[**http://www.cosa.k12.or.us/sites/default/files/materials/events/erin\_miles\_mathematical\_practices\_with\_questions-1.pdf**](http://www.cosa.k12.or.us/sites/default/files/materials/events/erin_miles_mathematical_practices_with_questions-1.pdf)

**MATH PRACTICE STANDARDS and LESSON PLAN RESOURCES**

**Designed for grades 3-HS (with a few resources from grades K-2 to use with elementary grades as appropriate.)**

*Below is a guide and resource for designing* Learning Strategy Lessons *using the 8 Math Practice Standards to help students recognize and use a repertoire of effective learning strategies that will help them become successful independent learners.*

*Resources include questions the teacher would ask in class, including a follow-up student activity with links to student examples aligned to Common Core and PARCC. (If the hyperlink does not work for you, just copy and paste the link into your browser.)*

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| **#1 Make sense of problems and persevere in solving them** | | |
| **Summary of Standards for Mathematical Practice with some**  **STUDENT LEARNING STRATEGIES** | **Questions to Develop Mathematical Thinking**  **plus**  **Links to Resources for Student Tasks** | |
| 1. **Make sense of problems and persevere in solving them**   1. Interpret and make meaning of the problem looking for starting points. Analyze what is given to explain to yourself the meaning of the problem. 2. Plan a solution pathway instead of jumping to a solution. 3. Monitor the progress and change the approach if necessary. 4. See relationships between various representations. 5. Relate current situations to concepts or skills previously learned and connect mathematical ideas to one another. 6. Students ask themselves, “Does this make sense?” and understand various approaches to solutions. | 1. **Make sense of problems and persevere in solving them**   * How would you describe the problem in your own words? * How would you describe what you are trying to find? * What do you notice about...? * What information is given in the problem? * Describe the relationship between the quantities. * Describe what you have already tried. * What might you change? * Talk me through the steps you’ve used to this point. * What steps in the process are you most confident about? * What are some other strategies you might try? * What are some other problems that are similar to this one? * How might you use one of your previous problems to help you begin? * How else might you organize...represent...show...?   **Student Task (an independent assignment):**  A) **Select** one example from those listed below. You may select one from your grade or course, or from one to two years prior.  B) **Solve** the example; show all work; draw and label any diagrams used.  C) **Write down** one of the *independent learning strategies (1, 2, 3, 4, 5 or 6)* that you used to *reason abstractly and/or quantitatively* in this example.    D) **Explain** how you used this strategy to solve this particular example.  **Math Practices # 1**  Make sense of problems and persevere in solving them  Grade K   * Books on Shelves (mp # 1,2,3,6) <http://schools.nyc.gov/NR/rdonlyres/B50F3E83-1202-4999-B14A-309F5429A82A/0/NYCDOEKMathBooksonShelves_Final.pdf>   Grade 1   * Nina’s Numbers (mp # 1,2,3,4,7) <http://schools.nyc.gov/NR/rdonlyres/B8F6F552-ED31-498A-A1B6-4AA86018FE5D/0/NYCDOEG1MathNinasNumbers_Final.pdf> * Fun in the Snow with Max and Ruby (mp # 1,2,3,4,6,7) <http://schools.nyc.gov/NR/rdonlyres/4062DDD9-0137-4305-9313-4A4C3F415800/0/NYCDOE_G1_Math_MAXANDRUBY_Final.pdf>   Grade 2   * Carol’s Numbers (mp # 1,3,6) <http://schools.nyc.gov/NR/rdonlyres/CAC1375E-6DF9-475D-97EE-E94BAB0BEFAB/0/NYCDOEG2MathCarolsNumbers_Final.pdf>   Grade 3   * Kai Index Cards (3.OA.6) * Cookie Dough performance Task (mp #1-4) <http://schools.nyc.gov/NR/rdonlyres/0ACC1E30-0BB7-42AC-93D7-7CE7B83E0136/0/NYCDOEG3MathCookieDough_Final.pdf> or use http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm * City Farmers (mp # 1, 3, 4) <http://schools.nyc.gov/NR/rdonlyres/CD824F33-84DA-4D5F-8D4A-B450EA8C8000/0/NYCDOE_G3_Math_CityFarmers_Final.pdf> or use the following link; select [grade 3], [math] and this task <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * Peter’s Garden (mp # 1,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/CD8EAFC6-862F-433D-B293-8DA61757028E/141424/NYCDOE_G3_Math_PetersGarden_FINAL.pdf> * Isabella’s Garden (mp # 1,4) <http://schools.nyc.gov/NR/rdonlyres/067DB512-9685-43CD-9ACE-246CBD0B2A89/0/NYCDOE_G3_Math_IsabellasGarden_FINAL.pdf>   Grade 4   * Bus, Vans and Cars <http://ccsstoolbox.agilemind.com/parcc/elementary_3775_1.html> * Ordering Juice <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3777.html> * Farmer Fred (mp # 1,3,6,7) <http://schools.nyc.gov/NR/rdonlyres/04CC9ECB-C5AB-47DA-891B-6D8F6B6EFE88/0/NYCDOEG4MathFarmerFred_Final.pdf> * Chocolate Bar Fractions (mp # 1,3,4,6,7) <http://schools.nyc.gov/NR/rdonlyres/0C0422CA-DBAF-4476-928F-71102DB2F703/140801/NYCDOE_G4_ChocolateBarFractions_FINAL.pdf>   Grade 5   * Deb has a board that measures …. (EngageNY test 2014) * Stuffed with Pizza (mp # 1,3,6) <http://schools.nyc.gov/NR/rdonlyres/D0A70F2D-1133-418C-B68F-95E6D714F357/0/NYCDOEG5MathStuffedwithPizza_Final.pdf> * Time for Recess (mp # 1,3,6) <http://schools.nyc.gov/NR/rdonlyres/B8B8BDAD-2EF2-4BF8-AE93-114C48B563E2/130938/NYCDOEG5Math_TimeforRecess_Final.pdf>   Grade 6   * Proportions of Instruments <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G6Kelvin_081513_Final.pdf> * Rational Numbers (mp # 1,2, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/CE3C9B3D-609C-4F98-84A5-DEB04A9138F1/141876/NYCDOE_G7_Math_RationalNumbers_FINAL.pdf> or go to this site and select [math], [grade 6]and this task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Grade 7   * Anne’s Family Trip <http://ccsstoolbox.agilemind.com/parcc/about_middle_3808.html> * School