**Slope Intercept Form**

**Section 1**

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| 00:00:02 | TEACHER: The lesson question is, how does knowing the slope |
| 00:00:05 | and the y-intercept help you graph and write the equation of a line? You reviewed how to use two points to find the slope of a line. Now, we will use the slope and y-intercept to write the equation of a line. |

**Section 2**

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| 00:00:01 | TEACHER: Terra starts with $15 in her bank account and plans |
| 00:00:04 | to save $5 per week. Now as you know, the initial value is a starting amount when x is 0. Here, x refers to time. Initially, when the time is 0, Terra starts with $15 in the account. So this means the initial value is 15. This initial value corresponds to the point where the y-axis |
| 00:00:29 | and the graph of the line intersect or meet. Where the line hits the y-axis occurs at the point 0, 15. This y-intercept is the initial value. The y-intercept is the point on the graph at which the graph crosses the y-axis. So in this scenario, when we write the y-intercept as 0, 15, we're saying, at time 0, there's $15 in the account. In fact, in general, when you write down the y-intercept, |
| 00:01:04 | it's refer to as 0, b, with b being the y-coordinate when x is 0. We're going to look at points, some that are y-intercepts and some that are not y-intercepts. For points that are y-intercepts, notice the x value is always 0, and the y value can be any number at all. And for points that are not y-intercepts, notice the x |
| 00:01:33 | value is any number except for 0. The y value can be any number at all. |

**Section 4**

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| 00:00:00 | TEACHER: We will use the slope formula to write an equation |
| 00:00:03 | of a line, the slope-intercept form of a line. We know that if given two points, we can find the slope of a line. But what we want to do is use the slope formula to find the equation of a line. So we need two points. We'll choose 0, b, which is the y-intercept, and x, y, which is any other point on the line. |
| 00:00:22 | And we will substitute into our slope formula m equals rise over run. And we know the rise is y2 minus y1, so that would be y minus b. And the run is x2 minus x1. That would be x minus 0. So now we have the slope is equal to y minus b over-- x minus 0 is just x. |
| 00:00:47 | We want to isolate the y, get it by itself. So we'll multiply both sides of the equation by x, and we have mx equals y minus b. The last step is just to add a b to the other side of the equation. This gives us mx plus b equals y. This is our slope-intercept form, written y equals mx plus b. |
| 00:01:12 | Jasper has $20 in his bank account, and he deposits $8 per week. We want to write a linear equation that finds out how much money is in Jasper's account after a certain number of weeks. So we first begin by saying the initial deposit is $20. The initial deposit is the initial value. This corresponds to the y-intercept. |
| 00:01:36 | So we have 0, 20 as the y-intercept. What else do we know? Since he deposits $8 per week, this is the rate of change. So our slope is equal to 8. Now we need another point on the line. And again, we will choose x, y to be that other point. Substituting into our slope formula, we have m equals y2 minus y1 over x2 minus x1. |
| 00:02:03 | m, 8 is equal to y minus 20 over x minus 0. Since x minus 0 is x, we have 8 is equal to y minus 20 over x. We want to isolate y, get it by itself. So we'll multiply both sides of the equation by x. We have 8x is equal to y minus 20. Our last step is just to add a 20 to the other side of the equation. |
| 00:02:35 | This gives us 8x plus 20 equals y. So we have our slope-intercept form. y is equal to 8x plus 20. Now we have a question. How much money will be in the account after 25 weeks? Recall-- x is the number of weeks, y is the total money in the account. |
| 00:02:58 | This equation tells us for so many weeks x, then the amount of money in the account will be y. Let us substitute in for x 25. So we have 8 times 25 plus 20. This is what's equal to y substituting in for x the 25. This gives us y is equal to 200 plus 20, or y is equal to 220. This means after 25 weeks, Jasper has |
| 00:03:33 | $220 in the bank account. |

**Section 7**

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| 00:00:00 | TEACHER: The lesson question is, how does knowing the slope |
| 00:00:03 | and y-intercept help you graph and write the equation of a line? Well, up till now, we've been given the slope and the y-intercept, and we've determined the slope-intercept form of a line. Now let us reverse the thought process. If we're given the slope-intercept form of the line, let us determine the slope and the y-intercept. |

