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| MAT 220: Math 4 Today  20 week: Coding | | | |
| Learning Targets | Unit Name | Instructional Resources | Vocabulary |
|  | Unit 1: |  |  |
| **I can....**  - Use an iterative process to plan the development of a program by including others' perspectives and considering user preferences.  - Seek diverse perspectives for the purpose of improving computational artifacts.  - Recommend improvements to the design of computing devices, based on an analysis of how users interact with the devices.  - Seek and incorporate feedback from team members and users to refine a solution that meets user needs.  - Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.  - Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions. | Making with micro: bit - An introduction to design thinking and the micro: bit as a component for a basic making activity. | [Introduction Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EWFQrY_BE7tPoiQm6IOQwYIBGdT-P9FuyFN1SOoLDhXhjQ?e=HtJ3xn)  [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EUOxdPXLNoNGmxajbsRfFcMBrQRthbipK2n7tNwq6fSOeg?e=XMWIfi)  [Quick Start Power point](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/EVWMBLfaOctDp5mfZex8UrcBg4tEx4pbvItoRucehlHbTA?e=AL6ZLa)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EVqy6T_H8NVPmg68ge6mPUUBDxuUrqz66RD52xHZMLGMMA?e=6Wpyy1)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EZ_hwM_DaKlNqJ0ktw_3n-ABsu37CcUQ4ekeAn3UghedBg?e=Hgm9fY)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Micro: bit  Processing |
|  | Unit 2: |  |  |
| **I can...**  - Describe how internal and external parts of computing devices function to form a system.  - Model how computer hardware and so􀁸ware work together as a system to accomplish tasks.  - Create programs that include sequences, events, loops, and conditionals.  - Describe choices made during program development using code comments, presentations, and demonstrations.  - Use flowcharts and/or pseudocode to address complex problems as algorithms | Algorithms  Introduces a conceptual framework for thinking of a computing device as something that uses code to process one or more inputs and send them to an output(s). | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EbQstidFwAROpLBylvjJ7pABn-ZO5EtrxZpR-1-NTAccYw?e=QU6GM2)  [Classroom Presentation](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/EVriM_jgqDNOoF1MK_7ZUKEBPFvquANPB85rXGdtL1PrAQ?e=61Qacs)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/Ead1Mae_6L9GgLnr_aYcj-oBdrA7IuaJjeA4vEGiOotyuw?e=oK9kyD)  [Quick Start Video](https://nfschools-my.sharepoint.com/:v:/g/personal/cdubois_nfschools_net/EVvrQ34u3-xBpwAn9lhET9UBOWZ2QZgURWijzJEHQEziwA?e=cc1ze4)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/Ee-WNwWG5TVIhgSB3xm3tcEBuGocboAvyJgjEjB8SLowxA?e=0yx0aE)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Algorithms |
|  | Unit 3: |  |  |
| **I can...**  - Create programs that use variables to store and modify data.  - Create clearly named variables that represent different data types and perform operations on their values. | Variables  Introduces the use of variables to store data or the results of mathematical operations, and the importance of giving variables unique and meaningful names. | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EaP5072ror5Ev1QlU3MOtDcBwzK7Bmoh2VVazrWq0FfgXw?e=dgocg2)  [Classroom Presentation](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/Ecc5downibxMjqklMLUykj8BOWuPKsaFvhXD68U_pulrBw?e=FtlHIy)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EYHt02cHer5AqDJQyLPioG8BNRaXVm2FfVEOMNoDoS_-CQ?e=J5yBW6)  [Quick Start Video](https://nfschools-my.sharepoint.com/:v:/g/personal/cdubois_nfschools_net/EVPjFwciA8pAjozdrr6CXB8B68g8ZJfk6NJiETSMBsrXPA?e=KNWt41)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EcKyTokW-GROgBjfilAxKvIB3z02MH5VZxODH2JsiJ59YQ?e=JvOYDu)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Variables |
|  | Unit 4: |  |  |
| **I can...**  - Create programs that include sequences, events, loops, and conditionals.  - Use flowcharts and/or pseudocode to address complex problems as algorithms.  - Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. | Conditionals  Introduces the Logic blocks, such as ‘If…then’ and ‘If…then…else’, with a focus on practicing skills of creativity, problem-solving, and collaboration. | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EUysDsnMTbBIqLn1PK4typUBdcJYeKvMnL3qO1q8LqFHbA?e=Z7UHfm)  [Classroom Presentation](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/EWEP8gI7EXxIspIekfFq5rMBoqZyGtsOwgDIi4zbCl8Siw?e=STpd43)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EbJXXQfAnYFGp0xeJV2hVHsBFmxi3UMs8tAi20Ugb-A8FA?e=0ETCam)  [Quick Start Video](https://nfschools-my.sharepoint.com/:v:/g/personal/cdubois_nfschools_net/Ee7n9a-z4wJHhytGLglHsT0BfrPar7iQlVwG9UJJVtEB2w?e=gAFACv)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EW4W8j2UrVlDmxDe9LNs5QkBFf2RX7geOl0pwryDmfxX-g?e=GPCJb8)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Conditionals |