Supplies <http://ccsstoolbox.agilemind.com/parcc/about_middle_3819.html> * Spicy Vegetables <http://ccsstoolbox.agilemind.com/parcc/about_middle_3812.html> * Proportional Reasoning (mp # 1,2,3,6) <http://schools.nyc.gov/NR/rdonlyres/41C0F04C-0BD6-491F-9BF0-16485EC080BE/0/NYCDOEG7MathProportionalReasoning_Final.pdf> * Leaky Faucets (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/FFF98A0A-16D1-4E10-BF2C-01A83F011B67/140497/NYCDOE_G7_Math_LeakyFaucets_FINAL.pdf>   Grade 8   * Combined volume of all the tanks …. (EngageNY 2014 exam) * Math Expressions and Equations (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/835F949D-A3D9-419E-A54C-A004209AAC80/0/NYCDOEG8MathExpressionsandEquations_Final.pdf> * Representing and Interpreting Proportional Relationships (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/638B9380-FE20-422C-9556-8A6D56BD5C80/0/NYCDOEG8RepresentingandInterpreting_FINAL.pdf> * Talk and Text Plans (mp # 1,2,3,4,5,6) <http://schools.nyc.gov/NR/rdonlyres/37BEA54D-7761-4BC3-B036-01889BED352D/0/NYCDOE_G8_Math_TxtandTalk_Final.pdf> * Slippery Shoes (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/1F533263-05A2-4723-9423-95ABC6C1CB9A/130937/NYCDOE_G8_Math_SlipperySlopes_Final.pdf> * Free Style (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/5A4617E5-DDF2-4D0F-94B7-BD397E5F3725/139658/NYCDOE_G8_Math_200Freestyle_FINAL1.pdf> * The Picture Frame Problem (mp # 1,2,3,4,5) <http://schools.nyc.gov/NR/rdonlyres/A1472F33-F711-4154-8B08-90BCEFF737A1/140499/NYCDOE_G8_Math_PictureFrame_FINAL.pdf>   Algebra I   * Mini Golf Prices <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf> * Golf Balls <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3834.html>   Geometry   * Company Logo (mp # 1, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/49162FEC-37E2-4A96-93C1-6671664FACD5/0/NYCDOEHSMathCompanyLogo_Final.pdf> or go to this site and select [math], [grade 11], and this task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * A Day at the Beach (mp # 1,4,6) <http://schools.nyc.gov/NR/rdonlyres/C03D80B2-9213-43A9-AAA3-BB0032C62F4F/139657/NYCDOE_G10_ADayattheBeach_FINAL1.pdf> or go to this link and select [math] [grade 10] and locate this geometry task. * Designing Euclid’s (mp # 1,4,6) <http://schools.nyc.gov/NR/rdonlyres/B6D1886B-B5A9-4F55-882C-3526FA23C043/165319/G10_Math_Euclid_NL_052914.pdf> or go to this link and select [math] [grade 10] and locate this geometry task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * The Inheritance (mp # 1,6) <http://schools.nyc.gov/NR/rdonlyres/EDEBDBC0-DE30-4298-AB89-7CEBF566C82E/165320/G10_Math_Inheritance_NL_52814.pdf> or go to this link and select [math] [grade 10] and locate this geometry task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * Nested Boxes (Algebra and Geometry; mp # 1,2,6) <http://schools.nyc.gov/NR/rdonlyres/CA72BE7E-252D-4C25-9F67-42EB5B8B759E/165667/G10_Math_NestedBoxes_NL_052915.pdf> or go to this link and select [math] [grade 10] and locate this geometry task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Algebra II   * Temperature Change <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf> | |
| **#2 Reason abstractly and quantitatively** | | |
| **Summary of Standards for Mathematical Practice**  **with some**  **STUDENT LEARNING STRATEGIES** | | **Questions to Develop Mathematical Thinking**  **plus**  **Links to Resources for Student Tasks** |
| **2. Reason abstractly and quantitatively**   1. Make sense of quantities and their relationships. 2. Represent a situation symbolically and manipulate the symbols and make meaning of the symbols in a problem. 3. Be flexible in the use of operations and their properties. 4. Create a logical representation of the problem. 5. Attend to the meaning of quantities, not just how to compute them. | | **2. Reason abstractly and quantitatively**   * What do the numbers used in the problem represent? * What is the relationship of the quantities? * How is \_\_\_\_\_\_\_ related to \_\_\_\_\_\_\_\_? * What does\_\_\_\_\_\_\_mean to you? (e.g. symbol, quantity, diagram) * What properties might we use to find a solution? * How did you decide in this task that you needed to use...? * Could you have used another operation or property to solve this task? Why or why not?   **Student Task (an independent assignment)**  A) **Select** one example from those listed below. You may select one from your grade or course, or from one to two years prior.  B) **Solve** the example; show all work; draw and label any diagrams used.  C) **Write down** one of the *independent learning strategies (2, 3 or 4)* that you used to *reason abstractly and/or quantitatively* in this example.    D) **Explain** how you used this strategy to solve this particular example.  **Math Practices # 2**  Reason abstractly and quantitatively  Grade K   * Books on Shelves (mp # 1,2,3,6) <http://schools.nyc.gov/NR/rdonlyres/B50F3E83-1202-4999-B14A-309F5429A82A/0/NYCDOEKMathBooksonShelves_Final.pdf>   Grade 1   * Nina’s Numbers (mp # 1,2,3,4,7) <http://schools.nyc.gov/NR/rdonlyres/B8F6F552-ED31-498A-A1B6-4AA86018FE5D/0/NYCDOEG1MathNinasNumbers_Final.pdf> * Fun in the Snow with Max and Ruby (mp # 1,2,3,4,6,7) <http://schools.nyc.gov/NR/rdonlyres/4062DDD9-0137-4305-9313-4A4C3F415800/0/NYCDOE_G1_Math_MAXANDRUBY_Final.pdf>   Grade 3   * The Field <http://www.parcconline.org/samples/mathematics/grade-3-mathematics-field> * Art Teacher’s Rectangular Array <http://www.parcconline.org/sites/parcc/files/ArtTeacherRectangularArray_0.pdf> * Cookie Dough performance Task (mp #1-4) <http://schools.nyc.gov/NR/rdonlyres/0ACC1E30-0BB7-42AC-93D7-7CE7B83E0136/0/NYCDOEG3MathCookieDough_Final.pdf> or use the following link; select grade, math and this task <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Grade 4   * Three Friends Beads <http://www.parcconline.org/sites/parcc/files/Grade4-ThreeFriends%27Beads.pdf> * Bus, Vans and Cars <http://ccsstoolbox.agilemind.com/parcc/elementary_3775_1.html> * Deer in the Park <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3770.html> * Ordering Juice <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3777.html>   Grade 5   * Mr. Edumund’s Pencil Box <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G5AreaofBoard_081913_Final.pdf>   Grade 6   * Fraction Model <http://www.parcconline.org/sites/parcc/files/FractionModelFINAL.pdf> * Inches and Centimeters <http://ccsstoolbox.agilemind.com/parcc/about_middle_3789.html> * Rational Numbers (mp # 1,2, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/CE3C9B3D-609C-4F98-84A5-DEB04A9138F1/141876/NYCDOE_G7_Math_RationalNumbers_FINAL.pdf> or go to this site and select math, grade-level and topic: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Grade 7   * Speed <http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20Sample%20Problems_GR7_SpeedV2.pdf> * Proportional Reasoning (mp # 1,2,3,6) <http://schools.nyc.gov/NR/rdonlyres/41C0F04C-0BD6-491F-9BF0-16485EC080BE/0/NYCDOEG7MathProportionalReasoning_Final.pdf> * Leaky Faucets (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/FFF98A0A-16D1-4E10-BF2C-01A83F011B67/140497/NYCDOE_G7_Math_LeakyFaucets_FINAL.pdf>   Grade 8   * Length of Line Segment AB Proportional Relationships <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G7ReadingBooks_081913_Final.pdfs> * Math Expressions and Equations (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/835F949D-A3D9-419E-A54C-A004209AAC80/0/NYCDOEG8MathExpressionsandEquations_Final.pdf> * Representing and Interpreting Proportional Relationships (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/638B9380-FE20-422C-9556-8A6D56BD5C80/0/NYCDOEG8RepresentingandInterpreting_FINAL.pdf> * Talk and Text Plans (mp # 1,2,3,4,5,6) <http://schools.nyc.gov/NR/rdonlyres/37BEA54D-7761-4BC3-B036-01889BED352D/0/NYCDOE_G8_Math_TxtandTalk_Final.pdf> * Slippery Shoes (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/1F533263-05A2-4723-9423-95ABC6C1CB9A/130937/NYCDOE_G8_Math_SlipperySlopes_Final.pdf> * Free Style (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/5A4617E5-DDF2-4D0F-94B7-BD397E5F3725/139658/NYCDOE_G8_Math_200Freestyle_FINAL1.pdf> * The Picture Frame Problem (mp # 1,2,3,4,5) <http://schools.nyc.gov/NR/rdonlyres/A1472F33-F711-4154-8B08-90BCEFF737A1/140499/NYCDOE_G8_Math_PictureFrame_FINAL.pdf>   Algebra   * Picture Frame <http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20Sample%20Problems_HS-FunctionsV2.pdf> * Popcorn Inventory [http://www.parcconline.org/sites/parcc/files/HighSchoolAlg2Math3-](http://www.parcconline.org/sites/parcc/files/HighSchoolAlg2Math3-GraphsofFunctions.pdf) * Brett’s Race <http://www.parcconline.org/sites/parcc/files/HighSchoolAlg2Math3-GraphsofFunctions.pdf> * Mini Golf Prices <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf> * Golf Balls <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3834.html>   Geometry   * Which statement has the same truth value …. (NY Regents 6/2014 ex. 23) * Nested Boxes (Algebra and Geometry; mp # 1,2,6) <http://schools.nyc.gov/NR/rdonlyres/CA72BE7E-252D-4C25-9F67-42EB5B8B759E/165667/G10_Math_NestedBoxes_NL_052915.pdf> or go to this link and select [math] [grade 10] and locate this geometry task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Algebra-II   * Temperature Change <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf> * Cellular Growth <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3836.html> * Isabella’s Credit Card <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3829_align.html> |
| **#3 Construct viable arguments and critique the reasoning of others.** | | |
| **Summary of Standards for Mathematical Practice**  **with some**  **STUDENT LEARNING STRATEGIES** | | **Questions to Develop Mathematical Thinking**  **plus**  **Links to Resources for Student Tasks** |
| **3. Construct viable arguments and critique the reasoning of others.**   1. Analyze problems and use stated mathematical assumptions, definitions, and established results in constructing arguments. 2. Justify conclusions with mathematical ideas. 3. Listen to the arguments of others and ask useful questions to determine if an argument makes sense.      1. Ask clarifying questions or suggest ideas to improve/revise the argument. 2. Compare two arguments and determine correct or flawed logic. | | **3. Construct viable arguments and critique the reasoning of others.**   * What mathematical evidence would support your solution? How can we be sure that...? / How could you prove that...? * Will it still work if...? * What were you considering when...? * How did you decide to try that strategy? * How did you test whether your approach worked? * How did you decide what the problem was asking you to find? (What was unknown?) * Did you try a method that did not work? Why didn’t it work? * Would it ever work? Why or why not? * What is the same and what is different about...? * How could you demonstrate a counter-example?   **Student Task (an independent assignment)**  A) **Select** one example from those listed below. You may select one from your grade or course, or from one to two years prior.  B) **Solve** the example; show all work; draw and label any diagrams used.  C) **Write down** one of the *independent learning strategies* that you used to *reason abstractly and/or quantitatively* in this example.    D) **Explain** how you used this strategy to solve this particular example.  **Math Practices #3**  **C**onstruct viable arguments and critique the reasoning of others.  