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For one line to be parallel to another means that they have the same **slope** and, when extended to infinity, will never cross. Here, I will find the equation of a line parallel to the given line y=1/2x+3 and passing through a given point, identified by the **ordered pair** (4,-1). The result will be in slope-intercept form which identifies the **y-intercept** of the graphed line when x=0. The **y-intercept** is the distance on the y-axis from the **origin** (0,0).

y-y1=m(x-x1) Point-slope form

y-(-1)=1/2(x-4) Substitute the **ordered pair** for x1,y1, and ½ for m (the **slope** of the original line)

y+1=1/2x-2 Simplify by subtracting 1 from both sides of the equation

y=1/2x-3 Slope-intercept form

Since -1=1/2(4)-3 is correct, the line y=1/2x-3 goes through the point (4,-1). Since both lines have a **slope** of ½, they are clearly parallel.

For one line to be perpendicular to another, it means that the **slope** is the negative **reciprocal** of the **slope** of the given line. The result is that the lines will meet at right angles. To find the equation of a line perpendicular to y=1/2x+3 and passing through the point (4,-1) we begin by taking the negative **reciprocal** of the **slope** ½, which is -2.

y-y1=m(x-x1) Point-slope form

y-(-1)=-2(x-4) Substitute

y+1=-2x+8 Distribute

y=-2x+7 Subtract 1 from both sides = slope-intercept form

Since -1=-2(4)+7 is correct, the line passes through (4,-1) and the **slope** (-2) is then negative **reciprocal** of ½ so the lines are perpendicular.