WMO 2015

THE 8th WORLD MATHEMATICAL OLYMPIAD COMPETITION

L2

Stanford university · USA

2015 . 02

Name:_____ Grade:_____

Country:_____ Number:_____

Level 2:The World Cup Finals

Total marks:120 Time:90min

Section One: Multiple Choice Questions [40 marks in this section]

1.When Mary was calculating 1.23 plus a number with a decimal place, she carelessly forgot to write the decimal point of the number. As a result, she got 22.23.The correct answer should be ( ).

(A) 2.11 (B) 3.33

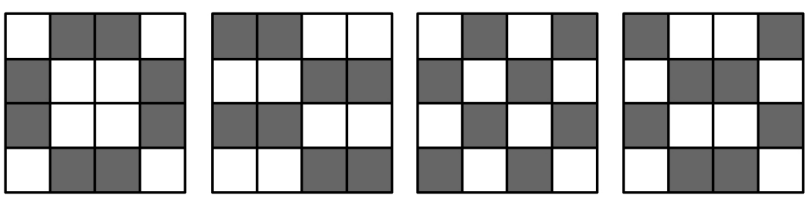
(C) 21.1 (D) 33.3

2.Given x lies between 11 and the number 19, the average of 8, 12 and x is ( ).

(A) 12 (B) 14

(C) 16 (D) 18

3.The chocolate company, DOS, designed 4 different types of chocolate with different patterns comprising back and white squares as the pictures below. Which one of them has 2 axis of symmetry? ( )

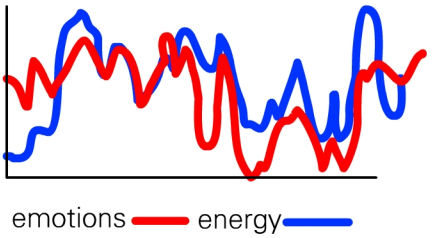


(A) (B) (C) (D)

4.The human body condition varies periodically. Human emotions follow a 28–day cycle whereas human energy follows a 22–day cycle. If both these human conditions can reached their peak at the same time, how many days does it take for both conditions to reach their peak again? ( )

(A) 2　　(B)22

(C) 308　　(D) 616



5.Brad uses a square paper and cut out the biggest circle he can as shown in Figure A. Cherie use a circular paper and cut out 7 circle of equal size as shown in Figure B. Which one of them uses the maximum utilization? (Utilization refers to the circular area cut and as a percentage of the original area) ( )。

(A) Brad has the better utilization

(B) Cherie has the better utilization

(C) Both has equal utilization

(D) It cannot be determined

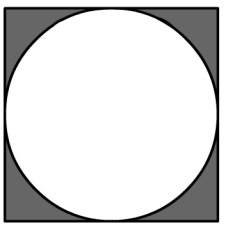


Figure A

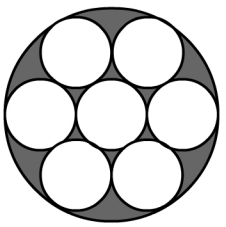


Figure B

6. There was a theft in County Pilfer. Four suspects were being taken to the police station

Suspect A：The four of us did not commit the crime；
Suspect B：Somebody between the four of us commit the crime；
Suspect C：Either Suspect B or D is innocent；
Suspect D：I did not commit the crime.

If two of them are telling the truth and the other two are telling lies, what can be established? ( )

(A)A and D are telling the truth

(B) B and C are telling the truth

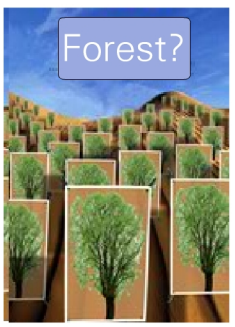
(C) A and B are telling the truth

(D) C and D are telling the truth

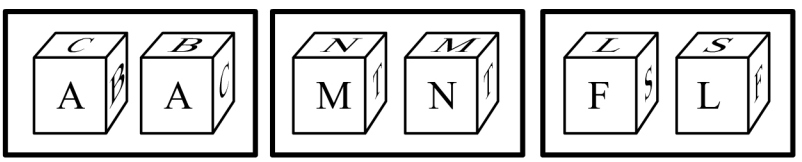
Section Two: Fill In the Blanks [40 marks in this section]

1.The numbers in the weekly lottery range from 1，2，3，…，48，49. The organizer will pick 6 different numbers。Andy’s parents bought a ticket and the numbers in the ticket are 2，17，26，29，30，43.On that Saturday, the organizer picked 17，26，30，2 and 43，the probability that the last number is 29 is _____。

2.2 tons of recycled wastepaper can make 1.6 tons of paper, saving 34 large trees. 47.5 tons of recycled wastepaper can make_____ tons of paper.