Grade K   * Books on Shelves (mp # 1,2,3,6) <http://schools.nyc.gov/NR/rdonlyres/B50F3E83-1202-4999-B14A-309F5429A82A/0/NYCDOEKMathBooksonShelves_Final.pdf>   Grade 1   * Nina’s Numbers (mp # 1,2,3,4,7) <http://schools.nyc.gov/NR/rdonlyres/B8F6F552-ED31-498A-A1B6-4AA86018FE5D/0/NYCDOEG1MathNinasNumbers_Final.pdf> * Fun in the Snow with Max and Ruby (mp # 1,2,3,4,6,7) <http://schools.nyc.gov/NR/rdonlyres/4062DDD9-0137-4305-9313-4A4C3F415800/0/NYCDOE_G1_Math_MAXANDRUBY_Final.pdf>   Grade 2   * Carol’s Numbers (mp # 1,3,6) <http://schools.nyc.gov/NR/rdonlyres/CAC1375E-6DF9-475D-97EE-E94BAB0BEFAB/0/NYCDOEG2MathCarolsNumbers_Final.pdf>   Grade 3   * Mariana’s Fractions <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3749.html> * Fractions on the Number Line <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3749.html> * Cookie Dough performance Task (mp #1-4) <http://schools.nyc.gov/NR/rdonlyres/0ACC1E30-0BB7-42AC-93D7-7CE7B83E0136/0/NYCDOEG3MathCookieDough_Final.pdf> * City Farmers (mp # 1, 3, 4) <http://schools.nyc.gov/NR/rdonlyres/CD824F33-84DA-4D5F-8D4A-B450EA8C8000/0/NYCDOE_G3_Math_CityFarmers_Final.pdf> or use the following link; select [grade 3], [math] and this task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * Peter’s Garden (mp # 1,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/CD8EAFC6-862F-433D-B293-8DA61757028E/141424/NYCDOE_G3_Math_PetersGarden_FINAL.pdf>   Grade 4   * Fraction Comparison <http://www.parcconline.org/sites/parcc/files/Grade4-FractionComparison.pdf> * Fraction Model <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G4FractionModel_081913_Final.pdf> * Number of Stadium Seats <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3776.html> * Farmer Fred (mp# 1, 3, 6, 7) <http://schools.nyc.gov/NR/rdonlyres/04CC9ECB-C5AB-47DA-891B-6D8F6B6EFE88/0/NYCDOEG4MathFarmerFred_Final.pdf> * Chocolate Bar Fractions (mp # 1, 3, 4, 6, 7) <http://schools.nyc.gov/NR/rdonlyres/0C0422CA-DBAF-4476-928F-71102DB2F703/140801/NYCDOE_G4_ChocolateBarFractions_FINAL.pdf>   Grade 5   * Alice draws and triangle and measures … (NY Regents 6/2010 bk.2 ex.30) * Stuffed with Pizza (mp # 1, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/D0A70F2D-1133-418C-B68F-95E6D714F357/0/NYCDOEG5MathStuffedwithPizza_Final.pdf> * Time for Recess (mp # 1,3,6) <http://schools.nyc.gov/NR/rdonlyres/B8B8BDAD-2EF2-4BF8-AE93-114C48B563E2/130938/NYCDOEG5Math_TimeforRecess_Final.pdf>   Grade 6   * Proportions of Instruments <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G6Kelvin_081513_Final.pdf> * Rational Numbers (mp # 1, 2, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/CE3C9B3D-609C-4F98-84A5-DEB04A9138F1/141876/NYCDOE_G7_Math_RationalNumbers_FINAL.pdf> or go to this site and select math, grade-level and topic: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * Company Logo (mp # 1, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/49162FEC-37E2-4A96-93C1-6671664FACD5/0/NYCDOEHSMathCompanyLogo_Final.pdf> or go to this site and select [math], [grade 11], and this topic: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Grade 7   * Proportional Relationships <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G7ReadingBooks_081913_Final.pdf> * TV Sales <http://ccsstoolbox.agilemind.com/parcc/about_middle_3815.html> * Proportional Reasoning (mp # 1, 2, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/41C0F04C-0BD6-491F-9BF0-16485EC080BE/0/NYCDOEG7MathProportionalReasoning_Final.pdf>   Grade 8   * Does the equation below define …. (EngageNY 2014 test page-59) * Math Expressions and Equations (mp # 1, 2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/835F949D-A3D9-419E-A54C-A004209AAC80/0/NYCDOEG8MathExpressionsandEquations_Final.pdf> * Representing and Interpreting Proportional Relationships (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/638B9380-FE20-422C-9556-8A6D56BD5C80/0/NYCDOEG8RepresentingandInterpreting_FINAL.pdf> * Talk and Text Plans (mp # 1, 2, 3, 4, 5, 6) <http://schools.nyc.gov/NR/rdonlyres/37BEA54D-7761-4BC3-B036-01889BED352D/0/NYCDOE_G8_Math_TxtandTalk_Final.pdf> * Slippery Shoes (mp # 1,2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/1F533263-05A2-4723-9423-95ABC6C1CB9A/130937/NYCDOE_G8_Math_SlipperySlopes_Final.pdf> * Free Style (mp # 1,2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/5A4617E5-DDF2-4D0F-94B7-BD397E5F3725/139658/NYCDOE_G8_Math_200Freestyle_FINAL1.pdf> * The Picture Frame Problem (mp # 1, 2, 3, 4, 5) <http://schools.nyc.gov/NR/rdonlyres/A1472F33-F711-4154-8B08-90BCEFF737A1/140499/NYCDOE_G8_Math_PictureFrame_FINAL.pdf>   Algebra   * Michelle’s Conjectures <http://www.parcconline.org/sites/parcc/files/HighSchoolAlg2Math3-GraphsofFunctions.pdf> * Brett’s Race <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf>   Geometry   * (MP # 2,3,4,5,6,7) 8.SP.4 “The Table Illustrates …. “ (page 37 of 45 from “NYS Testing Program; Common Core Sample Questions”\_Grade 8 draft copy)   Algebra-II   * Temperature Change <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf> * Transforming Graphs of Quadratic Functions <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3831.html> |

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| **# 4 Model with mathematics** | |
| **Summary of Standards for Mathematical Practice**  **with some**  **STUDENT LEARNING STRATEGIES** | **Questions to Develop Mathematical Thinking**  **plus**  **Links to Resources for Student Tasks** |
