Writing Equations of Parallel and Perpendicular Lines

This first question asks, "Write the slope-intercept equation for the line that is parallel to y equals x plus 7 and passes through the ordered pair 1, 2." Well, first, let's determine what the slope is of this line. And there is an unwritten one as that coefficient there, so our slope, m, is going to be equal to 1. We also know that the line we're creating passes through the point 1, 2, so we have a point and we have the slope, which is enough information to write an equation in point slope form. Recall that point slope form is y minus y_1 equals m times x minus x_1. So let's substitute in 2 for y_1, 1 for x_1, and 1 for m. That gives us y minus 2 equals 1 times x minus 1. There's no double negatives here to deal with, so let's distribute this 1. And that gives us y minus 2 equals x minus 1, because 1 times x is x, and 1 times 1 is 1. Now all we have to do to get y by itself is to add 2 to both sides of the equation. And that gives us y equals x plus 1, and we know that this line will be parallel to our other line because their slopes are the same. Alright, let's look at another example.

This one reads, "Write the slope-intercept equation for the line that is perpendicular to y equals 1 fourth x plus 3, and passes through the ordered pair negative 4, 3. Alright, the slope of this line is positive 1 fourth, so the slope of the line that we're creating, which we need to be perpendicular to this, well first, it's going to be negative, the opposite sign, and then it's going to be the reciprocal of this number. Well, the reciprocal of 1 over 4 is 4 over 1, or just 4, so the slope of our new line is going to be negative 4. And we know that it's going to pass through the point negative 4, 3. So now we have enough information for a point-slope form equation. So that's going to be y minus y_1 is 3 equals m, which is negative 4, times x minus x_1 is negative 4. First, let's resolve this double negative here. That's equivalent to y minus 3 equals negative 4 times x plus 4. Now let's distribute this negative four across both of these terms. We get y minus 3 equals negative 4x minus 16. Then, to get y by itself, we're going to add 3 to both sides of this equation, and that gives us y equals negative 4x minus 13. And this is the equation for the line that is perpendicular to this line and passes through this ordered pair. Alright, let's look at one more example.

This one reads, "Write the point-slope equation for the line that is parallel to the x-axis and passed through the ordered pair 0, negative 1." Well, a line that's parallel to the x-axis. The x-axis has a slope of 0, so if we're looking for a line that's parallel to that, it's going to have the same slope, so we're going to say m equals 0. And it's going to pass through the ordered pair 0, negative 1, so we have enough information to write a point-slope equation. That's going to be y minus y_1 is negative one, y-minus negative 1 equals m, which is 0, times x minus x_1 is 0. And that's the equation in point-slope form for a line with 0 slope, so parallel to the x-axis, passing through the ordered pair 0, negative 1.