

1	There are 30 students in the math circle. Of the 30 students, 15 like hamburgers, 10 like hotdogs, and 8 don't like either. How many students like both hamburgers and hotdogs?	2 1
2	If you rotate an equilateral triangle clockwise twice and then counterclockwise three times, what transformation is this equivalent to?	3 1
3	Find the result of the following permutation:  $\begin{matrix} 1 & 2 & 3 & 4 & 1 & 2 & 3 & 4 \\ (\downarrow & \downarrow & \downarrow & \downarrow) * (\downarrow & \downarrow & \downarrow & \downarrow) \\ 3 & 4 & 1 & 2 & 4 & 3 & 1 & 3 \end{matrix}$	2 2
4	Represent 37 as a sum of power of 2	3 2
5	There are 7 green marbles, 4 blue marbles, and 1 red marble in a bag. How many marbles must you pick to make sure that you have the red marble?	4 1
6	Find the result of the following transformation on a triangle: $F_2 * F_3$ :  (Write as a single transformation, i.e., no numbers)	3 1

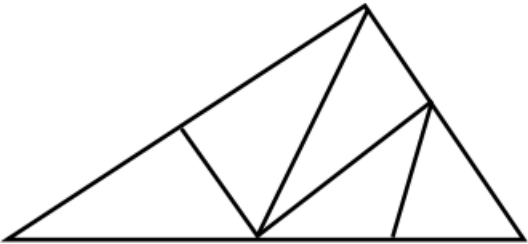
7	<p>Multiply <math>47 \cdot 19</math> using Russian Peasant</p> <p>Multiplication:</p>	2 2
8	<p>Multiply <math>59 \cdot 15</math> using Egyptian Multiplication:</p>	2 1
9	<p>Find the final result of the following permutations:</p> <p> <math display="block">\begin{matrix} 1 &amp; 2 &amp; 3 &amp; 4 &amp; 5 &amp; 1 &amp; 2 &amp; 3 &amp; 4 &amp; 5 \\ (\downarrow &amp; \downarrow &amp; \downarrow &amp; \downarrow &amp; \downarrow) * (\downarrow &amp; \downarrow &amp; \downarrow &amp; \downarrow &amp; \downarrow) \\ 2 &amp; 5 &amp; 1 &amp; 3 &amp; 2 &amp; 3 &amp; 4 &amp; 2 &amp; 1 &amp; 5 \end{matrix}</math> </p>	3 2
10	<p>There are 30 students in the math circle. Of the 30 students 16 speak Spanish, 7 only speak English, and 3 speak French and English, but not Spanish. Assuming everyone speaks at least of these languages, how many students only speak French?</p>	4 1

11	<p>What would be the result of the following actions on a triangle:</p> <p>An F1 permutation then rotated counterclockwise then an F2 permutation?</p>	5 3
12	<p>Out of forty Math Circle students, 14 wanted chocolate ice cream and 29 wanted vanilla ice cream. If 5 students wanted both flavors, how many wanted neither chocolate or vanilla ice cream?</p>	5 3
13	<p>In a Math Circle class of 20 students, all students went to either the beach or the park over the weekend. If 12 students went to the beach and 14 went to the park. How many visited both destinations?</p>	3 3
14	<p>There are 30 students in the after-school club. If 12 want to play soccer and 16 want to play basketball and 8 don't want to play either basketball or soccer, then how many students want to play both soccer and basketball?</p>	4 4

15	How would you write the number 77 using base 10 binary notation?	4 0
16	How would you convert the binary number below to its decimal number equivalent?  1 1 0 1 1 1 1	3 0
17	If we add 17 to the smallest two-digit number and then we divide the sum by the largest one-digit number, what is the result?	2 2
18	Marysia leaves her house at 6:55 a.m. and arrives at school at 7:32 a.m. Zosia needs 12 minutes less than Marysia to get to school. Yesterday, Zosia showed up at school at 7:45 a.m. What time did she leave her house?	3 3

19	A daughter is 3 years old, and her mother is 28 years older than her daughter. How many years later will the mother be three times as old as her daughter?	4 1																		
20	A conductor wanted to make a trio consisting of a fiddler, a pianist, and a drummer. He had to choose one of two fiddlers, one of two pianists, and one of two drummers. He decided to try each of the possible trios. How many attempts did he have to make?	5 2																		
21	Write down 97 in ternary (base 3):	0 0																		
22	<p>For a regular hexagon, what is the resulting permutation matrix of</p> $F1 * F2 * F3 * F4 * F5 * F6 * F5 * F4 * F3 * F2 * F1$ <p>Write in the form of:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td> </tr> <tr> <td>↓</td><td>↓</td><td>↓</td><td>↓</td><td>↓</td><td>↓</td> </tr> <tr> <td>?</td><td>?</td><td>?</td><td>?</td><td>?</td><td>?</td> </tr> </table>	1	2	3	4	5	6	↓	↓	↓	↓	↓	↓	?	?	?	?	?	?	5 4
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↓	↓	↓	↓	↓	↓															
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23	<p>You forgot your lock combination! The combination uses the digits 0-9 and also the alphabet, and you know that none of the numbers or letters repeat. How many different combinations of four digits/letters are there to try?</p>	6 2
24	<p>A log that is 12 meters long has to be cut into pieces that are each 3 meters. How many cuts will be made?</p>	3 3
25	<p>Insert several plus and minus signs in such a way as to get a correct equality.</p> <p>5 4 3 2 1 = 3</p>	3 1
26	<p>One bacterium was placed in a dish. Every second, each bacterium divides into 2. How many bacteria will there be in the dish after 6 seconds? (Hint: Draw a picture.)</p>	5 1

27	<p>There are chickens and sheep on a farm. The number of chickens is two times the number of sheep. All together, they have 24 legs. How many chickens are there on the farm?</p>	4 2
28	<p>How many triangles are there in the following image?</p> 	3 1
29	<p>What is the result of an F2 flip of a triangle 299,792,458 times? Write your answer as a permutation.</p>	6 2
30	<p>What are the names of all the instructors for Junior Circle that are students at UCLA?</p>	3 3