Examinee Info. 学生资料

Country/国 家: ________ City/市（省）: ________ School/学 校: ________

Name/姓 名: ________ Sex/性 别: ________ Instructor/辅导老师: ________

2013年第九屆"IMC國際數學競賽"(新加坡)
Ninth IMC International Mathematics Contest (Singapore), 2013

Primary Four Contest Problem

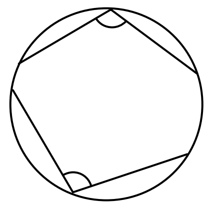
Examination Time：90 min　Total Point：100points　Score：________

- Contestant must write down the answer of each problem in the blank, answer with erasure will not be credited!
- For Problem 17 and 18, presentation of solution on the space provided is a must, no credit will be given if only the final answer is written down in the paper!

Multiple Choice	1	2	3	4	5	6	7	8
Answer								
Fill-in the blank	9	10	11	12	13	14	15	16
Answer								

A. Multiple-Choice Problems.（5 points each, a total of 40 points）

1. Let [a] denote the greatest integer not exceeding a. For example, [4.1]=4，[4]=4. What is the final answer of [3÷2]×[3×3÷2÷2]×[3×3×3÷2÷2÷2]?
A.1　B.2　C.3　D.6

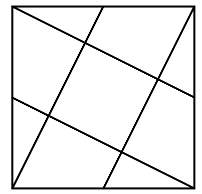


2. If there are two inscribed angles in the given circle; then at most how many parts can the circle be divided into? (There are five parts as shown in the given figure)
A.7　B.8　C.9　D.10

3. There is a square piece of paper. First, fold this sheet of paper into two parts (not necessarily of the same size); then cut it with scissors, producing two pieces of paper. If these two pieces of paper are not in triangular shape, then what shape could not these two pieces of paper be?
A. Two quadrilateral　B. Two pentagons
C. A quadrilateral and a hexagon　D. A quadrilateral and a pentagon

4. The letters A to Z are arranged clockwise in a circle. The operation begins as follows: starting from letter A, cross out the letter after A , then cross out the letter after the following letter. Repeat the operation until one letter is left. What letter is left not being crossed out?
A.T　B.U　C.V　D.W

5. There is a 4-digit number such that none of the digit is 0. Starting on the 3^{rd} digit from left to right, each digit must be the product of two previous digits. How many such kinds of 4-digit are there?
A.5　B.9　C.11　D.12



6. The figure at the right is a square. After drawing two sets of parallel lines from its vertex, how many trapezoids does the figure have now?
A.4　B.8　C.12　D.16

7. There are four mathematical sentences: □+□=□, □−□=□, □×□=□□, □□□÷□=□□, if you are allowed to use only three different digits to place in each □, to make the set ups of all the four statements to become true, which of the following digits appear most number of times? (the first digit of any two-digit number or three-digit number can't be a 0)
A.9　B.8　C.7　D.6

8. From natural numbers 1 to 20, multiply those two numbers with a difference of 2 and record it in a sheet of paper. What is the sum of all those numbers recorded in the paper?
A.2449　B.2450　C.2451　D.2452

B. Fill in the blank.（5 points each, a total of 40 points）

9. The figure at the right is an addition puzzle problem containing numbers 1, 2 and 3. Fill in each □ with any digit from 0 to 9 only once. What are the other digits in the sum, 1 □□3?

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      2
    □ □
+ □ □ □
1 □ □ 3
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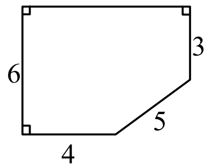
10. A hotel has an available twin, triple and quadruple sharing rooms for a certain country with a total of 100 delegates who are participating in the 9^{th} IMC Singapore. After all the delegates have been checked in, the team leader found out that if the number of twin sharing rooms is interchanged with the number of quadruple sharing rooms, then one quadruple-sharing room will become vacant. Likewise, if the number of twin sharing rooms is interchanged with triple sharing room, then two triple rooms will become vacant. How many twin sharing rooms the team leader has reserved with the hotel? (Assume that all rooms are occupied and no beds are vacant.)

11. Andy, Bernie and Carlo are cousins. When Bernie's age is twice that of Andy's, then Carlo is 26 years old. If Carlo's age is twice that of Bernie's, then Andy is 5 years old. How old will Bernie be when Carlo' age is twice the age of Andy?

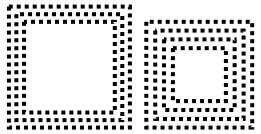
12. Peter, Richard and Terry, traveling to one's own destination, set off at the same time. Peter started from town A and headed towards town B, while Richard and Terry left town B toward town A, when Peter and Richard met each other at gasoline station C, Peter immediately turned back to return to town A. Finally, when Terry arrived at town A he was able to meet Peter. If the speed of Richard is twice that of Peter, the meet point of Peter and Richard is 15 kilometers far from Terry, what is the distance between town A and town B in kilometers?

13. A bank manager offers a "NO WAITING TIME PROMO" for the clients in the bank. The simple rule is as following: If the client from the moment of waiting to the completion of the transaction is longer than 10 minutes in the bank with the teller, the client receives a $10 gift check for every extra minute overstayed in the bank. Now the bank had 2 tellers to serve the clients and 6 clients entered the bank simultaneously. The bank manager believed that the different estimated times spent by the clients to transact business with the tellers are 5,6,7,8,9 and 10 minutes respectively. With the number of clients the tellers had served, what should be the total amount of check the bank manager should prepare?

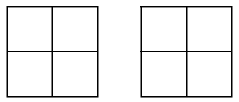
14. The figure at the right is a pentagon with three right angles and with side lengths as labeled. What is the area of the given figure?



15. What is largest possible number of chess pieces less than 100 which can be arranged in a 3-layer hollow square and in a 4-layer hollow square as shown in the right? (The diagram is just a guide; do not use it as basis to count directly)



16. There are two different tables, each of 2×2 grids. Place each digit 1, 2, 3, 4 once in each cell in any order in the left table, and then place the same four digits 1, 2, 3, 4 in different positions in the other table such that the digits in two cells that have a common side must not exactly in the same position as in the 2×2 grid table on the left. How many different possible positions can this be done? (Different positions mean that the same digit must not be placed in the same position of both grids.)



C. Problem Solving. (10 points each, a total of 20 points. Show your detailed solution on the space below each question)

17. Robert walks from town *A* to town *B*, he must pass a hill and a section of a flat road. His speed of walking uphill is 3 km per hour, on a flat road is 5 km per hour and downhill is 6 km per hour. Robert's average speed from town *A* to town *B* is 4.2 km per hour. What is his average speed from town *B* to town *A*?

18. Continue writing all the whole numbers in one line such that each digit occupies one grid, so we form a long string of digit as 0 1 2 3 4 5 6 7 8 9 10 11 12 13 …. Now, there is a fluoroscopy card which could cover eight grids. Whatever the digits in the 3rd, 1st and 2nd original grids will become the digits in the 1st, 2nd and 3rd grids respectively while the digits in the 7th, 5th and 6th original grids will become the digits in the 5th, 6th and 7th grids, respectively. For example, after using the fluoroscopy card to the string of digits 0 1 2 3 4 5 6 7, the new string of digits become 2 0 1 3 6 4 5 7. In order for the four digits 2 0 1 3 to appear again, how many grids must the fluoroscopy card be moved from left to right? (Do not worry on how long string of digits, the fluoroscopy card is enough for any number of digits, the digits will never move to another line).