Grade 5 Sample Tasks	Grade 5 Sample Tasks
Task A: Make sure you have plenty of snap cubes. * Build a rectangular prism that is 2 cubes high, 3 cubes wide, and 5 cubes long. * We will say that the volume of one cube is 1 cubic unit. What is the volume of the rectangular prism? * The volume of the cube is 2×3×5 cubic units. The expression 2×(3×5) can be interpreted as 2 groups with 3×5 cubes in each group. 3×5 can be interpreted as 3 groups with 5 cubes in each group. How can you see the rectangular prism as being made of 2 groups with (3 groups of 5 cubes in each)? *Explain how you can see each of these products by looking at the rectangular prism in different ways: 2×(5×3) 3×(2×5) 3×(5×2) 5×(2×3) 5×(3×2)	**Task B:** Evaluate the following numerical expressions. a. 2×5+3×2+4 b. 2×(5+3×2+4) c. 2×5+3×(2+4) d. 2×(5+3)×2+4 e. (2×5)+(3×2)+4 f. 2×(5+3)×(2+4) Can the parentheses in any of these expressions be removed without changing the value of the expression?

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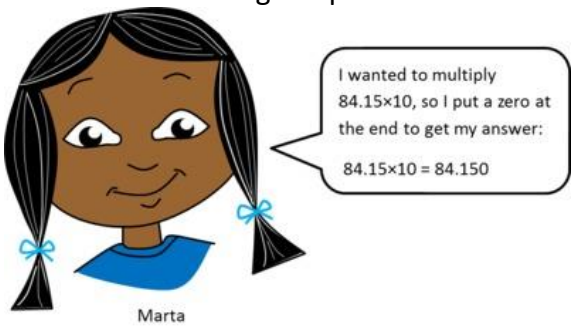
Task C:

Marta made an error while finding the product 84.15×10.



In your own words, explain Marta's misunderstanding. Please explain what she should do to get the correct answer and include the correct answer in your response.

Task D:

a. Jessa has 23 one-dollar bills that she wants to divide equally between her 5 children.
   i. How much money will each receive? How much money will Jessa have left over?
   ii. Jessa exchanged the remaining one-dollar bills for dimes. If she divides the money equally between her 5 children, how much money will each child get?

b. A website has games available to purchase for $5 each. If Lita has $23, how many games can she purchase? Explain.

c. A jug holds 5 gallons of water. How many jugs can Mark fill with 23 gallons of water? Explain.

d. A class of 23 children will take a field trip. Each car can take 5 children. How many cars are needed to take all the children on the field trip? Explain.

e. Write a division problem for 31 ÷ 4 where the answer is a mixed number. Show how to solve your problem.

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Task E:

Nick and Tasha are buying supplies for a camping trip. They need to buy chocolate bars to make s'mores, their favorite campfire dessert. Each of them has a different recipe for their perfect s'more. Nick likes to use 1/2 of a chocolate bar to make a s'more. Tasha will only eat a s'more that is made with exactly 2/5 of a chocolate bar.

a. What fraction of a chocolate bar will Nick and Tasha use in total if they each eat one s'more?

b. Nick wants to cut one chocolate bar into pieces of equal size so that he and Tasha can make their s'mores. How many pieces should he cut the chocolate bar into so that each person will get the right amount of chocolate to make their perfect s'more?

c. After Nick cuts the chocolate bar into pieces of equal size, how many pieces of the chocolate bar should he get? How many pieces of the chocolate bar should he give to Tasha?

Task F:

Aunt Barb's Salad Dressing Recipe
⅓ cup olive oil
⅙ cup balsamic vinegar
a pinch of herbs
a pinch of salt

Makes 6 servings

a. How many cups of salad dressing will this recipe make? Write an equation to represent your thinking. Assume that the herbs and salt do not change the amount of dressing.

b. If this recipe makes 6 servings, how much dressing would there be in one serving? Write a number sentence to represent your thinking.

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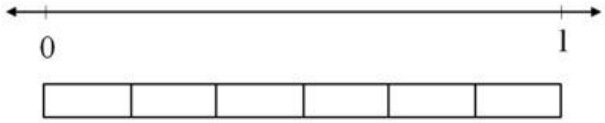
Task G:

a. Label the points on the number line that correspond to 1/6, 2/6, 3/6, 4/6, and 5/6.



b. Carefully cut out a strip of paper that has a length of 56.
   i. Bring the ends of the strip together to fold the strip of paper in half. How long is half of the strip? Use your strip to mark this point on the number line.
   ii. What two numbers can you multiply to find the length of half the strip? Write an equation to show this.

c. Unfold your paper strip so that you start with 56 again. Now fold the strip of paper in half and then in half again.
   i. How long is half of half of the strip? Use your strip to mark this point on the number line.
   ii. What numbers can you multiply to find the length of half the strip? Write an equation to show this.

