

Content and Language Objectives using the Common Core SMP

Content Objectives

- Students will be able to (SWBAT) analyze givens, constraints, relationships, and goals. (MP1)
- SWBAT consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. (MP1)
- SWBAT monitor and evaluate their progress and change course if necessary. For example older students may transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need, depending on the context of the problem. (MP1)
- SWBAT check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” (MP1)
- SWBAT make sense of quantities and their relationships in problem situations. (MP2)
- SWBAT decontextualize a problem by abstracting a given situation, representing it symbolically, and manipulating the representing symbols as if they have a life of their own without necessarily attending to their referents. (MP2)
- SWBAT contextualize a problem by pausing as needed during the manipulation process in order to probe into the referents for the symbols involved. (MP2)
- SWBAT create a coherent representation of the problem at hand (MP2)
- SWBAT consider the units involved (MP2)
- SWBAT attend to the meaning of quantities, not just how to compute them (MP2)
- SWBAT know and flexibly use different properties of operations and objects. (MP2)
- SWBAT analyze situations by breaking them into cases, and can recognize and use counterexamples. (MP3)
- SWBAT apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. For example:
 - In early grades, this might be as simple as writing an addition equation to describe a situation. (MP4)
 - In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. (MP4)
 - By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. (MP4)
- SWBAT make assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. (MP4)
- SWBAT identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. (MP4)
- SWBAT routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. (MP4)
- SWBAT consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. (MP5)
- SWBAT be sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example high school students may analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. (MP5)
- SWBAT to use technology to enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data when making mathematical models. (MP5)
- SWBAT identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. (MP5)
- SWBAT use technological tools to explore and deepen their understanding of concepts. (MP5)
- SWBAT state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. (MP6)
- SWBAT carefully specify units of measure, labeling axes to clarify the correspondence with quantities in a problem. (MP6)
- SWBAT calculate accurately, efficiently, and express numerical answers with a degree of precision appropriate for the problem context. (MP6)

- SWBAT look closely to discern a pattern or structure. For example:
 - Elementary SWBAT notice that three and seven more is the same amount as seven and three more (MP7)
 - Elementary SWBAT sort a collection of shapes according to how many sides the shapes have. (MP7)
 - Middle school SWBAT see 7×8 equals $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. (MP7)
 - High school SWBAT see in the expression $x^2 + 9x + 14$ that the 14 is also 2×7 and the 9 is also $2 + 7$.
 - High school SWBAT recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. (MP7)
- SWBAT step back for an overview and shift perspective. (MP7)
- SWBAT see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y . (MP7)
- SWBAT notice if calculations are repeated, and look both for general methods and for shortcuts. For example:
 - Upper elementary SWBAT might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. (MP8)
 - Middle school SWBAT abstract the equation $(y - 2)/(x - 1) = 3$ by paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3(MP8)
 - High school SWBAT notice the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ leading them to the general formula for the sum of a geometric series. (MP8)
- SWBAT maintain oversight of the process while attending to the details as they work to solve a problem. (MP8)
- SWBAT continually evaluate the reasonableness of their intermediate results. (MP8)

Language Objectives

- SWBAT explain to themselves the meaning of a problem and looking for entry points to its solution. (MP1)
- SWBAT make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. (MP1)
- SWBAT explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. For example, younger students may use concrete objects or pictures to help conceptualize and solve a problem, as necessary. (MP1)
- SWBAT understand the approaches of others to solving complex problems and identify correspondences between different approaches. (MP1)
- SWBAT understand and use stated assumptions, definitions, and previously established results in constructing arguments. (MP3)
- SWBAT make conjectures and build a logical progression of statements to explore the truth of their conjectures. (MP3)
- SWBAT justify their conclusions, communicate them to others, and respond to the arguments of others. (MP3)
- SWBAT reason inductively about data, making plausible arguments that take into account the context from which the data arose. (MP3)
- SWBAT compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. For example:
 - Elementary SWBAT construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. (MP3)
 - Older SWBAT learn to determine domains to which an argument applies. (MP3)
- SWBAT listen to or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments. (MP3)
- SWBAT analyze relationships (such tools as diagrams, two-way tables, graphs, flowcharts and formulas) between important quantities to draw conclusions. (MP4)
- SWBAT communicate precisely to others. (MP6)
- SWBAT use clear definitions in discussion with others and in their own reasoning. (MP6)
- Elementary SWBAT give carefully formulated explanations to each other. (MP6)
- High school SWBAT examine claims and make explicit use of definitions. (MP6)