**Section 8**

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| 00:00:01 | TEACHER: Slope-intercept form of a linear function is y |
| 00:00:04 | equals mx plus b, where m represents the slope and is constant, and b represents the y-intercept. We will use the slope-intercept form of a line to find the slope and the y-intercept. So given the following equation y equals negative 1/2 x minus 8, we will locate both the slope and the y-intercept of the line. So let us turn to the y-intercept form and notice |
| 00:00:30 | that in place of m, we have negative 1/2. So the slope m equals negative 1/2. Now, in place of plus b, we are subtracting an 8. Well, let's think about this for a second. We want to write this equation so that we have the form y equals mx plus b-- plus b. So let's do just that. |
| 00:00:54 | y equals negative 1/2 x plus-- and when you subtract a number, you add its opposite, or it's negative-- so plus negative 8. Adding a negative 8 is the same as subtracting a b. Now we're in the same form. Our plus sign gives us our b, which is negative 8. The y-intercept b equals negative 8. |
| 00:01:20 | So we can think of it this way. If we have a plus sign, then b is positive. If we are subtracting b, then b is negative. One last point-- if we want to rewrite negative 1/2, we can put the negative sign in front of the 1/2. But we may also write it as negative 1 over 2, or even 1 over negative 2. |

**Section 10**

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| 00:00:01 | TEACHER: The slope-intercept form of a linear function is y |
| 00:00:04 | equals mx plus b. m is the slope, and b is the y-intercept. Now, we know if we're given the slope-intercept form of a linear function, we can find or identify the slope and the y-intercept. We are going to reverse the thought process. We are going to be given the slope and the y-intercept, and we will derive the slope-intercept form of a |
| 00:00:24 | linear function. Write the equation with the following characteristics-- the slope, m, equals 3. The y-intercept, b, equals negative 1. Well, first we write the slope-intercept form y equals mx plus b. In place of m, we substitute in a 3. We have y equals 3x. |
| 00:00:49 | In place of b, we substitute in a negative 1. We have y equals 3x plus a negative 1. But when you add a negative, that's the same as subtracting. So what we're going to do is rewrite our equation-- y equals 3x minus 1. No, notice when you are subtracting b, this is telling us that b is negative. |

**Section 12**

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| 00:00:00 | TEACHER: The lesson question is, how does knowing the slope |
| 00:00:03 | and y-intercept help you graph and write the equation of a line? Up till now, when given a linear equation in slope-intercept form, we found the slope and the y-intercept. And we've reversed the thought process. When given the slope and the y-intercept, we have found the slope-intercept form of that linear equation. But now, from a graph, we will identify the slope and |
| 00:00:27 | y-intercept. And from that graph, we will write the equation of a line. And lastly, we will identify a graph that will correspond to a linear equation. |

**Section 13**

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| 00:00:00 | TEACHER: Our goal is to see if we can take the graph and go |
| 00:00:03 | from the graph of the line to the slope-intercept form that the line represents. The slope-intercept form of a linear function is y equals mx plus b, where m represents the slope and is constant, and b represents the y-intercept. Let's first turn our attention to b. Let's look where the line intercepts the y-axis. And this occurs at the coordinates 0, negative 3. |
| 00:00:27 | So b for us is negative 3. Now we'll turn our attention to finding the slope. We'll pick another point on the line. I'll choose the point 2, 1. And using rise over run-- m is equal to rise over run-- we'll calculate the slope. So the rise would be up one, two, three, four units. |
| 00:00:50 | This is the rise. So we have rise as 4. The run one will be over one, two units. The run is 2. Rise over run, 4 over 2, is a 2. Now let us write down the slope intercept form, y equals mx plus b. And in place of m, we'll put the slope, which is 2. |
| 00:01:14 | And in place of b, we will put minus 3. In place of the plus b, we'll put a minus 3. Remember, if your b is negative, then you will write minus b. |

**Section 15**

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| 00:00:02 | TEACHER: Given the slope-intercept form of a |
| 00:00:03 | linear equation, you can graph the line. There are five steps. Step one-- determine the slope and the y-intercept. Step two-- plot the y-intercept 0, b. Step three-- use the slope, m, to locate a second point. Step four-- |
| 00:00:21 | draw a line that passes through both points. And step five is to test the point on your line in the equation to verify the equation, or verify that this point is on the line. Let us graph a line given y equals negative 3 over 4 x plus 1. Step one-- determine the slope and y-intercept. So if we look at the slope-intercept form of a |
| 00:00:44 | line, y equals mx plus b, notice in place of the m is negative 3 over 4. And in place of the b is 1. Step two-- plot the y-intercept 0, b. So we will plot 0, 1. We will go up one unit on the y-axis and plot a point. Step three-- use the slope to locate a second point. |
| 00:01:10 | Well, the slope is negative 3 over 4. So we will fall 3 units-- over 4, and we will run 4 units. And this gives us a second point with coordinates 4, negative 2. Step four-- draw a line that passes through both points. Step five-- |
| 00:01:35 | verify the equation using another point. Let's use this point right here-- coordinates negative 4, 4. All right, let's substitute into y equals negative 3 over 4 x plus 1. The y is going to be replaced by a 4-- negative 3 over 4. x will be replaced by negative 4 plus 1. |
| 00:02:00 | A negative times a negative is positive. Notice the 4's cancel. So now we have 4 equals 3 plus 1. And 3 plus 1 is 4. We have verified the equation. |