**Comparing Slopes and Intercepts**

**Section 1**

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| 00:00:00 | TEACHER: You're answering the question, how can you |
| 00:00:03 | determine the characteristics of linear functions that are represented in different ways? You just reviewed the different representations of linear functions. Now you'll look at each representation and identify the slope and y-intercept of each, such as in this graph and equation. |

**Section 2**

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| 00:00:00 | TEACHER: Let's take a look at linear function |
| 00:00:02 | representations. A linear function can be described as a slope of negative 1/3 and a y-intercept of 2. Taking a look at the table, we can see that the change in the y values is negative 1/3. The change in between 2 and 1 and 2/3 is also negative 1/3, as the change in the x values increase by 1. In the equation, which is written in slope intercept |
| 00:00:36 | form of y equals mx plus b, we can see that the m represents the slope, negative 1/3, and b represents the y-intercept of 2. And in the graph, we can find the y-intercept where the linear function crosses the y-axis. So our y-intercept is at the point 0, 2. And the slope can be found using our rise over run. We can see that the slope falls 1 as it runs, 1, 2, 3 to |
| 00:01:11 | the right, to have a slope of negative 1/3. |

**Section 4**

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| 00:00:00 | TEACHER: Let's compare slopes. |
| 00:00:02 | Slopes of linear equations can be compared in different ways. The first way is by the sign of the slope, meaning it goes up or down. And the second way is by the absolute value of the slope, meaning its steepness. First, let's compare slopes by the sign of the slope. The first equation I'm going to graph is negative 2x plus 4. |
| 00:00:25 | 4 is the y-intercept. The slope is a negative 2. Then you go down 2 to the right 1. I'm going to graph the function y equals negative 2x, plus 4. I'm going to compare that to the function y equals 2x plus 6x. 6 is my y-intercept, the slope is a positive 2, so I go up 2 |
| 00:00:55 | to the right 1. And I graph my function, y equals 2x plus 6. Now comparing the signs of the slopes, y equals 2x plus 6 is a positive slope so it trends upward. So as y increases, as x increases from left to right, the function y equals negative 2x plus 4 represents a negative slope, and it trends downward. So as y decreases as x increases from left to right. |
| 00:01:33 | Now let's take a look at an example of comparing the steepness of slopes. So the first function I'm going to graph is y equals 4x plus 2. 2 is the y-intercept. We have a positive 4 for the slope. So I go up 4 to the right 1. And I graph my function, y equals 4x plus 2. |
| 00:02:03 | I'm going to compare that to the function y equals negative 2x plus 6. 6 is my y-intercept, and the slope is a negative 2. So I go down 2 to the right 1. And I graph my function, y equals negative 2x plus 6. So now when we compare the steepness, recall that we're comparing the absolute value of the slopes, meaning we ignore sign and just look at the number itself. |
| 00:02:41 | So looking at the function y equals 4x plus 2, the number is 4, meaning it has a slope of 4. And looking at the function y equals negative 2x plus 6 has a steepness of 2 because we are ignoring the sign, because the absolute value of negative 2 is 2. So that function has a steepness of 2. Now, looking here, the larger slope means a steeper line. So the function y equals 4x plus 2 is a steeper slope. |
| 00:03:15 | So as the number part increases for our slope, the line is steeper whether it is going up or down. |

**Section 7**

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| 00:00:00 | TEACHER: Let's take a look at this example of finding the |
| 00:00:02 | y-intercept. In this example, we're going to find and compare the y-intercept of a function given as a graph and given as an equation. So first, we need to locate the y-intercept of the linear function represented in the graph. Recall the linear function is where the graph crosses the y-axis. |
| 00:00:23 | So the point where the graph crosses the y-axis is at negative 2, 0. So the y-intercept for the function representing the graph is negative 2. Next, let's locate the y-intercept of the linear function represented in an equation written in slope intercept form. We'll recall that slope intercept form is y |
| 00:00:47 | equals mx plus b. b is our y-intercept. So in the equation, the y-intercept is 4. Now, also note that in the equation, y equals 3x plus 4, that our slope is just 3 and not 3x. So let's answer this question. Which function has a larger y-intercept? Well, the graph function has a y-intercept of negative 2, and |
| 00:01:20 | the equation function has a y-intercept of 4. So the equation has the larger y-intercept of 4, because 4 is greater than negative 2. |

