u>
Find the equation (in standard form) of a line that goes through the points $(-3, 4)$ and $(5, -2)$.

Step 1 – Use the two points to find the slope (m).

$$m = \frac{-2 - 4}{5 - (-3)} = \frac{-6}{5 + 3} = \frac{-6}{8} = -\frac{3}{4}$$

Step 2 – Choose either one of the two points you started with and use point-slope form to make an equation (it really doesn't matter which one you pick as either point will give you the same correct answer!).

$$y - y_1 = m(x - x_1)$$

Let's use $(-3, 4)$. That means $m = -\frac{3}{4}$, $x_1 = -3$, and $y_1 = 4$, so we have…

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

Step 3 – Follow the procedure you've learned to get this in standard form ($Ax + By = C$).

$$y - 4 = -\frac{3}{4}(x + 3)$$
$$4(y - 4 = -\frac{3}{4}(x + 3))$$
$$4y - 16 = -3(x + 3)$$
$$4y - 16 = -3x - 9$$
$$3x + 4y - 16 = -9$$

$$\mathbf{3x + 4y = 7}$$