5th International Mathematics Assessments for Schools (2015-2016)

Middle Primary Division Round 2

Time: 120 minutes

Printed Name ________________ *Code* ____________ *Score* ___________

Instructions:

- Do not open the contest booklet until you are told to do so.
- Be sure that your name and code are written on the space provided above.
- Round 2 of IMAS is composed of three parts; the total score is 100 marks.
- Questions 1 to 5 are given as a multiple-choice test. Each question has five possible options marked as A, B, C, D and E. Only one of these options is correct. After making your choice, fill in the appropriate letter in the space provided. Each correct answer is worth 4 marks. There is no penalty for an incorrect answer.
- Questions 6 to 13 are a short answer test. Only Arabic numerals are accepted; using other written text will not be honored or credited. Some questions have more than one answer, as such all answers are required to be written down in the space provided to obtain full marks. Each correct answer is worth 5 marks. There is no penalty for incorrect answers.
- Questions 14 and 15 require a detailed solution or process in which 20 marks are to be awarded to a completely written solution. Partial marks may be given to an incomplete presentation. There is no penalty for an incorrect answer.
- Use of electronic computing devices is not allowed.
- Only pencil, blue or black ball-pens may be used to write your solution or answer.
- Diagrams are not drawn to scale. They are intended as aids only.
- After the contest the invigilator will collect the contest paper.

The following area is to be filled in by the judges;
the contestants are not supposed to mark anything here.

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Score	Signature
Score																	
Score																	

Middle Primary Division Round 2

Questions 1 to 5, 4 marks each

1. The operation * is such that $2*6=26-2-6=18$ and $7*3=73-7-3=63$. If a and b are non-zero digits such that $a*b=36$, what is the value of a?
（A）3 （B）4 （C）6 （D）7 （E）9

Answer: ______________

2. I In how many different ways can three identical balls be distributed among three distinct boxes, if we allow some boxes to be empty?
（A）6 （B）10 （C）12 （D）18 （E）27

Answer: ______________

3. The diagram shows the playing board of a game where we start on square 1. We move forward 2 squares and backwards 1 square. Then we move forward 3 squares and backwards 2 squares, and so on. Each time, we move forward one square more than the last time, and the backward move is one square shorter than the forward move. Moving from one square to the next, in either direction, is called a step. How many steps does it take to reach square 11 for the first time?

1	2	3	4	5	6	7	8	9	10	11

（A）30 （B）32 （C）34 （D）36 （E）38

Answer: ______________

4. A beam balance has a 1 g token, a 4 g token and a 7 g token. Each token may be placed on the same pan as the object being weighed or on the other pan, or not at all. How many different positive integral weights can be measured exactly using this balance and the three tokens?

（A）8 （B）9 （C）10 （D）11 （E）12

Answer: ______________

5. There are three kinds of bottles, holding 0.4 L, 0.6 L and 1 L respectively. The total capacity of several bottles is 10 L. How many possible values of the number of bottles holding 0.6 L are there if there is at least one bottle of each kind?

（A）9　　（B）10　　（C）11　　（D）12　　（E）13

Answer: ______________

Questions 6 to 13, 5 marks each

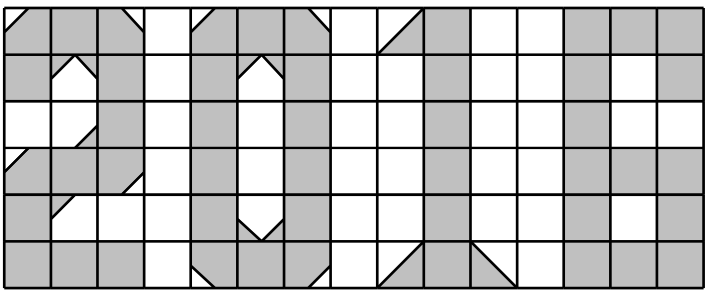
6. A three-digit number has digit-sum 18. The tens digit is 2 less than the hundreds digit and the units digit is 2 less than the tens digit. What is this three-digit number?

Answer: ______________

7. The diagram shows a paper strip with four possible dividing lines. We may cut along none, any or all of these lines. How many different sizes can the piece containing the circle have?

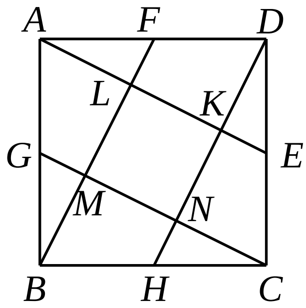
Answer: ______________

8. The diagram shows a 15 by 6 board on which the number 2016 are shaded. Each square is 1 cm by 1 cm. Each long diagonal joins opposite vertices of a square while each short diagonal joins midpoints of adjacent sides of a square. What is the total area, in cm^2, of the shaded regions?



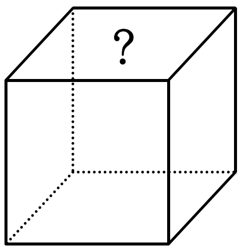
Answer: __________ cm^2

9. In the diagram, E, F, G and H are the respective midpoints of the sides CD, DA, AB and BC of a square $ABCD$. If the area of the square $KLMN$ is 4 cm^2, what is the area, in cm^2, of $ABCD$?



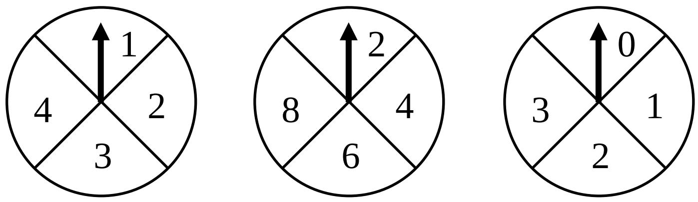
Answer: ________ cm^2

10. A cube is placed on the table, and a number is written on each face. The sum of the two numbers on opposite faces is always 16. Honey can see three faces, and the numbers on them add up to 24, and Lily can see the top face and the other two lateral faces, and the numbers on them add up to 26. What is the number on the top face?



Answer: ____________

11. The diagram shows three wheels of fortune, generating a three-digit number. The hundreds digit comes from the wheel on the left, the tens digit from the wheel in the middle, and the units digit from the wheel on the right. A prize is awarded if this three-digit number is divisible by 6. How many different winning numbers are there?



Answer: ____________

12. Daniel finished reading a comic book in 16 days. Then Ray starts reading the same book, and gets to the halfway point of it in 5 less days. If Daniel reads 6 pages per day more than Ray, how many pages does this book have?

Answer: ____________

13. There are five different red points in the plane. The midpoint of each segment joining two red points is painted black. What is the minimum number of black points?

Answer: ______________

Questions 14 to 15, 20 marks each

(Detailed solutions are needed for these two problems)

14. In how many ways can the numbers 1, 2, 3, 4, 5, 6, 7, 8 and 9 be divided into three groups of three such that the sum of the numbers in the second group is 1 less than the sum of the numbers in the first group but 1 more than the sum of the numbers in the third group?

Answer: __________ ways

15. Consider all integers between 100 and 999 inclusive such that the hundreds digit is equal to the units digit. If S is the sum of all such numbers, what is the digit-sum of S?

Answer: _______________