**Section 9**

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| 00:00:00 | TEACHER: You're answering the question, how can you |
| 00:00:03 | determine the characteristics of linear functions that are represented in different ways? In the previous segment, you compared slopes and y-intercepts of functions represented as graphs and equations. Now you're going to compare slopes and y-intercepts of functions represented as tables and as graphs. |

**Section 10**

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| 00:00:00 | TEACHER: Let's take a look at this example of representing |
| 00:00:02 | slopes of linear functions. So first we need to find the slope of the linear function from the data in the table. Well, the data in the table is given as points of the function, so the first point shown in the table is negative 4, 14. Since we're given the function as ordered pairs, we can use the slope formula of m equals y sub 2 minus y sub 1, over x |
| 00:00:24 | sub 2 minus x sub 1, to find the slope of the function. Picking any of these two points, I'm going to pick 1, 1 as my first point-- x sub 1, y sub 1. I'm going to pick the point 3, 7 as my second point-- x sub 2, y sub 2. Substituting these into the slope formula, we have 7 minus 1 over 3 minus 1, solving 7 minus 1 is 6, 3 minus 1 is 2, |
| 00:00:55 | 6 divided by 2 is 3. So the slope of the function represented in this table is 3. Now we need to find the slope of the linear function expressed in the graph. Well, to find the slope of a graph, we can use rise over run. Looking at my graph though, I notice that the scale of my |
| 00:01:14 | axes are different. The scale of the y-axis, each square represents 1, so we have 1, 2, 3, 4. But the scale of my x-axis, each square represents 2, so we have 2, 4, 6, 8. It is important to pay attention to the scales when finding the slope. So the slope of the graph starting at 2, 0, it rises 1 |
| 00:01:40 | and it runs 2 to the right, so the slope of the graph is 1/2. Now comparing slopes, recall that there are two ways to compare a slope versus by the sign of the slope. We have 3 and 1/2-- both are positive slopes, so they will trend upward. And the second way to compare slopes is by the steepness, meaning its absolute value. So we ignore the signs and look only at the number. |
| 00:02:12 | So we have a steepness of 3. In the steepness of 1/2, 3 is greater than 1/2, so the slope of m equals 3 is the steeper function. Now comparing the two functions, you know that the function represented in the table is positive and has a steeper slope than the function represented in the graph. |

**Section 12**

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| 00:00:00 | TEACHER: Let's take a look at this example of representing |
| 00:00:02 | intercepts of linear functions. So we're going to compare the two linear functions. First, we need to find the y-intercept of the linear function from the data in the table. Recall that the table gives ordered pairs of the function, and the y-intercept has a corresponding x-coordinate of 0. Since that is not given, we need to first find the slope, |
| 00:00:24 | using the slope formula. Taking any two points, 1, 1 will be my first point-- x sub 1, y sub 1. 3, 7 will be my second point-- x sub 2, y sub 2. Substituting these into the slope formula, we have m equals y sub 2, 7 minus y sub 1, 1 over x sub 2, 3 minus x sub 2, 1. |
| 00:00:50 | 7 minus 1 is 6. 3 minus 1 is 2. 6 divided by 2 is 3. So the slope of the function in the table is 3. Now, we need to use the slope and a point, to substitute in slope-intercept form, to find the y-intercept. So recall, slope-intercept form is y equals mx plus b. So our y, choosing the first point, is a 1, |
| 00:01:21 | equals m, our slope-- 3-- times x. Our x is 1 plus b. Solving, we have 1 equals 3 plus b. Subtracting 3 from both sides, we have negative 2 equals b. So the y-intercept of the function is negative 2. Now we need to find the y-intercept of the linear |
| 00:01:50 | function expressed in the graph. Recall that the y-intercept is where the graph crosses the y-axis. So it crosses the y-axis here at the point 0, negative 1. So the y-intercept of the function is negative 1. Now, comparing the y-intercepts, we can answer the question, which function has a larger y-intercept. Well, we have negative 2, negative 1. |
| 00:02:18 | Negative 1 is larger than negative 2. So the graphed function has the larger y |