

GRADE 6 MONTHLY PROBLEMS

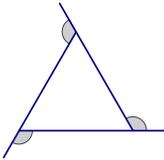
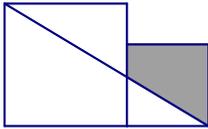
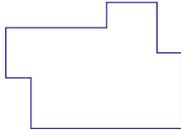
The math standards referenced in the Solutions are for the State of Minnesota. A Common Core alignment will be available soon, but the problems will work in any sixth grade classroom. Because the problems are designed to meet the needs of talented math students, they are also appropriate for older students.

Notes and Suggestions:

- The standards addressed by a problem may vary depending on the strategies that students choose.
- Some cells do not have standards listed. These problems may address more advanced standards. Problems from the "General" column may not be focused on specific standards.
- The problems vary substantially in difficulty. In general, they are quite challenging and will require time and persistence. Most students are unlikely to complete every problem within the month.
- When students solve a problem incorrectly, stress the importance of persistence!
- Some problems have many solutions. Others have no solution.
- Students should usually be able to work without direct instruction, but they may often get stuck. Encourage collaboration! Ask them to look up unfamiliar vocabulary.
- For most problems, students may decide whether to use a calculator. However, they should be able to justify their decision. Sometimes, they can learn a lot from solving them with and without!
- Some problems address content that students will not study until later in the school year. They may still attempt the problems using strategies that are based on what they already know.
- Avoid teaching rules and procedures before you discuss topics in class. If students don't know the rules, so much the better! Creating their own strategies will help them think more deeply.
- Many of these problems provide opportunities for mathematical communication, (even when the problem does not call for explanations). Consider having students write and submit their solution processes from time to time. Be sure to read their ideas carefully and offer one or two brief but thoughtful comments in response. This is very motivating!

Classroom teachers may freely copy and distribute these problems in their classroom. I ask only that you include my name and contact information as they appear at the bottom of each page. Please inform me of any typographical or mathematical errors by contacting me through 5280math.com. I would love to hear about how you are using the problems in your classroom, and I welcome your feedback and suggestions.

GRADE 6 NOVEMBER PROBLEMS

	Number and Operation (NO)	Algebra (A)	Geometry and Measurement (GM)	Data and Probability; Ratios and Rates (DR)	General (G)												
1	Create a story problem for $6 \div \frac{1}{2}$. Explain why it makes sense that the quotient is 12.	Find the values of U, V, and W. $U + V = 10$ $V + W = 7$ $U + W = 4$	Find the sum of the <i>exterior</i> angles of an equilateral triangle. 	If you roll two fair dice, what is the probability that the product of the numbers will be prime?	After 100, what is the smallest three-digit number having an odd number of factors?												
2	Jack bought a bike for \$215. The bike was on sale from its usual price of \$250. By what percentage was the price reduced?	Find a rule or formula that turns x into y . <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding-right: 20px;">in (x)</td> <td>out (y)</td> </tr> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>6</td> <td>4</td> </tr> <tr> <td>10</td> <td>6 and $\frac{2}{3}$</td> </tr> <tr> <td>21</td> <td>14</td> </tr> <tr> <td>150</td> <td>100</td> </tr> </table>	in (x)	out (y)	0	0	6	4	10	6 and $\frac{2}{3}$	21	14	150	100	The two squares have areas of 36 and 16 square units. Find the area of the shaded trapezoid. 	Lindsay walks at a steady rate to meet her plane at the airport. For the final $\frac{2}{3}$ of the walk, she takes a moving walkway that doubles her pace. She arrives in 8 minutes. The walkway is out of order when she returns. How long does her return walk take?	What is the ones digit of $3^{43} + 6^{28}$?
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3	Estimate the coordinates of the three points, and write at least two true equations that contain each number exactly once. (Try to use number sense instead of a calculator!) 	Find the missing value, and write an algebraic expression for $a \div b$ using familiar operations. Is \div a commutative operation? Explain. <table style="margin-left: auto; margin-right: auto;"> <tr> <td>$4 \div 3 = 7$</td> <td>$21 = 5 \div 2$</td> </tr> <tr> <td>$56 = 9 \div 5$</td> <td>$2 \div 4 = -12$</td> </tr> <tr> <td>$-19 = 9 \div 10$</td> <td>$6 \div 6 = 0$</td> </tr> <tr> <td>$? = 11 \div 8$</td> <td></td> </tr> </table>	$4 \div 3 = 7$	$21 = 5 \div 2$	$56 = 9 \div 5$	$2 \div 4 = -12$	$-19 = 9 \div 10$	$6 \div 6 = 0$	$? = 11 \div 8$		A flat-roofed store has a height of 20 feet. The floor looks like this.  180 ft Estimate the store's volume and surface area.	Freya and Gitte are roommates. Freya earns \$1800 per month and Gitte earns \$2100 per month. They plan to share expenses proportionally to their income. If their total rent and utilities are \$1100 per month, and their combined food costs for the month are \$525, how much should each person pay for each expense?	A ball is dropped. Each time it bounces, it returns to half its previous height. The ball bounces four times and returns to the ground before someone stops it. If the ball has travelled a total of 26 feet 10 inches, how high was it when it was dropped?				
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GRADE 6 NOVEMBER SOLUTIONS

