Block Coding Lesson

Lesson Title:	**Slope and Intercepts**
Grade Level:	**High School**
Subject:	**Mathematics**
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Engagement:

- To begin today's lesson, we will ask students what they know about linear functions, specifically dealing with slope and intercepts. As students respond, we will record answers on the board.
- Then, we'll have 2 students volunteer to race in the hallway. The rest of the class will split into two teams (a side for each runner). We will set the hallway up ahead of time, placing tape marks at various locations down the hall. Each team will assign a student the role of timekeeper at the various tape marks. As student #1 and student #2 race, the timekeepers will stop the timer as they pass the tape mark. There will also be timekeepers at the finish line.
- Once we declare a winner, we'll return to the classroom and bring the focus back to our original question from the beginning of class. Instead of asking what they know about linear functions, we will ask how what they saw out in the hallway, specifically the times that the timekeepers recorded, is related to slope and intercepts. This will also lead into a discussion on how slope does not always have to mean how steep a line is.

Exploration:

- Students will be provided with a Scratch file (https://scratch.mit.edu/projects/250431425/), containing the blocks that they need to make 2 bugs race down a track. These blocks will be: "When Green Flag Clicked," "Go To X: __ Y: __", "Forever Loop," and "Move __ Steps."
- Students will be instructed to put these blocks in place so that, when the green flag is clicked, the bugs will start at the line and repeatedly move forward.
- Students will decide with their groups on the position where the bugs should start. These should be different for each bug, so that they start at the line but are not on top of each other.

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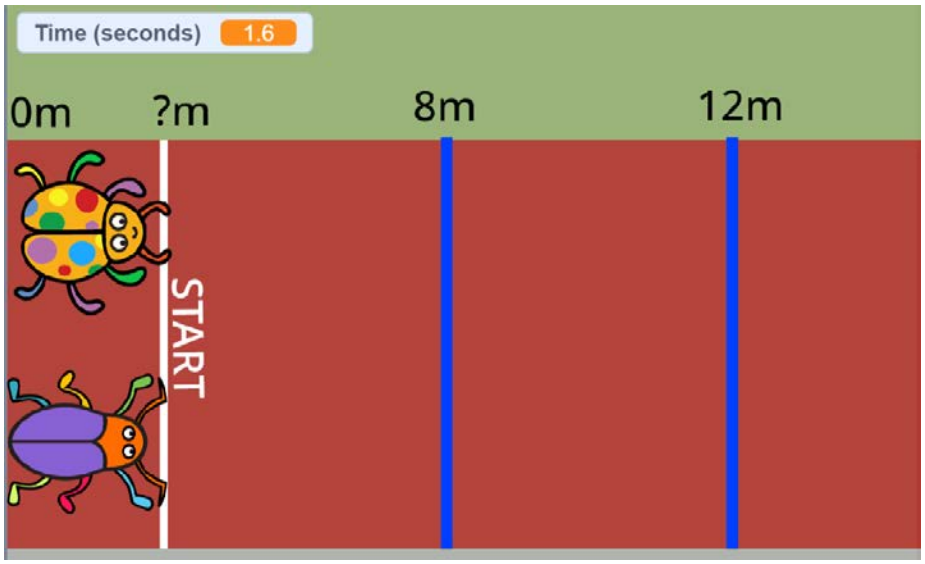
- They will also decide how many steps each bug should move in each loop. This will change how quickly each bu

Source: https://scratch.mit.edu/projects/250431425/

- Students should experiment with playing the race and pausing it as each bug passes a blue line. The number of steps in each bug's Forever Loop should be set to a value that is reasonable for them to pause the race at exactly the right time.



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Explanation:

- Student will calculate slope using how far their bugs travel and how long it takes them to travel that distance. Then, following a worksheet, they will write equations based off their slopes from the code they made in the explore. They will start and stop the code when each bug is about to cross the different meter lines. Then they will take the meters and put them over time (change in meters over change in time) which models the normal slope definition, change in y over change in x. Once students have their slope, they will use the point-slope equation to write the equation of each bug's race.

Elaboration:

- Students will create a linear equation to make the losing bug become the winning bug. In order to accomplish this, they will need to play around with their equations and their code. They will need to understand the relationship between the slope and how fast the bug moves. (i.e. will having the slope of 5 make a bug faster than a bug with a slope of 2?)

Evaluation:

- We will be evaluating students throughout each part of the lesson. We will also be giving an exit student to formatively assess students' knowledge on both linear equations and the coding aspect of today's lesson.

Exit Ticket

Scenario: Imagine that the bugs must run back to the starting place twice as fast.

- What would you add to the code?
- How would this change the MOVE values in the code?
- How would this change your linear equations?

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Example of handout:

Name: _____ Date: _____

Part 1:

Directions: Fill in the following tables recording the positions and times of bug #1 and bug #2 as they cross the designated lines in your code.

Bug 1 Steps _____	**First Line**	**Second Line**
Position		
Time		

Bug 2 Steps _____	**First Line**	**Second Line**
Position		
Time		

Part 2:

1) What variable represents position? What variable represents time?
2) Using your tables, calculate the slope for each bug racer.
3) Write an equation in point-slope form for each bug.
4) Convert point-slope equations to slope-intercept form.
5) Write 1-2 sentences to describe what your equations tell us about the bug race.

Extension: Graph both equations!

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