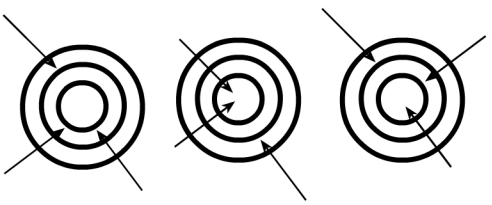
3.As shown below, there are three pairs of cubes: Pair (1), Pair (2) and Pair (3). The identical cubes are in Pair _____.



(1)　　(2)　　(3)

4.Cards are shared among Amy, Betty, Chris and David so that Amy gets 1 card, Betty gets 2 cards, Chris gets 3 cards and David gets 4 cards. The last card (the 54th card) is given to_____.

5.William Tell decided to go for his archery practice. He shot 9 arrows at 3 target boards with 3 arrows for each board. The score on the first target board was 29 points, whereas the score on the second board was 43 points. The score on the 3rd target board was_____ points.



6.Jack found a mysterious formula. The usage of the symbols “+”、“–”、“×”、“÷”is the same as what he has been taught but the meaning of 0、1、2、3、…、9 is different. Look at the formulas below for more examples：

① 1×5=1　② 7×2=96　③ 99–5=3

④ 83÷4=4　⑤ 5×5×5=6　⑥ 9+(7×8)=97

（1）What does 2015 stand for in the “mysterious equation”_____?

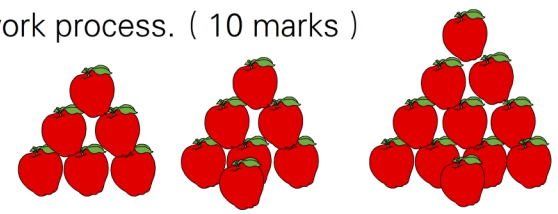
（2）If we use the “mysterious equation”，what is the answer of 201+5_____。

Section Three: Operating-question [20 marks in this section]

1.Tim is hunting treasure in a 4×4 maze with a total of 16 rooms (as shown below). The value of the treasure in each room is indicated by a number on it. Tim begins at the room valued "1". Each time he can only continues via the neighboring room which shares the wall with the room in which he stands. Every time he reaches a room, he can get all the treasure in it. He cannot return to a room once he has visited it. His final destination is the room valued "2". Please help Tim design a treasure map (draw it on the diagram) that he can get the treasure with maximum value. What is the maximum value of the treasure in total that Tim can get? (10 marks)

8	16	13	12
3	14	2	4
6	9	15	11
1	7	5	10

2.There are three groups of apples with 6, 7 and 11 apples per group. Now some apples can be moved from one group to another, but the quantity of these apples in the group that will be moved must be the same as that of apples in the existing group. Consider how to remove the apples to make the three groups of apples equal in quantity. Please fill in the numbers in the diagram to show your work process. (10 marks)



	Group 1	Group 2	Group 3
the quantity of apples per group	6	7	11
the quantity of apples per group after the first movement			
the quantity of apples per group after the second movement			
the quantity of apples per group after the third movement			

Section Four: Answer the Questions [20 marks in this section]

1.Get ready your paper and pen and we are going to do an experiment now. Choose a number, any number. We are going to do 4 calculations and there will be an unexpected result.
Take your number multiply by 2 and add 1.Take the result, multiply by 6 and divide by 3. After that, take this result and minus a number that is 4 times your original number. Minus 2 again and [drumbeat….] the result is 0.
Are you feeling amazed? Can you explain why it is 0? (8 marks)

2.Tom owns a fast food restaurant and his fast food restaurant only provides two and four seaters. Yesterday, a large group of people came into the restaurant. Tom realized that there were more than 100 but less than 150 customers. He observed that there were groups of single customer who made use of the two seaters and groups of threes who sat at the four seaters. He calculated that on average, each customer has taken up 1.35 of the seats. How many two seaters and how many four seaters are there in his restaurant? (12 marks)