|  | Unit 5: |  |  |
| **I can...**  - Create programs that include sequences, events, loops, and conditionals.  - Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.  - Use flowcharts and/or pseudocode to address complex problems as algorithms.  - Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. | Iteration  Introduces the concept of iteration and loops to program repeated sequences of code more efficiently. | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EWh_N7iuCvVCgWo3cbFG0IIBtsxO8VYfNPP9x9buREVREA?e=FOgLzV)  [Classroom Presentation](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/EY-4DnMhCi9MuC1ULd225fcB6d14EFRawrb2wV34Z7KNLg?e=xvUIda)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/ETkYQmVew2tOtQYhmPoRRKoBFIEPWoNthXuU2zsWaCepjQ?e=IhKhIO)  [Quick Start Video](https://nfschools-my.sharepoint.com/:v:/g/personal/cdubois_nfschools_net/EWi3KpFtbdVJlbvitOVO44kB38oKUSafF32IcI553H2Oww?e=Ik98U0)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/ET83IZE3KQVEuPGvDtiE5hwBOAYU9l6DVG0v1_k1xAGWaw?e=1Z9OcE)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Iteration  Looping |
|  | Unit 6: |  |  |
| **I can...**  - Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.  - Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.  - Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.  - Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.  - Systematically test and refine programs using a range of test cases.  - Document programs in order to make them easier to follow, test, and debug.  - Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.  - Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions. | Mini project  Provides a review of the concepts covered in units 1-5, introduces an independent “mini-project,” and reinforces the important idea that programming is a process of patient problem-solving. | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/ET99MHskdzVMs6MV4eDDiYwB5VlZTriPYaJZmVGb9bD76Q?e=TTYTgA)  [Classroom Presentation](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/EVg3Ks9QzWdMiYoIQRsaGHkBfdGe3IMESTjRJk0x__IpZw?e=hmT4h4)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EeA6blA5i7FDmsbRl4vJM0MBhHyCOytiV3Qvk1dkMI3sxg?e=fA6bbz)  [Quick Start Video](https://nfschools-my.sharepoint.com/:v:/g/personal/cdubois_nfschools_net/EWfLLY4hu_JEmmgarLw0_qABolJz1alQmNFo21fPnkJwqA?e=21NqAP)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EX5TQ1gfeIBAigXLiIQAHAYBsWxQD6rt8Jv06UTT-LHX7w?e=yT92OA)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Micro: bits  Processing  Algorithms  Variables  Conditionals  Iteration and looping |

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| MAT 220: Math 4 Today | | | |
| NYS Standards | Unit Name | Instructional Resources | Vocabulary |
|  | \*Unit 7: |  |  |
| I Can...  - Use flowcharts and/or pseudocode to address complex problems as algorithms. | Coordinates  Introduces the use of coordinates to store data or the results of mathematical operations and gives students practice programming the LEDs of the micro:bit screen using coordinates. | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EalxwNK_kmNCubYY_IysUCQBMyY8vtiLFElLfXeH14ynxQ?e=Xc56qe)  [Classroom Presentation](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/EauEDvZlPV5IjUbAQrqoRQ8Bjg3eyTT1o_yrdXZTD5R6Zw?e=B9jskw)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EU2vhI1Sf-BOtRBk57pT9AYBASZ6rXR9iO5IStN7dKTREg?e=qlCTzm)  [Quick Start Video](https://nfschools-my.sharepoint.com/:v:/g/personal/cdubois_nfschools_net/EcEQ6Ek-H6NHuzEzuaiQQLoBZ3GwdJrJxtLfWHxgJMyZ3w?e=p2ZXqV)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EarHDcQ2JtZMufW67_iaA80BjWOzAgG-P1VenM9rj4OQug?e=MaGD8X)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Coordinates |
|  | Unit 8: |  |  |
| I Can...  - Use flowcharts and/or pseudocode to address complex problems as algorithms. | Booleans  Introduces the use of the Boolean data type to control the flow of a program, keep track of state, and to include or exclude certain conditions. | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EQEhjgvxB5pMrAUqsOSBgfgBkIEhdYLSNe76VYEyx3vaeg?e=jdjC2d)  [Classroom Presentation](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/ESelYrfnP0hIuiGfWqwcawYBWKUt_ZU9Lv2_wWojXAWSsQ?e=Q8LGma)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EYobA0Xc3DREvHD8Mbcw-CkBhFMKcqCoiirJOqjyNR0Rlg?e=UbIGHe)  [Quick Start Video](https://nfschools-my.sharepoint.com/:v:/g/personal/cdubois_nfschools_net/ER6fB4n_4_JOsofHiC8uK7IB0UctUl3oqDN-UQRbGW8F3w?e=v5vhyo)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EaWkbPxplcNNlWYkvarog6sBvhSOQYz_ZcB0uw76J-wUng?e=v2mCgN)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Booleans |
|  | \*Unit 9: |  |  |