| **4. Model with mathematics**   1. Apply the mathematics [you] know to solve everyday problems. 2. Are able to simplify a complex problem and identify important quantities to look at relationships. 3. Represent mathematics to describe a situation either with an equation or a diagram and interpret the results of a mathematical situation. 4. Reflect on whether the results make sense, possibly improving/revising the model. 5. Ask [yourself], “How can I represent this mathematically?” | **4. Model with mathematics**   * What number model could you construct to represent the problem? * What are some ways to represent the quantities? * What is an equation or expression that matches the diagram number line .., chart ..., table ….? * Where did you see one of the quantities in the task in your equation or expression? * How would it help to create a diagram, graph table …? * What are some ways to visually represent …? * What formula might apply in this situation?   **Student Task (an independent assignment)**  A) **Select** one example from those listed below. You may select one from your grade or course, or from one to two years prior.  B) **Solve** the example; show all work; draw and label any diagrams used.  C) **Write down** one of the *independent learning strategies* that you used to *reason abstractly and/or quantitatively* in this example.    D) **Explain** how you used this strategy to solve this particular example.  **Math Practices #4**  Model with mathematics  Grade 1   * Nina’s Numbers (mp # 1,2,3,4,7) <http://schools.nyc.gov/NR/rdonlyres/B8F6F552-ED31-498A-A1B6-4AA86018FE5D/0/NYCDOEG1MathNinasNumbers_Final.pdf> * Fun in the Snow with Max and Ruby (mp # 1,2,3,4,6,7) <http://schools.nyc.gov/NR/rdonlyres/4062DDD9-0137-4305-9313-4A4C3F415800/0/NYCDOE_G1_Math_MAXANDRUBY_Final.pdf>   Grade 3   * Patricia’s Reading Times <http://www.parcconline.org/sites/parcc/files/Grade3-Patricia%27sReadingTime.pdf> * Vans for a Field Trip <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G3Vansforfieldtrip_081513_Final.pdf> * Art Teacher’s Rectangular Array <http://www.parcconline.org/sites/parcc/files/ArtTeacherRectangularArray_0.pdf> * School Mural <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3777.html> * Cookie Dough performance Task (mp # 1-4) <http://schools.nyc.gov/NR/rdonlyres/0ACC1E30-0BB7-42AC-93D7-7CE7B83E0136/0/NYCDOEG3MathCookieDough_Final.pdf> * City Farms (mp # 1, 3, 4) <http://schools.nyc.gov/NR/rdonlyres/CD824F33-84DA-4D5F-8D4A-B450EA8C8000/0/NYCDOE_G3_Math_CityFarmers_Final.pdf> or use the following link; select [grade 3], [math] and this task <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * Peter’s Garden (mp # 1, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/CD8EAFC6-862F-433D-B293-8DA61757028E/141424/NYCDOE_G3_Math_PetersGarden_FINAL.pdf> * Isabella’s Garden (mp # 1, 4) <http://schools.nyc.gov/NR/rdonlyres/067DB512-9685-43CD-9ACE-246CBD0B2A89/0/NYCDOE_G3_Math_IsabellasGarden_FINAL.pdf>   Grade 4   * Three Friends’ Beads <http://www.parcconline.org/sites/parcc/files/Grade4-ThreeFriends%27Beads.pdf> * Deer in the Park <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3770.html> * Chocolate Bar Fractions (mp # 1, 3, 4, 6, 7) <http://schools.nyc.gov/NR/rdonlyres/0C0422CA-DBAF-4476-928F-71102DB2F703/140801/NYCDOE_G4_ChocolateBarFractions_FINAL.pdf>   Grade 5   * The Aquarium Tanks <http://www.parcconline.org/sites/parcc/files/Grade5-TwoAquariumTanks.pdf> * The Area of a Cut Board <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G5AreaofBoard_081913_Final.pdf>   Grade 6   * Kevin’s Hundred Meter Dash <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G6Kelvin_081513_Final.pdf> * Fraction Model <http://www.parcconline.org/sites/parcc/files/FractionModelFINAL.pdf> * Gasoline Consumption <http://ccsstoolbox.agilemind.com/parcc/about_middle_3788.html>   Grade 7   * Reading Three Books <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G7ReadingBooks_081913_Final.pdf> * Leaky Faucets (mp # 1, 2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/FFF98A0A-16D1-4E10-BF2C-01A83F011B67/140497/NYCDOE_G7_Math_LeakyFaucets_FINAL.pdf>   Grade 8   * The population growth…. (EngageNY 2013 test) * Math Expressions and Equations (mp # 1, 2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/835F949D-A3D9-419E-A54C-A004209AAC80/0/NYCDOEG8MathExpressionsandEquations_Final.pdf> * Representing and Interpreting Proportional Relationships (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/638B9380-FE20-422C-9556-8A6D56BD5C80/0/NYCDOEG8RepresentingandInterpreting_FINAL.pdf> * Talk and Text Plans (mp # 1, 2, 3, 4, 5, 6) <http://schools.nyc.gov/NR/rdonlyres/37BEA54D-7761-4BC3-B036-01889BED352D/0/NYCDOE_G8_Math_TxtandTalk_Final.pdf> * Slippery Shoes (mp # 1, 2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/1F533263-05A2-4723-9423-95ABC6C1CB9A/130937/NYCDOE_G8_Math_SlipperySlopes_Final.pdf> * Free Style (mp # 1, 2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/5A4617E5-DDF2-4D0F-94B7-BD397E5F3725/139658/NYCDOE_G8_Math_200Freestyle_FINAL1.pdf> * The Picture Frame Problem (mp # 1, 2, 3, 4, 5) <http://schools.nyc.gov/NR/rdonlyres/A1472F33-F711-4154-8B08-90BCEFF737A1/140499/NYCDOE_G8_Math_PictureFrame_FINAL.pdf>   Algebra   * Popcorn Inventory <http://www.parcconline.org/sites/parcc/files/HighSchoolAlg2Math3-GraphsofFunctions.pdf> * Mini Golf Prices <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf> * Golf Balls <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3834.html>   Geometry   * The graph below shows … (NY Regents June 2014 ex. 35) * A Day at the Beach (mp # 1, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/C03D80B2-9213-43A9-AAA3-BB0032C62F4F/139657/NYCDOE_G10_ADayattheBeach_FINAL1.pdf> or go to this link and select [math] [grade 10] and locate this geometry task. * Designing Euclid’s (mp # 1, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/B6D1886B-B5A9-4F55-882C-3526FA23C043/165319/G10_Math_Euclid_NL_052914.pdf> or go to this link and select [math] [grade 10] and locate this geometry task.   Algebra-II   * Green Tea Observation Study <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_HSAlgIIMathIIIGreenTeaStudy_081913_Final_0.pdf> * Temperature Change <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf> * Cellular Growth <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3836.html> * Isabella’s Credit Card <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3829_align.html> * Rabbit Population <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3831.html> * Transforming Graphs of Quadratic Functions <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3831.html> |
| **# 5 Use appropriate tools strategically**. | |
| **Summary of Standards for Mathematical Practice**  **with some**  **STUDENT LEARNING STRATEGIES** | **Questions to Develop Mathematical Thinking**  **plus**  **Links to Resources for Student Tasks** |