	Number and Operation (NO)	Algebra (A)	Geometry and Measurement (GM)	Data and Probability; Ratios and Rates (DR)	General (G)
1	<p>You have 6 cups of apple juice. If each person gets $\frac{1}{2}$ of a cup, how many people can you serve? $6 \div \frac{1}{2} = 12$, because there are 12 groups of $\frac{1}{2}$ in 6 (In other words, 6 is 12 times greater than $\frac{1}{2}$).</p> <p style="text-align: right;">6.1.3.2</p>	<p>$U = 3.5$ $V = 6.5$ $W = 0.5$</p> <p style="text-align: right;">6.2.3.2</p>	<p>360° $(120^\circ + 120^\circ + 120^\circ)$</p> <p style="text-align: right;">6.3.2.1</p>	<p>$\frac{1}{6}$ or approximately 16.7%</p> <p>There are 36 outcomes in the sample space. 6 of these are in the desired event (1, 2; 2, 1; 1, 3; 3, 1; 1, 5; 5, 1)</p> <p style="text-align: right;">6.4.1.2</p>	<p>121 (Its only factors are 1, 11 and 121.)</p> <p>Square numbers—and square numbers only—have an odd number of factors. Can you see why?</p> <p style="text-align: right;">6.1.1.5</p>
2	<p>The price was reduced by 14%.</p> <p style="text-align: right;">6.1.3.3</p>	<p>There are many possibilities!</p> <p>$y = x \div 3 \cdot 2$ $y = x \cdot 2 \div 3$ $y = x \cdot \frac{2}{3}$ $y = x \div 1.5$</p> <p style="text-align: right;">6.2.1.2</p>	<p>11.2 square units</p> <p style="text-align: right;">6.3.1.2</p>	<p>12 minutes (Notice that Lindsey spends the same amount of time on each part of her walk to the plane!)</p> <p style="text-align: right;">6.1.2.3</p>	<p>3</p> <p>Look at patterns in the ones digits for powers of 3 and powers of 6.</p>
3	<p>0.8, 0.1, and 0.08 (from right to left) are reasonable values that are practical to work with.</p> <p>Three possible equations:</p> <p style="padding-left: 40px;">$0.8 \cdot 0.1 = 0.08$ $0.08 \div 0.8 = 0.1$ $0.08 \div 0.1 = 0.8$</p> <p style="text-align: right;">6.1.1.1 6.1.3.1 6.1.3.4</p>	<p>$? = 57$ $a \neg b = a^2 - b^2$, or $a \neg b = (a + b) \cdot (a - b)$</p> <p>$\Delta$ is not a commutative operation because $a \neg b$ does not always equal $b \neg a$. (In fact, $a \neg b$ is always the opposite of $b \neg a$. Mathematicians call it <i>anti-commutative</i>!)</p> <p style="text-align: right;">6.2.2.1</p>	<p>Volume: about 486,000 cu ft Surface area: about 63,000 sq ft</p> <p>Students' answers will vary since they are estimates.</p> <p>(Note: The surface area includes the floor and the ceiling.)</p> <p style="text-align: right;">6.3.1.1 6.3.3.2</p>	<p>Freya: \$507.69 for rent and \$242.31 for food.</p> <p>Gitte: \$592.31 for rent and \$282.69 for rent.</p> <p style="text-align: right;">6.1.2.2 6.1.2.4 6.1.3.4</p>	<p>9 feet 4 inches (or 112 inches)</p>