Task H:

Cora and Cecilia each use chalk to make their own number patterns on the sidewalk. They make each of their patterns 10 boxes long and line their patterns up, so they are next to each other.

Cora puts 0 in her first box and decides that she will add 3 every time to get the next number.

Cecilia puts 0 in her first box and decides that she will add 9 every time to get the next number.

Cora:

0	3								

Cecilia:

0	9								

a. Complete each girl's sidewalk pattern.

b. How many times greater is Cecilia's number in the 5th box be than Cora's number in the 5th box? What about the numbers in the 8th box? The 10th box?

c. What pattern do you notice in your answers for part b? Why do you think that pattern exists?

d. If Cora and Cecilia kept their sidewalk patterns going, what number would be in Cora's box when Cecilia's corresponding box shows 153?

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A Closer Look at the Standards for Mathematical Practice - Grade 5

Participant Guide

Directions: Match each task to the SMP targeted by the author of the task. While some tasks may connect to more than one SMP, there is one task that most closely aligns with each of the SMPs. Thus, each SMP will have one task to match and each task will only be used once.

Note: The Standards for Mathematical Practice focus on the nature of the learning experiences by attending to the thinking processes and habits of mind that students need to develop in order to attain a deep and flexible understanding of mathematics. Certain tasks lend themselves to the demonstration of specific practices by students. The practices that are observable during exploration of a task depend on how instruction unfolds in the classroom. While it is possible that tasks may be connected to several practices, only one practice connection will be discussed in depth. Possible secondary practice connections may be discussed but not in the same degree of detail.

Standards of Mathematical Practice (SMP)	Standards of Mathematical Practice (SMP)
MP.1. Make sense of problems and persevere in solving them.	MP.5. Use appropriate tools strategically.
MP.2. Reason abstractly and quantitatively.	MP.6. Attend to precision.
MP.3. Construct viable arguments and critique the reasoning of others.	MP.7. Look for and make use of structure.
MP.4. Model with mathematics.	MP.8. Look for and express regularity in repeated reasoning.

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Facilitator's Guide

Throughout facilitation of this activity it will be important to remind participants:

- Use the cluster level narratives to better understand what attending to the mathematical practices might look like in the classroom.
- Emphasize to participants the statement at the end of each cluster within the *KAS for Mathematics*, "The identified mathematical practices, coherence connections, and clarifications are possible suggestions; however, they are not the only pathways."

Standards of Mathematical Practice (SMP)	Standards of Mathematical Practice (SMP)
MP.1. Make sense of problems and persevere in solving them. **Task D** This task helps illustrate MP.1. Problem solving is based upon students engaging in tasks in which a solution pathway is not known in advance. As fifth graders approach these problems, they will analyze them to make sense of what each is asking and decide on the best solution pathways. Students will notice that even though the same numbers are used in problems (a), (b), (c), and (d), the contexts are very different, and it might not be obvious when reading the problem that division is necessary in each context. As students look for similarities/differences between the problems, they observe that problems (b), (c), and (d) ask the question "how many groups?" while problem (a) asks "how many in each group?" These observations will determine their entry points into each problem. Students may also conclude that how the remainder is reported is dependent upon the context of each problem. For instance, in problem (b) a remainder is reported but in problem (d) only a whole number quotient is required. Answering to a required degree of precision also supports MP.6, Attend to precision.	MP.5. Use appropriate tools strategically. **Task G** This task engages students in MP.5. The students are directed to create a number line marking 1/6, 2/6, 3/6, 4/6, and 5/6. Then they carefully cut out a strip of paper of 5/6 length and fold it in half and then fold it in half again. The paper folding along with the connection to the number line helps students visualize that when you divide a fraction in half, it is the same as multiplying ½ by 5/6. The same thinking corresponds to folding the strip once again in half. Folding the paper in half twice is really the same as folding it into fourths or multiplying 1/4 by 5/6. As students become proficient in MP.5, they will be able to consider a tool's usefulness and consider its strengths and limitations, as well as know how to use it appropriately. The solution pathway that a student selects needs to make sense to him/her to be able to explain and justify (MP.3). Students will come to realize that certain methods/tools are more efficient, and they will abandon less useful tools in favor of more appropriate strategies/tools. Some tools might make more sense for a student to use depending on their level of understanding vs. their need for efficiency. While some tools might make more sense for beginning to understand a concept, others might make more sense once students are searching to make calculations in the most efficient way.