| **5. Use appropriate tools strategically**.   1. Use available tools recognizing the strengths and limitations of each. 2. Use estimation and other mathematical knowledge to detect possible errors. 3. Identify relevant external mathematical resources to pose and solve problems. 4. Use technological tools to deepen [your] understanding of mathematics. | **5. Use appropriate tools strategically**.   * What mathematical tools could we use to visualize and represent the situation? * What information do you have? * What do you know that is not stated in the problem? * What approach are you considering trying first? * What estimate did you make for the solution? * In this situation would it be helpful to use...a graph..., number line..., ruler..., diagram..., calculator..., manipulative? * Why was it helpful to use...? * What can using a \_\_\_\_\_\_ show us that \_\_\_\_\_may not? * In what situations might it be more informative or helpful to use...?   **Student Task (an independent assignment)**  A) **Select** one example from those listed below. You may select one from your grade or course, or from one to two years prior.  B) **Solve** the example; show all work; draw and label any diagrams used.  C) **Write down** one of the *independent learning strategies* that you used to *reason abstractly and/or quantitatively* in this example.    D) **Explain** how you used this strategy to solve this particular example.  **Math Practices # 5**  Use appropriate tools strategically.  Grade 3   * Which giraffe sticker …. (NY Regents 2010 gr.3 book 1 ex. 1) * Chris’ Garden Dilemma (mp # 1-8) <http://schools.nyc.gov/NR/rdonlyres/6256D8F2-5272-4BDB-863D-7827582B9984/143626/NYCDOE_G3_Math_ChrisGardenDilemma_FINAL1.pdf> or use the following link; select grade, math and this task <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Grade 4   * What is the length, in inches ….(NY Regents 2010 gr.4 book 1 ex.1)   Grade 5   * Mr. Edumund’s Pencil Box <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G5AreaofBoard_081913_Final.pdf>   Grade 6   * Waverly Waves (mp # 1-8) <http://schools.nyc.gov/NR/rdonlyres/1C08B352-23EF-4F37-98E2-5945D8FB034F/141425/NYCDOE_G6_Math_WaverlyWaves_FINAL.pdf> or go to the link below and select [math], [grade 6] and this task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Grade 7   * Proportional Relationships <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G7ReadingBooks_081913_Final.pdf>   Grade 8   * Length of Line Segment AB Proportional Relationships <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G7ReadingBooks_081913_Final.pdf> * Talk and Text Plans (mp # 1, 2, 3, 4, 5, 6) <http://schools.nyc.gov/NR/rdonlyres/37BEA54D-7761-4BC3-B036-01889BED352D/0/NYCDOE_G8_Math_TxtandTalk_Final.pdf> * The Picture Frame Problem (mp # 1, 2, 3, 4, 5) <http://schools.nyc.gov/NR/rdonlyres/A1472F33-F711-4154-8B08-90BCEFF737A1/140499/NYCDOE_G8_Math_PictureFrame_FINAL.pdf>   Algebra   * Michelle’s Conjectures <http://www.parcconline.org/sites/parcc/files/HighSchoolAlg2Math3-GraphsofFunctions.pdf>   Geometry   * Which diagram shows the construction (NY Regents Jan.2014 ex.1)   Algebra-II   * Temperature Change <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf> |
| **# 6 Attend to Precision** | |
| **Summary of Standards for Mathematical Practice**  **with some**  **STUDENT LEARNING STRATEGIES** | **Questions to Develop Mathematical Thinking**  **plus**  **Links to Resources for Student Tasks** |
| **6. Attend to precision.**   1. Communicate precisely with others and try to use clear mathematical language when discussing [your] reasoning. 2. Understand the meanings of symbols used in mathematics and label quantities appropriately. 3. Express numerical answers with a degree of precision appropriate for the problem context. 4. Calculate efficiently and accurately. | **6. Attend to precision.**   * What mathematical terms apply in this situation? * How did you know your solution was reasonable? Explain how you might show that your solution answers the problem. * What would be a more efficient strategy? * How are you showing the meaning of the quantities? * What symbols or mathematical notations are important in this problem? * What mathematical language...,definitions..., properties can you use to explain...? * How could you test your solution to see if it answers the problem?   **Student Task (an independent assignment)**  A) **Select** one example from those listed below. You may select one from your grade or course, or from one to two years prior.  B) **Solve** the example; show all work; draw and label any diagrams used.  C) **Write down** one of the *independent learning strategies* that you used to *reason abstractly and/or quantitatively* in this example.    D) **Explain** how you used this strategy to solve this particular example.  **Math Practices # 6**  Attend to precision.  Grade K   * Books on Shelves (mp # 1, 2, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/B50F3E83-1202-4999-B14A-309F5429A82A/0/NYCDOEKMathBooksonShelves_Final.pdf>   Grade 1   * Fun in the Snow with Max and Ruby (mp # 1, 2, 3, 4, 6, 7) <http://schools.nyc.gov/NR/rdonlyres/4062DDD9-0137-4305-9313-4A4C3F415800/0/NYCDOE_G1_Math_MAXANDRUBY_Final.pdf>   Grade 2   * Carol’s Numbers (mp # 1, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/CAC1375E-6DF9-475D-97EE-E94BAB0BEFAB/0/NYCDOEG2MathCarolsNumbers_Final.pdf>   Grade 3   * Fractions on the Number Line <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3749.html> * Peter’s Garden (mp # 1,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/CD8EAFC6-862F-433D-B293-8DA61757028E/141424/NYCDOE_G3_Math_PetersGarden_FINAL.pdf>   Grade 4   * Fraction Comparison <http://www.parcconline.org/sites/parcc/files/Grade4-FractionComparison.pdf> * Fraction Model <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G4FractionModel_081913_Final.pdf> * Number of Stadium Seats <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3776.html> * Farmer Fred (mp# 1, 3, 6, 7) <http://schools.nyc.gov/NR/rdonlyres/04CC9ECB-C5AB-47DA-891B-6D8F6B6EFE88/0/NYCDOEG4MathFarmerFred_Final.pdf> * Chocolate Bar Fractions (mp # 1, 3, 4, 6, 7) <http://schools.nyc.gov/NR/rdonlyres/0C0422CA-DBAF-4476-928F-71102DB2F703/140801/NYCDOE_G4_ChocolateBarFractions_FINAL.pdf>   Grade 5   * A Race car driver completed … (engageNY test 2014 page 28) * Stuffed with Pizza (mp # 1, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/D0A70F2D-1133-418C-B68F-95E6D714F357/0/NYCDOEG5MathStuffedwithPizza_Final.pdf> * Time for Recess (mp # 1, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/B8B8BDAD-2EF2-4BF8-AE93-114C48B563E2/130938/NYCDOEG5Math_TimeforRecess_Final.pdf>   Grade 6   * Inches and Centimeters <http://ccsstoolbox.agilemind.com/parcc/about_middle_3789.html> * Rational Numbers (mp # 1, 2, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/CE3C9B3D-609C-4F98-84A5-DEB04A9138F1/141876/NYCDOE_G7_Math_RationalNumbers_FINAL.pdf> or go to this site and select [math], [grade] and locate this task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * Company Logo (mp # 1, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/49162FEC-37E2-4A96-93C1-6671664FACD5/0/NYCDOEHSMathCompanyLogo_Final.pdf> or go to this site and select math, grade 11, and this topic: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Grade 7   * Proportional Relationships <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G7ReadingBooks_081913_Final.pdf> * Proportional Reasoning (mp # 1, 2, 3, 6) <http://schools.nyc.gov/NR/rdonlyres/41C0F04C-0BD6-491F-9BF0-16485EC080BE/0/NYCDOEG7MathProportionalReasoning_Final.pdf> * How I Roll (mp # 1, 2, 4, 6, 8) a probability unit <http://schools.nyc.gov/NR/rdonlyres/90D520E5-02FC-42FA-81C8-6CAFED3C9A8D/144265/NYCDOE_Math_G7_HowIRoll_FINAL.pdf> or use this link and select [math][grade 7] and locate this task <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * Leaky Faucets (mp # 1, 2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/FFF98A0A-16D1-4E10-BF2C-01A83F011B67/140497/NYCDOE_G7_Math_LeakyFaucets_FINAL.pdf>   Grade 8   * A box contains 9 identical glass …. (EngageNY test 2014 page 72) * Nested Boxes (Algebra and Geometry; mp # 1, 2, 6) <http://schools.nyc.gov/NR/rdonlyres/CA72BE7E-252D-4C25-9F67-42EB5B8B759E/165667/G10_Math_NestedBoxes_NL_052915.pdf> or go to this link and select [math] [grade 10] and locate this geometry task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * Math Expressions and Equations (mp # 1, 2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/835F949D-A3D9-419E-A54C-A004209AAC80/0/NYCDOEG8MathExpressionsandEquations_Final.pdf> * Representing and Interpreting Proportional Relationships (mp # 1,2,3,4,6) <http://schools.nyc.gov/NR/rdonlyres/638B9380-FE20-422C-9556-8A6D56BD5C80/0/NYCDOEG8RepresentingandInterpreting_FINAL.pdf> * Talk and Text Plans (mp # 1, 2, 3, 4, 5, 6) <http://schools.nyc.gov/NR/rdonlyres/37BEA54D-7761-4BC3-B036-01889BED352D/0/NYCDOE_G8_Math_TxtandTalk_Final.pdf> * Slippery Shoes (mp # 1, 2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/1F533263-05A2-4723-9423-95ABC6C1CB9A/130937/NYCDOE_G8_Math_SlipperySlopes_Final.pdf> * Free Style (mp # 1, 2, 3, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/5A4617E5-DDF2-4D0F-94B7-BD397E5F3725/139658/NYCDOE_G8_Math_200Freestyle_FINAL1.pdf>   Algebra   * Michelle’s Conjectures <http://www.parcconline.org/sites/parcc/files/HighSchoolAlg2Math3-GraphsofFunctions.pdf>   Geometry   * As shown in the diagram below (NY Regents Jan 2014 ex. 18) * A Day at the Beach (mp # 1, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/C03D80B2-9213-43A9-AAA3-BB0032C62F4F/139657/NYCDOE_G10_ADayattheBeach_FINAL1.pdf> or go to this link and select [math] [grade 10] and locate this geometry task. * Designing Euclid’s (mp # 1, 4, 6) <http://schools.nyc.gov/NR/rdonlyres/B6D1886B-B5A9-4F55-882C-3526FA23C043/165319/G10_Math_Euclid_NL_052914.pdf> or go to this link and select [math] [grade 10] and locate this geometry task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm> * The Inheritance (mp # 1, 6) <http://schools.nyc.gov/NR/rdonlyres/EDEBDBC0-DE30-4298-AB89-7CEBF566C82E/165320/G10_Math_Inheritance_NL_52814.pdf> or go to this link and select [math] [grade 10] and locate this geometry task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Algebra-II   * High School Functions <http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20Sample%20Problems_HS-FunctionsV2.pdf> * Isabella’s Credit Card <http://ccsstoolbox.agilemind.com/parcc/about_highschool_3829_align.html> |
| **# 7 Look for and make use of structure.** | |
| **Summary of Standards for Mathematical Practice**  **with some**  **STUDENT LEARNING STRATEGIES** | **Questions to Develop Mathematical Thinking**  **plus**  **Links to Resources for Student Tasks** |
| **7. Look for and make use of structure.**   1. Apply general mathematical rules to specific situations. 2. Look for the overall structure and patterns in mathematics. 3. See complicated things as single objects or as being composed of several objects. | **7. Look for and make use of structure.**   * What observations do you make about...? * What do you notice when...? * What parts of the problem might you eliminate..., simplify...? * What patterns do you find in...? * How do you know if something is a pattern? * What ideas that we have learned before were useful in solving this problem? * What are some other problems that are similar to this one? How does this relate to...? * In what ways does this problem connect to other mathematical concepts?   **Student Task (an independent assignment)**  A) **Select** one example from those listed below. You may select one from your grade or course, or from one to two years prior.  B) **Solve** the example; show all work; draw and label any diagrams used.  