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## 2011 UPPER PRIMARY DIVISION FIRST ROUND SOLUTION

1.  $2011 - 1022 = 989$ .

Answer : (C)

2. The last lesson starts at 2:30 p.m. As each lesson lasts for forty five minutes, the last lesson ends at 3:15 p.m. At this time, the minute hand points at three and the hour hand points between three and four in the clock. Thus the angle between the hour hand and minute hand is larger than  $0^\circ$  and smaller than  $90^\circ$ .

Answer : (C)

3. The area of figure A, B, C, D and E are 8, 10, 9, 7, 9 respectively.

Answer : (B)

4. The area of the shaded region with respect to total area in figure A, B, C, D, E are  $\frac{3}{5}$ ,  $\frac{4}{8}$ ,  $\frac{3}{8}$ ,  $\frac{6}{8}$ ,  $\frac{20}{25}$ . Among them,  $\frac{20}{25}$  is larger than  $\frac{3}{4}$ .

Answer : (E)

5. The successive two pages illustrate that those two page numbers are consecutive natural numbers. As the sum of that two consecutive natural numbers is 345, The two numbers are  $(345-1)\div 2=172$  and  $172+1=173$  respectively. Therefore, the story starts at page 172.

Answer : (D)

6. All alphabets are arranged in periodic order, with every five alphabets forms a period. When 2011 is divided by 5, the remainder equals to 1, it follows that the 2011th alphabet equal to the first alphabet, which is M. Hence A.

Answer : (A)

7.  $3 \times \frac{3}{2} = 3 + \frac{3}{2}$ .

Answer : (B)

**【Remarks】** Generally, if  $a+b=ab$ , then  $a, b$  satisfy  $(a-1)(b-1)=1$ .

8. The area of the large triangle equals to the area of 16 small shaded triangles. Since there are 6 small shaded triangles, the ratio is  $\frac{6}{16} = \frac{3}{8} = 37.5\%$ .

Answer : (D)

9. When counts from left to right, Mickey is the thirteenth student. He has seventeen classmates in his right hand side. When Mickey counts from right to left, he will be the eighteenth student.

Answer : (A)

10. Among the 20 balls, there is only one ball marked with 11. Ten balls with even number printed. Four balls with last unit number equals to 5, 6, 7 and 8. There are 11 balls containing the digit "1" and 9 balls with one digit number printed.

Answer : (D)

11. The pattern of the graphic follows the rule that each four of them forms a period. Since  $2011 \div 4 = 502 \dots 3$ , it equals to the third figure, hence A.

Answer : (A)

12. Each day, a rabbit eats 1.5 carrots and half of a cabbage on average. For seven days, it needs to eat 10.5 carrots as well as 3.5 cabbages, hence the answer is E in order to sustain for seven days.

Answer : ( E )

13. By folding the cube into a 3 dimensional figure, M and S, I and K, A and O are opposite faces respectively.

Answer : ( B )

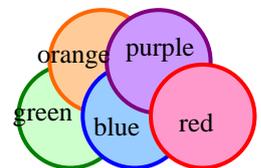
14. Riding bicycle to travel 6 km=6000 m. When the front wheel and rear wheel rolls one cycle, it moves 3m and 2m forward respectively. Thus, when the front wheel rolls 2000 cycles, the rear wheel has rolled 3000 cycles. Hence D.

Answer : ( D )

15. The side length of small square is  $30 \div 2 \div (3 + 2) = 3$  cm, thus the area of six squares are  $6 \times 3 \times 3 = 54$  cm<sup>2</sup>.

Answer : ( C )

16. The second sentence suggested that the green plate is under the orange plate and the orange plate is under other plates, hence the green plate is the most bottom one, with the orange plate on top. The third sentence suggested that the red plate is the most upper one, and then followed by the purple plate. It follows that X, Y, Z, U and V corresponds to green, orange, blue, purple and red respectively, as shown in the figure.



Answer : ( D )

17. The watch has 24 sections and the minute hand rolls one cycle by 60 minutes. Thus each two sections equals to 5 minutes. As the hour hand points at 19 and the minute hand points at 25, the time shown is 19:25.

Answer : ( C )

18. Four adults and three children under twelve years old go for a buffet. In order to minimize the fee, they should choose family set as far as possible:

( 1 ) Choose 2 family set A and 1 family set B, it costs  $\$45 \times 2 + 70 \times 1 = \$160$ ;

( 2 ) Choose 2 family set B and 1 kid set, it costs  $\$70 \times 2 + 25 = \$165$ ;

( 3 ) Choose 3 family set A and 1 adult set, it costs  $\$45 \times 3 + 30 = \$165$ ;

Others choice costs more than the above three choices. Hence B.

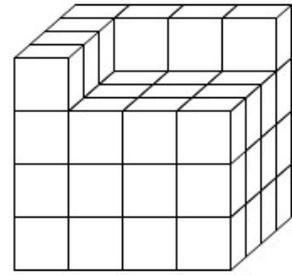
Answer : ( B )

19. Prime factorizations is done on the numbers. If a number can be expressed as the product of three numbers which are smaller or equals to six, then it satisfies the condition. Factorize 84 into prime factors,  $84 = 2 \times 2 \times 3 \times 7$ . 84 cannot be expressed by the product of three numbers which are smaller or equals to six. And  $48 = 3 \times 4 \times 4$ ,  $120 = 4 \times 5 \times 6$ ,  $180 = 5 \times 6 \times 6$ ,  $216 = 6 \times 6 \times 6$ . Hence B.

