

Standard: Algorithms & Programming: Program Development (4) Grade Band: 3-5

Grade	Standards AP.PD.04
3	Communicate and explain program development to peers and adults using comments, presentations, and demonstrations.
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5	Communicate and explain program development to peers and adults using comments, presentations, and demonstrations.

Grade	Essential Skills
3	Using correct terminology, describe the steps taken to develop a computer program .
4	Correlate the steps taken when developing a computer program to the final program produced.
5	Summarize how choices made during program development , including debugging and checking inputs and outputs , contributed to program development and the outcome achieved.

Explanation
Students will describe the process they used and explain the choices they made when developing a computer program . Descriptions should include the process used for debugging the program and the relationships between inputs and outputs . The development process can be described using comments within computer programs, coding journals, discussions with a teacher, class presentations, and/or blogs. Communicating about the decisions they made while coding can help others understand and use their programs.

Think of this as similar to....
Explain to your family how and why you made the breakfast you served them.

Essential Questions
How can you explain the process used to develop a computer program ?
How would you describe the way your goal influenced the development your computer program?

Implementation Examples—What would this look like in the classroom?

Grade(s)	Title	Description	Link	Content Connection & Notes
3	End of Course Project Course C	Grade 3 --Students look at projects on Code Studio to get ideas for what they can create. They complete a planning sheet by drawing and explaining how the project will work and/or what it will look like at different points in time. Explanations should include proper terminology.	End of Course Project Course C	
3	Build My City	Grade 3 --The Build My City project is a project in which students will review key programming concepts. A demo project is used to explain the design requirements and expectations. Students meet in their project groups and use storyboarding to develop their ideas for their city. Students should explain their ideas and the code that they will use to carry it out. When they develop the program, they should be able to correlate their storyboard with their projects. Grade 4 --Students will be able to correlate the specific parts of their storyboard with parts of their computer program. Use that process to locate and correct errors (debug) in their program. Grade 5 --Students will discuss the reasons for the choices they made during the development of the program.	Build My City	This also aligns with CS AP.M.02 and AP.PD.01 . Similar skills and concepts can be used in an About Me or Superhero project.
3	Conditionals with Cards	Grade 3 --Although students may not know the word conditionals, they are familiar with the concept from their everyday lives. In this unplugged lesson using a deck of cards, students write algorithms that depend on things like a card's suit, color, or number to add or subtract points. Students should explain the game, how it is played and how points are assigned to their classmates. Students can translate the algorithm to code in Scratch or another language and add comments to the program. Grade 4 -- Create a more complex conditional where certain cards can result in multiplication or division of the points. Demonstrate the game following a graphic to display how the algorithm for the game was developed. Grade 5 --Create a flowchart to model the algorithm created and indicate points where debugging was necessary, as well as where inputs were used, and outputs were generated.	Conditionals with Cards	This lesson also aligns with CS AP.C.01 . It is unplugged but can also be adapted to have students create a computer program.

Grade(s)	Title	Description	Link	Content Connection & Notes
4	End of Course Project Course D	Grade 4 --Students build a project of their choice in Code Studio. Discuss the reasons planning is a very important part of coding a game, a drawing or any creative process. Students explain the choices they make in the planning stage, and then build their program. Once the program is built students explain how they got their program to work and the choices they made.	End of Course Project Course D	
5	American Revolution	Grade 5 --Students will create an original computer program which presents information about an event leading up to the American Revolutionary War: Pontiac's' Rebellion, Boston Massacre, Acts, Boston Tea Party, Paul Revere's Ride, French and Indian War, King George III Protest and Speeches, Continental Congresses. Students will explain the choices they made in developing the program, including any changes necessary to their original plan and why those changes were made.	American Revolution	This lesson also aligns with ELA 4.W.6

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These annotations are a collaboration between [Maryland Center for Computing Education](#) and the [Maryland State Department of Education](#).