| I Can...  - Represent data using multiple encoding schemes.  - Use flowcharts and/or pseudocode to address complex problems as algorithms. | Bits, bytes, and binary  Introduces the concept of binary digits, base-2 notation, how data is stored digitally, and how it can be read and accessed. | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/ERVDV9nVXpBGgPi_4uB_ZB4B3_MtnyWigGAw3tpjzFA89A?e=L2eHff)  [Classroom Presentation](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/Ecb_NpiG-XxLr7METWUV-aAByfqpZQUcF41mqxglZn0eEg?e=O0cDRu)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EUDKQEXLNJlIpZ8QRaJfM1QBP-kSE86WsZf73Thx6XmoWg?e=HeaKcI)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EU6OZeRONFtGvf1Gu_AF0XQBZNIesbxp_t9pk_DQzuYKwQ?e=kBca5c)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Bits, bytes and binary |
|  | \*Unit 10: |  |  |
| I Can...  - Model how information is broken down into smaller pieces, transmitted as packets through multiple devices over networks and the Internet, and reassembled at the destination.  - Take on varying roles, with teacher guidance, when collaborating with peers during the design, implementation, and review stages of program development.  - Design projects that combine hardware and software components to collect and exchange data. | Radio communication  Introduces the radio functionality of the micro: bit to send and receive numeric and string data between micro: bits, and the concept of pair programming with the project. | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EVTIoEVEOLdKpDv0akCZ-44BVHTDTLsMtsv1nogA3_zeWQ?e=xN5vsZ)  [Quick Start Power Point](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/EWwiwkkCi9hKpLJtt4roHMQBituNOWUSqWK1is7SbgrN2w?e=dNg4tq)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EeHk2lTU4zVEruyEQpFt3KsB19gRfAMYOQWCuQ9iysmy4A?e=gpVJrF)  [Quick Start Video](https://nfschools-my.sharepoint.com/:v:/g/personal/cdubois_nfschools_net/EQ-AOrKMIP1Frd9JSNsB-MYBTm2IuyAntzCoo1nVubE8bQ?e=wrKJOK)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EZzt19pdC9RAg3rKKC71LZ4BwSR0pxbyHRz2vwJdKeKeeQ?e=kKVAIC)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Radio |
|  | \*Unit 11: |  |  |
| I Can...  - Use flowcharts and/or pseudocode to address complex problems as algorithms.  - Use lists to simplify solutions, generalizing computational problems instead of repeatedly using simple variables. | Arrays  Introduces the usefulness of arrays to store a collection of related data types and retrieve the data points in an ordered fashion, and common algorithms for sorting data. | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EeohX5-7riRIhV-iOY7-u80BTzzRE7Kl_sc7ZN87fFbVTQ?e=ftP9Pd)  [Quick Start Power Point](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/ERlOutLKCrhIqeQanR-6KHoBGXwtC5xm5APlSfQN65WJIA?e=240zc0)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EdKzlp2K6t5HpMfuR_dvregBq2xF3D3ZrcKx35e1_0xPZg?e=knrIDz)  [Quick Start Video](https://nfschools-my.sharepoint.com/:v:/g/personal/cdubois_nfschools_net/EVyP0_W44M1KlDLrIZ0U39QB_-FwqgjGXxLIt8iSHlM48g?e=aHyhtb)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EWxkoeL55gJHm_ZS9k4jtCUBsB7YXGZG-IdLN1nCkmGFaA?e=H45SIp)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Array |
|  | \*Unit 12: |  |  |
| I Can...  - Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.  - Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.  - Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.  - Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.  - Systematically test and refine programs using a range of test cases.  - Document programs in order to make them easier to follow, test, and debug.  - Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.  - Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions. | Independent final project  Provides review of units 7-11, and tasks students to create an independent project that demonstrates the use of something they have already learned, something they researched for themselves, something they borrowed from somewhere else (with citations), and something completely original, as well as documentation of their design, making, and learning process. | [Educator Guide](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/Ed_WayIgSoVNtiMg3DH23dQB3g_YxyJ3K1ZA6Hg8j5bbXA?e=uFa5Td)  [Quick Start Power Point](https://nfschools-my.sharepoint.com/:p:/g/personal/cdubois_nfschools_net/EQj8Wad49B9IjTTUxwcfVDcBsr8BTQw9RpZTQ0u48ku0pA?e=xIp8uy)  [Quick Start Script](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EYwuty3Ja75Fnk3r_N7MPgABHKNennlG05vg_FhpsrQhYA?e=2LjBHn)  [Quick Start Video](https://nfschools-my.sharepoint.com/:v:/g/personal/cdubois_nfschools_net/EU21zVfgtwpEomIhRsCn7ykBd11fcZjbQ1gAGI3n7fvQ_w?e=a1kb4b)  [Student Workbook](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EbyBzNQqLj1Kv6unUThupcsBOlZ5g5B19PBiXgZcCWGLAA?e=t3RAmC)  [Assessment materials](https://nfschools-my.sharepoint.com/:w:/g/personal/cdubois_nfschools_net/EXhvCOCx07FAg_A_TQHKDQwBPJ52h59rzRNsw9LZD3_3yA?e=A2vWkF) | Coordinates  Booleans  Bits, bytes, and binary  Radio  Arrays |