

Title of Lesson: Introduction to Programming and Scratch

Overview/Purpose: Students gain an understanding of what it means to program and gain experience with the Scratch platform.

Time: 2 - 50 minute class periods

Objectives:

- Students will write an algorithm in a group to make a peanut butter and jelly sandwich
- Students will write an algorithm/program in Scratch using a Scratch tutorial

Standards (CSTA and MN Academic):

CSTA: 3A-DA-12 Create computational models that represent the relationships among different elements of data collected from a phenomenon or process. (P4.4)

<u>Intro</u>	Describe to students that they are going to be making a peanut butter sandwich. Explain that when writing code in a programming platform they need to be very specific in their language and order. Have students get into small groups of 3-4 to work on an algorithm together.	<u>Materials Needed for Lesson:</u> <ul style="list-style-type: none">• Paper/pencil• Bread, peanut butter, jelly, plate, knives• Teacher computer/projector• Student computers or devices to use with Scratch
<u>Lesson/Activity</u>	Peanut Butter Algorithm Students work in groups on writing an algorithm for a peanut butter and jelly sandwich. Students should make sure someone is writing the steps down. Allow students 10-15 minutes to complete in groups. Teacher should take turns follow the literal steps to making the sandwich. Depending on time, teacher can have the students revise their algorithm to improve the steps they used. Teacher can once again test it out. Scratch Tutorial Students need to create a login and password on Scratch. If the teacher has a Scratch teacher account, they can give the students a specific link to use to sign up. Walk students through how to use Scratch in basic terms: Click create, sprites, backgrounds, blocks, and building a script. Instruct students to pick a Tutorial within Scratch to create. A whole class period can be spent on students getting to and working on a Scratch	

<p><u>Wrap-up and Next Steps</u></p>	<p>project.</p> <p>Students need to turn in their project they created. Points were given for completion of a project. Review how to share projects on Scratch. Students copy and pasted the address of their project and submitted on the school's LMS to be graded. Once students have submitted, share some of the creations they made.</p>	<p>Notes: Due to time, the peanut butter and jelly activity can be shortened for only one round of writing. It may also be replaced by using the following video. I have used this but watch for about 3-4 minutes as it is a long video.</p> <p><u>Dad Instructs Kids to write steps for making peanut butter and jelly sandwich</u></p>
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Title of Lesson: Using Conditional Statements in Scratch

Overview/Purpose: The Scratch project is aligned with a logic unit in geometry. In the unit, students learn about conditional statements, its forms, and writing proofs. Students work to write a code where 2 objects touch and an action occurs. Students should have completed the academic learning for if, then conditional statements.

Time: 1 - 50 minute class

Objectives:

- Students will be able to write a code in which 2 sprites interact and using if, then blocks an action occurs when they interact.
- Students will apply and demonstrate their knowledge of conditional statements.

Standards (CSTA and MN Academic):

CSTA: 1B-AP-10 Create programs that include sequences, events, loops, and conditionals. (P5.2)

MN Math: 9.3.2.2 Accurately interpret and use words and phrases such as "if...then," "if and only if," "all," and "not." Recognize the logical relationships between an "if...then" statement and its inverse, converse and contrapositive.

<u>Intro</u>	Review parts of the if, then statement: hypothesis and conditional. Show students a teacher example of the project and see if they can tell what if, then statements might be in the script. Teacher Sample	<u>Materials Needed for Lesson:</u> <ul style="list-style-type: none">● Teacher projector/computer● Student computers or devices Rubric for If, Then Conditional Project
<u>Lesson/Activity</u>	Discuss with students what parts need to be included in their script. Explain the expectations of what needs to be included in their script. <ul style="list-style-type: none">● 2 Sprites● Forever loops for both Sprites● If, then blocks for both Sprites Students work and complete their project individually.	

<p><u>Wrap-up and Next Steps</u></p>	<p>Review with students what they need to have in their project. Review how to share their project and how it must be submitted for grading.</p> <p>If students were struggling, brainstorm as a group how to troubleshoot what they may be encountering.</p>	<p><u>Notes:</u></p> <p>If students achieve the minimum, have them challenge themselves to adding more sprites, more actions, and having user controls of the Sprite.</p>
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Title of Lesson: Parallel and Perpendicular Lines in Scratch

Overview/Purpose: Students work to write a script in Scratch that draws perpendicular and parallel lines in the coordinate plane. Students should have some prior knowledge of the relationship between slopes of parallel and perpendicular lines.

Time: 1 - 50 minute class

Objectives:

- Students will be able to write a program in Scratch that applies their knowledge of the slopes of parallel and perpendicular lines.

Standards (CSTA and MN Academic):

CSTA: 3A-AP-13 Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests. (P5.2)

MN Math: 9.3.4.4 Use coordinate geometry to represent and analyze line segments and polygons, including determining lengths, midpoints and slopes of line segments.

<u>Intro</u>	Have students determine if a set of points can create parallel or perpendicular lines. Review how they can tell.	<u>Materials Needed for Lesson:</u> <ul style="list-style-type: none">• Teacher computer/projector• Student Computers
<u>Lesson/Activity</u>	Show students a teacher sample of the project they will be creating. Have students talk through what is happening in the script and what they may need to include. Teacher Sample Review the Rubric. Students must include: <ul style="list-style-type: none">• A Sprite drawing the lines• Parallel lines from Quadrant 2 to Quadrant 4• Perpendicular line drawn from Quadrant 1 to Quadrant 3 Students complete work on their program. Encourage them to check their lines using the math they reviewed.	Rubric for Scratch Parallel and Perpendicular Lines Project

<p><u>Wrap-up and Next Steps</u></p>	<p>Review how to share their program and submit the address for grading. Review what they need to make sure their script includes.</p>	<p><u>Notes:</u> To grade, the teacher may find it helpful to write an answer key in excel where you only need to input the points students used in their script and the slope equations are programmed in.</p>
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Extension of these Lessons

Additional Projects

- Transformations in the Coordinate Plane
 - Students work to create a costume quadrilateral and then use scripts to write possible transformations that could take place. Students use a remix to have a starting point to create. Remix link is included in the Rubric.
 - [Rubric for Transformations in the Coordinate Plane](#)
 - [Teacher Sample of Project](#)
- Interior Angle Sum Theorem
 - Students work to write a script that allows a user to input the number of sides of a polygon and the program calculates the sum of the interior angles.
 - [Rubric for Interior Angle Sum Theorem](#)
 - [Teacher Sample of Interior Sum Theorem](#)
- Calculating Trigonometric Ratios
 - Students work to write a script where a user inputs for 3 sides of a triangle. The script needs to determine if the sides make a right triangle. If not, there needs to be some response. If the sides make a right triangle, the program calculates and displays the trigonometric ratios.
 - [Rubric for Calculating Trigonometric Ratios](#)
 - [Teacher Sample of Project](#)