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A Closer Look at the Standards for Mathematical Practice - Grade 5

MP.2. Reason abstractly and quantitatively. **Task E** This task helps illustrate MP.2. In the task at hand, fifth graders make sense of fractions and how they are related in a problem situation. They decontextualize the problem and represent it with fractions and symbols. As they work through each step, they pause to make sense of the quantities and operations. For instance, students must find a common denominator which really is the number of pieces the chocolate bar is cut into so that both Nick and Tasha can make their s'mores. In part (c) the number of pieces each person receives becomes the numerator of their fractional part of the chocolate bar. Problems such as this one that begin with a context and are represented with mathematical objects or symbols are also examples of modeling with mathematics (MP.4).	MP.6. Attend to precision. **Task B** This task supports the demonstration of MP.6. Students evaluate six numerical expressions that contain the same integers and operations but differ in the placement of parentheses. It is essential that students attend to the placement of the parentheses to compute these expressions accurately. During this exercise, students experience first-how the value of an expression is dependent upon parentheses placement. As a result, they learn to appreciate, understand, and use symbols more precisely.
MP.3. Construct viable arguments and critique the reasoning of others. **Task C** This task helps to illustrate MP.3. Students are asked to critique the reasoning of Marta's claim that when you multiply 84.15 X 10, you only have to add a zero at the end to get the answer. This type of task provides students with an opportunity to distinguish a reasonable explanation from that which is flawed. If there is a flaw in the argument, they can further explain why it is flawed. To decide if Marta's claim is true or false, students will have to think critically about the "rules" they used when multiplying whole numbers by 10. By adding a zero to 84.15, the value stayed the same. If Marta had shifted the decimal one place to the right, each digit would represent ten times its original value. Students must recognize that Marta's misunderstanding comes from an understandable, but erroneous student line of thinking; if students use this rule for whole numbers, then they are likely to try to apply it to decimals as well. Students working on this task should see that while Marta's rule does work for whole numbers being multiplied by powers of 10, it will not work for decimals being multiplied by powers of 10 for the reasons stated in the solution. This process is very clearly explained using expanded notation and the distributive property in the solution set. Learning how to argue whether a claim is true or false concisely and precisely must become a routine part of a student's mathematical work as should the ability to construct an argument around a correct answer. These are both skills practiced in this task.	MP.7. Look for and make use of structure. **Task A** This task helps illustrate MP.7. During this activity, fifth graders are actively connecting the structure of the commutative and associative properties as they decompose a (2x3x5) rectangular prism built with snap cubes into the various groupings such as 2×(3×5), 3×(5×2), 5×(2×3,)or 5×(3×2). They will realize that regardless of the different decompositions of the rectangular prism the volume of the prism stays the same. This connects to the idea that they can multiply the 3 dimensions of the rectangular prism in any order and the resulting volume will be the same. With experience students should be able to visualize these decompositions in their head. Through this hands-on exploration of volume, students are immersed in pattern-recognition and pattern-generalizing which not only develops a better understanding of the commutative and associative properties but allows them to apply this understanding to solve other problems.

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MP.4. Model with mathematics.	MP.8. Look for and express regularity in repeated reasoning.
Task F This task helps illustrate MP.4. Students apply the mathematics they know to solve problems arising in everyday life. For this problem, fifth graders apply their understanding of addition as joining two separate quantities along with their understanding of division of a unit fraction by a whole number. The addition of fractions with unlike denominators can be shown symbolically or by creating a bar diagram depicting 1/3 cup of olive oil and 1/6 cup of balsamic vinegar. In order to make sense of these quantities, students will subdivide the 1/3 cup of olive oil into sixths. Then they can visually see that the two ingredients total 3/6 of a cup which is ½ of one whole cup. This same method may be used to divide the 1⁄2 cup of salad dressing into 6 equal portions. In each instance, students use the mathematics they know to find a solution pathway and then capture their thinking in an equation. By using the mathematical model of an equation to represent the real-life situation described in the task students exercise their ability to model with the mathematics that they know.	**Task H** This task helps illustrate MP.8. During this activity, fifth graders are actively comparing Celia's and Cora's sidewalk patterns and noticing any connections between the two. They are asked to directly compare numbers generated from a repeated pattern in certain boxes in order to draw conclusions and generalize a pattern between the sets of numbers. This explanation of "Why?" draws upon MP.3, Construct viable arguments and critique the reasoning of others. Through this in-depth exploration of these two sidewalk patterns, students are immersed in pattern-recognition and pattern-generalizing which not only develops a better understanding of how numbers behave in our base ten system but pushes students to generalize by reasoning repeatedly. Students will notice that Celia's numbers will always appear in Cora's numbers, but the opposite isn't true. Then they will observe that Cecilia's terms are always three times Cora's corresponding term. A full explanation of this thinking is detailed in the solution set. While looking closely at the repeated pattern and making generalizations students are also engaged in examining the structure of the number sets and making use of that structure in their comparisons (MP.7).

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