3ʳᵈ *International Mathematics Assessments for Schools* (2013-2014)

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.

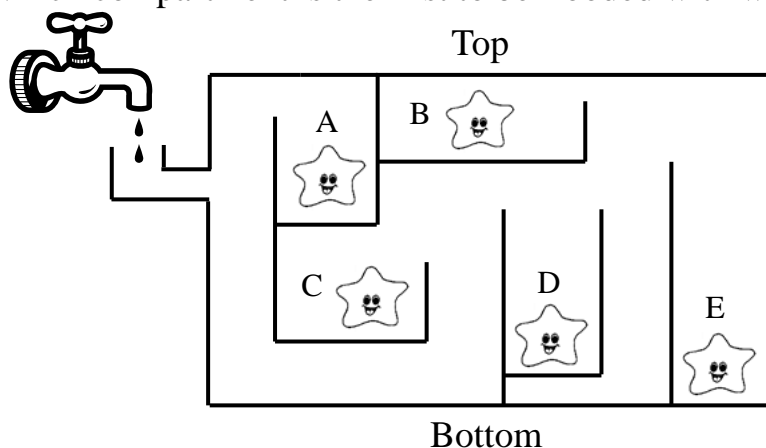| Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Score	Signature
Score																	
Score																	

Middle Primary Division Round 2

Questions 1 to 5, 4 marks each

1. The diagram shows an aquarium containing five starfish, each occupying a labelled compartment. Water is pumped into the aquarium through the pipe on the left side. Which compartment is the first to be flooded with water?

（A）A （B）B （C）C （D）D （E）E

Answer: _____

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2. When 10101 is subtracted from 10000000, how many times does the digit 9 appear in the difference?
（A）3 （B）4 （C）5 （D）6 （E）7

Answer: _____

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3. What is the sum of 32 copies of 1000, 19 copies of 100 and 29 copies of 10?
（A）3219290 （B）321929 （C）342190 （D）34190 （E）32129

Answer: _____

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4. The diagram shows a 6×8 chessboard with squares painted in black and white in an unusual pattern. Starting from the top left corner, a marker must move between squares which have opposite colours and share a common border. What is the minimum number of black squares it must visit in order to arrive at the top right corner, counting it as one of the black squares visited?
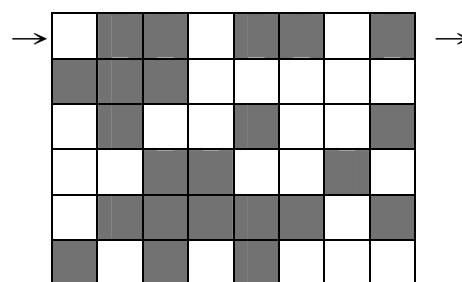
（A）3 （B）8 （C）9 （D）10 （E）11

Answer: _____

5. Max gives 27 apples to a group of friends. The numbers of apples they receive are consecutive positive integers. What is the maximum size of this group?
（A）2　　　　（B）3　　　　（C）4　　　　（D）5　　　　（E）6

Answer: _____

Questions 6 to 13, 5 marks each

6. When the digits 0, 1, 2, 5, 6, 8 and 9 are rotated 180°, they become 0, 1, 2, 5, 9, 8 and 6 respectively. What does 9105 become when the four-digit number is rotated 180°?

Answer: _____

7. An ant by itself is unable to drag a slice of bread back to the anthill. So summons 9 other ants to help, but the slice is still too heavy. So each of these 10 ants summons 9 other ants to help, and they manage to drag the slice back to the anthill. How many ants are involved?

Answer: _____ ants

8. Lily has 100 chocolates. She eats one on the first day. Each day after, she eats twice as many as the day before, until all the chocolates have been eaten. How many chocolates did she eat on the last day?

Answer: _____

9. A class is putting up 10 rectangular posters of the same shape and size on a wall. Each poster must be held in place by one nail near each corner. Adjacent posters may overlap slightly so that the same nail can serve to hold both of them. The diagram shows how 9 nails can hold four posters adjacent diagonally. What is the minimum number of nails required to hold all 10 posters?
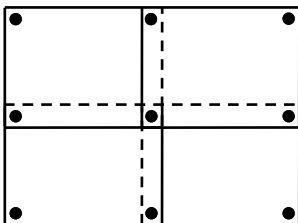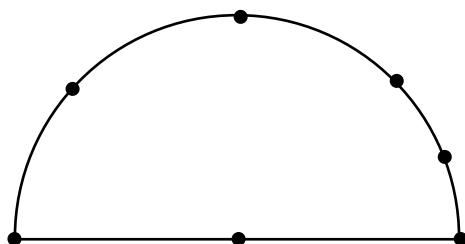

Answer: _____ nails

10. The diagram shows seven marked points, six on a semicircular arc, including both endpoints of the diameter, along with the centre of the arc. How many triangles are there whose vertices are all chosen from these points?

Answer: _____ triangles

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11. The diagram shows an addition of a three-digit number, a two-digit number and a one-digit number, with a three-digit sum. The same letter stands for the same digit and different letters stand for different digits. A question mark can stand for any digit, including those represented by a letter. What is the maximum value of the sum?

```
    X  Y  Z
       Y  Z
 +        Z
 ─────────────
    ?  ?  ?
```

Answer: _____

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12. Leon uses a code to convert a letter string consisting only of As, Bs and Cs, into a number string consisting only of 0s and 1s, by replacing A with 101, B with 11 and C with 0. If the number string obtained is 110101101110101, what is the number of letters in the original letter string?

Answer: _____ letters

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13. The total number of players on three badminton teams is 29. No two players on the same team play against each other, while every two players on different teams play each other exactly once. What is the maximum number of games played?

Answer: _____ games

Questions 14 to 15, 20 marks each

(Detailed solutions are needed for these two problems)

14. Some of the squares in the 6×6 table are shaded. The numbers of shaded squares in the respective rows and columns are indicated on the edge of the table, and there are no gaps between the shaded squares in any row or column. Show where the shaded squares are.

```
1 | | | | | | |
5 | | | | | | |
5 | | | | | | |
4 | | | | | | |
2 | | | | | | |
2 | | | | | | |
    2  3  6  5  2  1
```

```
1 | | | | | | |
5 | | | | | | |
5 | | | | | | |
4 | | | | | | |
2 | | | | | | |
2 | | | | | | |
    2  3  6  5  2  1
```

Answer: _____

15. A three-digit number is 13 times the product of its digits. The hundreds digit is larger than either of the other two digits. What is this number?

Answer: _____