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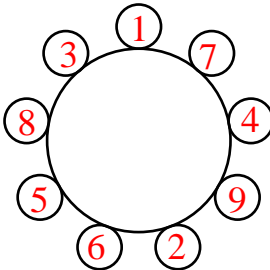
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2016 IMSO Answers

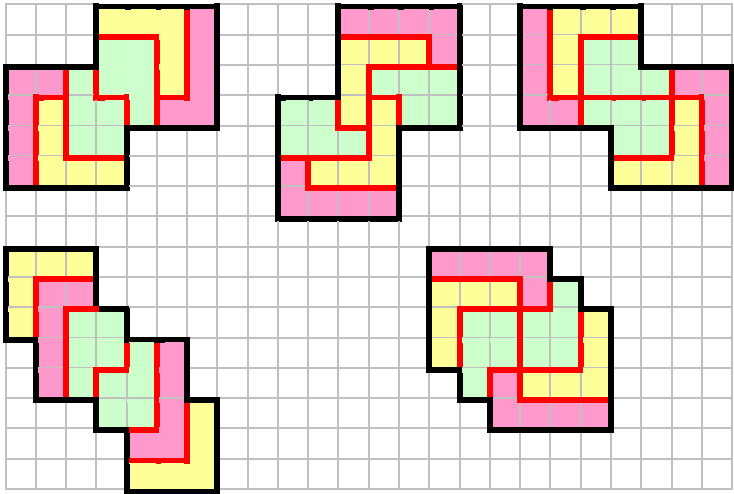
SHORT ANSWER

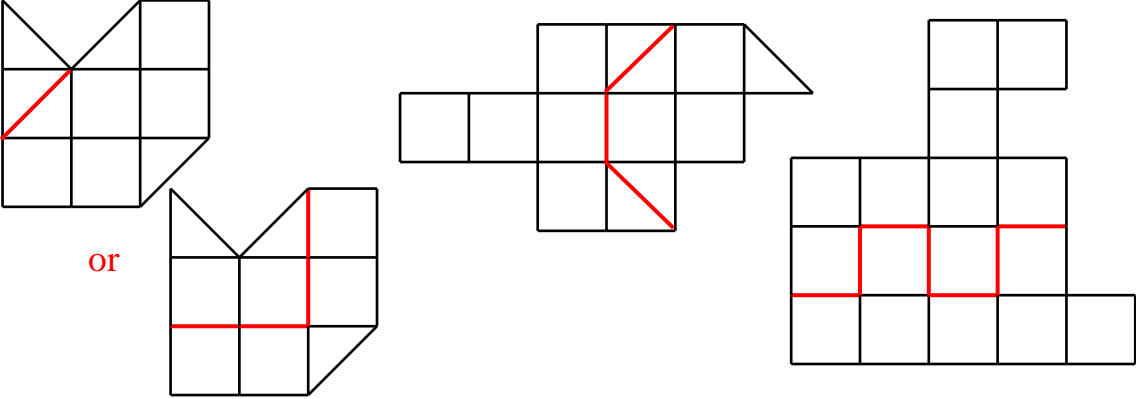
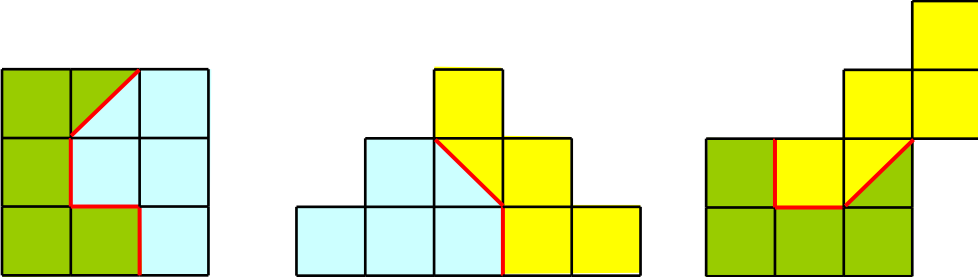
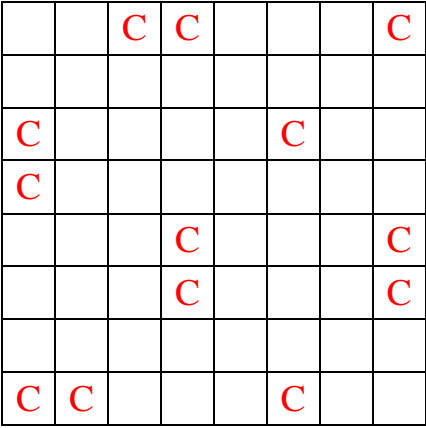
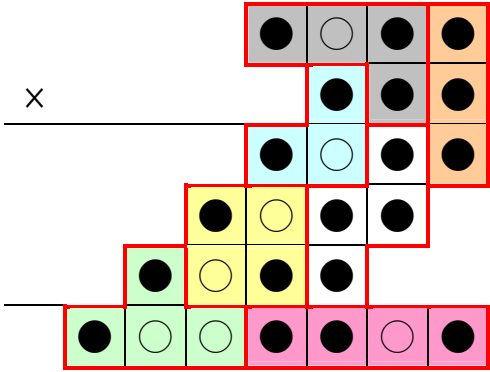
1.	60	2.	12	3.	46.2	4.	2500	5.	905
6.	5 : 6	7.	40	8.	Loss 9%	9.	Friday	10.	48
11.	28	12.	2	13.	16	14.	22	15.	10
16.	24°	17.	72	18.	72	19.	33	20.	17
21.	150	22.	38	23.	123475869	24.	$\frac{5}{16}$	25.	78

ESSAY PROBLEMS

1.		2.	110	3.	285461659 or 281612539		
		4.	224	5.	126	6.	158°
		7.	168	8.	180	9.	56
10.	1440	11.	230	12.	40	13.	115

EXPLORATION PROBLEMS

1.	
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2.	$ \begin{array}{r} \boxed{1} \ \boxed{7} \\ \times \quad \boxed{4} \\ \hline = \boxed{6} \ \boxed{8} + \boxed{2} \ \boxed{5} = \boxed{9} \ \boxed{3} \end{array} $
3.	<p>Label the coins A, B, C, D, E, F, G, H, I, J, K, L and M. In the first weighing, put (A, B, C, D, E, F) against (G, H, I, J, K, L). There are two cases.</p> <p>Case 1. We have equilibrium.</p> <p>Then each side contains a counterfeit coin. Hence one of (A, B), (C, D) and (E, F) contains a counterfeit coin. In the next two weighing, put A and B against C and D, and then against E and F. We cannot have equilibrium both times. If we do not have equilibrium at all, then (A, B) contains the counterfeit coin. If we have equilibrium once, say between (A, B) and (C, D), then (E, F) contains the counterfeit coin. In either case, we can tell if the counterfeit coin is heavier or lighter.</p> <p>Case 2. One side, say (A, B, C, D, E, F), is heavier.</p> <p>The next two weighings are the same as in Case 1. If we have equilibrium both times, the counterfeit coin is lighter. Otherwise, it is heavier.</p>
4.	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>(a)</p>  <p>or</p> </div> </div>
	<p>(b)</p> 
5.	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;">  </div> <div> <p>6.</p>  </div> </div>