C) **Write down** one of the *independent learning strategies* that you used to *reason abstractly and/or quantitatively* in this example.    D) **Explain** how you used this strategy to solve this particular example.  **Math Practices # 7**  Look for and make use of structure.  Grade 1   * Nina’s Numbers (mp # 1, 2, 3, 4, 7) <http://schools.nyc.gov/NR/rdonlyres/B8F6F552-ED31-498A-A1B6-4AA86018FE5D/0/NYCDOEG1MathNinasNumbers_Final.pdf> * Fun in the Snow with Max and Ruby (mp # 1, 2, 3, 4, 6, 7) <http://schools.nyc.gov/NR/rdonlyres/4062DDD9-0137-4305-9313-4A4C3F415800/0/NYCDOE_G1_Math_MAXANDRUBY_Final.pdf>   Grade 3   * The Field <http://www.parcconline.org/samples/mathematics/grade-3-mathematics-field> * Fractions on a Number Line <http://www.parcconline.org/samples/mathematics/grade-3-mathematics-number-line> * Fluency <http://www.parcconline.org/samples/mathematics/grade-3-mathematics-fluency> * School Mural <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3777.html> * Mariana’s Fractions <http://ccsstoolbox.agilemind.com/parcc/about_elementary_3749.html> * Fractions on the Number Line http://ccsstoolbox.agilemind.com/parcc/about\_elementary\_3749.html   Grade 4   * Which expression represents (Engage NY 2014 test) * Farmer Fred (mp# 1, 3, 6, 7) <http://schools.nyc.gov/NR/rdonlyres/04CC9ECB-C5AB-47DA-891B-6D8F6B6EFE88/0/NYCDOEG4MathFarmerFred_Final.pdf> * Chocolate Bar Fractions (mp # 1, 3, 4, 6, 7) <http://schools.nyc.gov/NR/rdonlyres/0C0422CA-DBAF-4476-928F-71102DB2F703/140801/NYCDOE_G4_ChocolateBarFractions_FINAL.pdf>   Grade 5   * The Aquarium Tanks <http://www.parcconline.org/sites/parcc/files/Grade5-TwoAquariumTanks.pdf>   Grade 6   * Proportions of Instruments <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G6Kelvin_081513_Final.pdf>   Grade 7   * Proportional Relationships Proportional Relationships <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G7ReadingBooks_081913_Final.pdf>   Grade 8   * The four tables below show ( EngageNY 2014 test)   Algebra   * Seeing Structure in an Equation <http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20Sample%20Problems_HS-FunctionsV2.pdf> * Picture Frame <http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20Sample%20Problems_HS-FunctionsV2.pdf> * Michelle’s Conjectures <http://www.parcconline.org/sites/parcc/files/HighSchoolAlg2Math3-GraphsofFunctions.pdf> * Brett’s Race <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf>   Geometry   * State whether the lines represented (NY Regents Jan.2014 ex. 33)   Algebra-II   * Seeing Structure in Quadratic Equations <http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20Sample%20Problems_HS-FunctionsV2.pdf> * Graphs of Functions <http://www.parcconline.org/sites/parcc/files/HighSchoolAlg2Math3-GraphsofFunctions.pdf> * Temperature Change <http://www.parcconline.org/sites/parcc/files/BRHSSampleItem.pdf> |
| **# 8 Look for and express regularity in repeated reasoning.** | |
| **Summary of Standards for Mathematical Practice**  **with some**  **STUDENT LEARNING STRATEGIES** | **Questions to Develop Mathematical Thinking**  **plus**  **Links to Resources for Student Tasks** |
| **8. Look for and express regularity in repeated reasoning.**   1. See repeated calculations and look for generalizations and shortcuts. 2. See the overall process of the problem and still attend to the details. 3. Understand the broader application of patterns and see the structure in similar situations. 4. Continually evaluate the reasonableness of their intermediate results. | **8. Look for and express regularity in repeated reasoning.**   * Explain how this strategy works in other situations. * Is this always true, sometimes true or never true? * How would you prove that … ? * What do you notice about … ? * What is happening in this situation? * What would happen if … ? * Is there a mathematical rule for … ? * What predictions or generalizations can this pattern support? * What mathematical consistencies do you notice?   **Student Task (an independent assignment)**  A) **Select** one example from those listed below. You may select one from your grade or course, or from one to two years prior.  B) **Solve** the example; show all work; draw and label any diagrams used.  C) **Write down** one of the *independent learning strategies* that you used to *reason abstractly and/or quantitatively* in this example.    D) **Explain** how you used this strategy to solve this particular example.  **Math Practices # 8**  Look for and express regularity in repeated reasoning  Grade 3   * Chris’ Garden Dilemma (mp. # 1-8) <http://schools.nyc.gov/NR/rdonlyres/6256D8F2-5272-4BDB-863D-7827582B9984/143626/NYCDOE_G3_Math_ChrisGardenDilemma_FINAL1.pdf> or use the following link; select [grade 3], [math] and this task: <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Grade 4   * Melissa has a rope (NY Regents gr.4, May 5-10, 2010 ex. 34) * Sharline made the pictograph (NY Regents June 2010, bk.2 ex. 38)   Grade 5   * Robert used pairs of blocks (NY Regents gr.5, ex. 29)   Grade 6   * Slider Ruler <http://www.parcconline.org/sites/parcc/files/PARCCMathSampleProblems_GR6_SliderV2.pdf>   Grade 7   * How I Roll (mp # 1, 2, 4, 6 and 8) a probability unit <http://schools.nyc.gov/NR/rdonlyres/90D520E5-02FC-42FA-81C8-6CAFED3C9A8D/144265/NYCDOE_Math_G7_HowIRoll_FINAL.pdf> or use this link and select [math][grade 7] and locate this task <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>   Grade 8   * “Answer the following questions based on the expression  ….” (from Barron’s Gr. 8 CCSS/PARCC Math Review book, 2015 edition) Test I example 14).   Algebra   * Myla’s Swimming Pool <http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_HSAlgIMylaPool_081913_Final.pdf>   Geometry   * Given the statement, “If a ….(NY Regents Geometry June 2015 ex. 17)   Algebra-II   * The table below shows the amount (NY Alg.II Regents June 2015 ex. 36) |