Answer : ( B )

20. Label the five blocks  $a, b, c, d, e$  from left to right. First, we fix the position of block  $a, b, c$  (shown in figure 20-a), we then need to use a  $3 \times 3 \times 1$  block to fill the space. Hence block  $d$  and  $e$  can only form a  $3 \times 3 \times 1$  block corresponds with choice C.

Answer : (C)



21. The sum of each row, each column and each diagonal is  $12+10+8=30$ , thus  $A=30-(10+6)=14$ ,  $B=30-(9+8)=13$ ,  $C=30-(9+A)=7$ ,  $D=30-(12+C)=11$ . It follows that  $(B-A \div C) \times D = (13-14 \div 7) \times 11 = 121$ .

Answer : 121

22. Obviously, bombs are embedded in grid A, B, C and E. The number of the upper left corner of grid A is 1 show that that grid with number 1 only has one bomb in its surrounding which is at grid A. Hence, there is no bomb in grid D. So among grid A, B, C, D, E, only four with bombs embedded.

Answer : 004

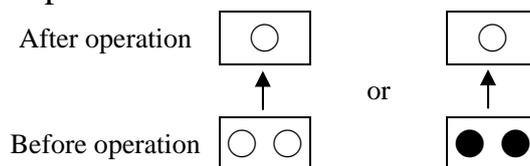
	0				
1	1	1			
1		2	☠		
1		2	☠		
1		1	2	☠	
1	1		1	3	
☠	1			1	
		1			1
		2	2	2	2

23. We consider those numbers with integral part be a 1-digit number. Once the integral part is fixed, the number of permutations of 3 digits in decimal place equals to  $3! = 6$ . As a result, there are total  $3! \times 4 = 24$  combinations with integral part being a one-digit number. These are the first 24 numbers in the series. The 23rd number is the second last numbers with integral part equals to 4, that is 4.312. And the 20th number is the second one with integral part equals to 4, that is 4.312. so the answer is  $(4.312 - 4.132) \times 1000 = 180$ .

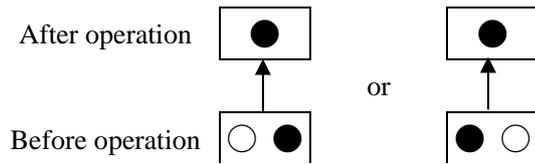
Answer : 180

24. By working backward, we can consider the status of the counters before each operation.

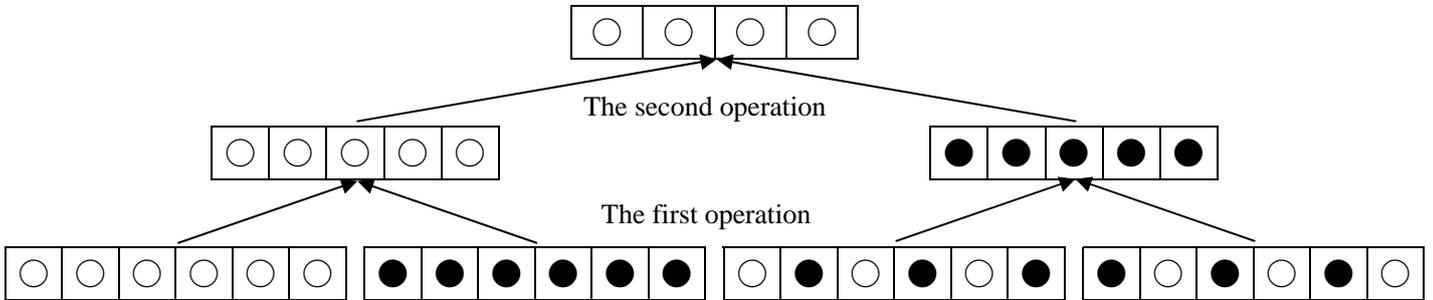
If there is one white counter after an operation, there should be two counters with same colour before the operation.



If there is one black counter after an operation, there should be two counters with different colours before the operation.



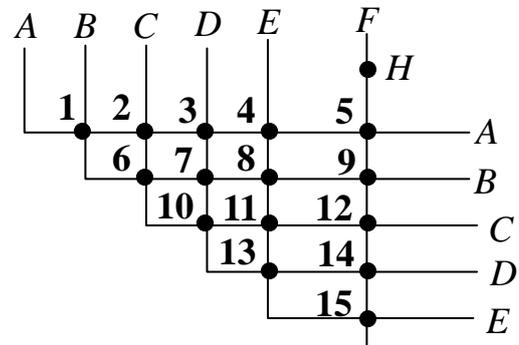
Using the above process, we can deduce the following :



At the beginning of the game, there are 4 different combinations of 6 counters.

**Answer : 004**

25. Note that every line has 5 interchange stations. When traveling on one line, at most two changes are made. Thus, Mickey needs to ride at least 3 times on each line. For the line that come-across his home, he needs to ride four times. (Since it starts and ends in the station near his home, and there will not be change). As a result, Mickey needs to ride at least  $3 \times 5 + 4 = 19$  times. In other words, he needs to make 18 changes. Refer to the figure on the right, it shows six lines A, B, C, D, E, F and interchange stations 1 to 15. Mickey starts at H, he can take the following route, which included 18 changes to go back to station H.



$H \rightarrow 15 \rightarrow 4 \rightarrow 1 \rightarrow 9 \rightarrow 14 \rightarrow 3 \rightarrow 2 \rightarrow 12 \rightarrow 5 \rightarrow 4$   
 $\rightarrow 13 \rightarrow 10 \rightarrow 6 \rightarrow 8 \rightarrow 11 \rightarrow 10 \rightarrow 7 \rightarrow 9 \rightarrow H$

**Answer : 018**