7th International Mathematics Assessments for Schools (2017-2018)

Upper 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																	

Upper Primary Division Round 2

Questions 1 to 5, 4 marks each

1. Arranged 80 triangles in a row and color them black and white in a pattern as shown below. How many more black triangles than white triangles are there?

▲▲▲△△▲▲▲△△▲▲▲△△……

（A）10　　（B）16　　（C）18　　（D）20　　（E）25

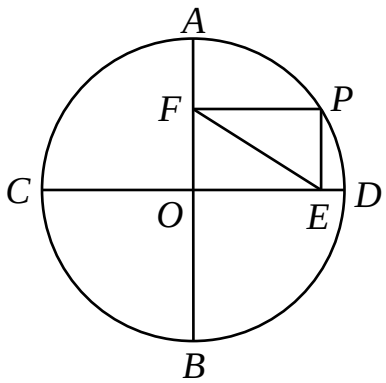
Answer：_____

2. The results of a math quiz of a certain class are as follows: 4 students got 100 points; the scores of 6 students are from 90 to 99; the scores of 18 students are from 80 to 89; while of 12 remaining students are from 70 to 79 and 10 students got below 69. The average of the class is 81.4. What is the total score of the class?

（A）4050　（B）3750　（C）4070　（D）3820　（E）Undetermined.

Answer：_____

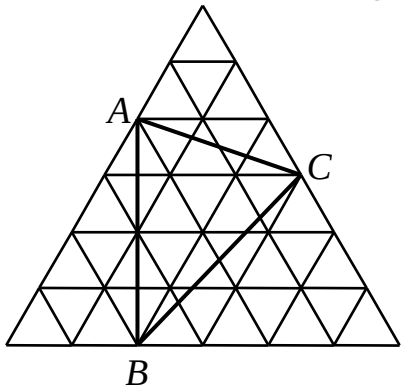
3. Let *AB* and *CD* be two perpendicular diameters of circle *O*. Draw two lines through any point *P* on the circle perpendicular to *AB* and *CD*, with intersections at *F* and *E*, respectively. If the diameter of circle *O* is 8 cm, what is the length, in cm, of *EF*?



（A）8　　（B）6　　（C）5　　（D）4　　（E）2

Answer：_____

4. The figure below is composed of 36 small equilateral triangles, with each having an area of 1 cm^2. What is the area, in cm^2, of triangle *ABC*?



（A）6　（B）8　（C）10　（D）12　（E）18

Answer：_____

5. After removing the decimal part of a certain positive number, 5 times the sum of the integral part and the original positive number is 22.1. What is the value of this positive number?

（A）4.42　（B）0.42　（C）4.41　（D）4　（E）2.42

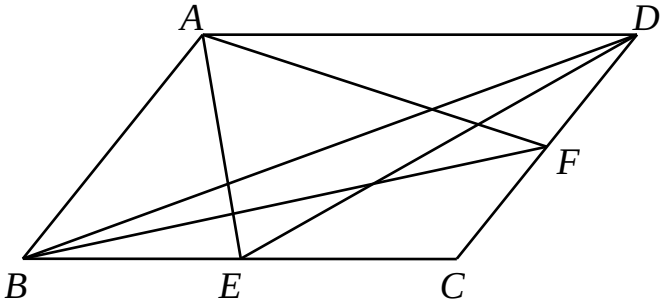
Answer：_____

Questions 6 to 13, 5 marks each

6. A box contains identical balls where 7 are black, 5 are white and 8 are red balls. What is the least number of balls that must be taken out from the box to get balls of each color?

Answer：_____ balls

7. In the figure, *ABCD* is a parallelogram, where *E* and *F* are midpoints of *BC* and *CD* respectively. Now connect *AE*, *AF*, *DE*, *BF*, *BD*. The area of *ABCD* is 4 cm^2. With three of *A*, *B*, *C*, *D*, *E*, *F* as vertices and present line segments as sides, how many triangles of area 1cm^2 can you find in the figure?

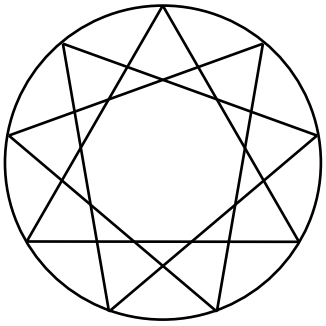


Answer：_____ triangles

8. A round table has 20 seats. Some seats are occupied such that a new person will always sit adjacent to someone wherever he is already seated. What is the least number of seats already occupied?

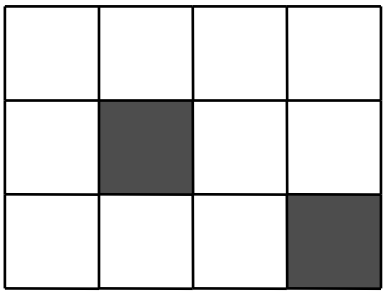
Answer： _____ seats

9. Rotate an equilateral triangle inscribed in a circle 40 degrees clockwise and counter-clockwise, as shown in the figure below. How many triangles are there in the figure?



Answer： _____ triangles

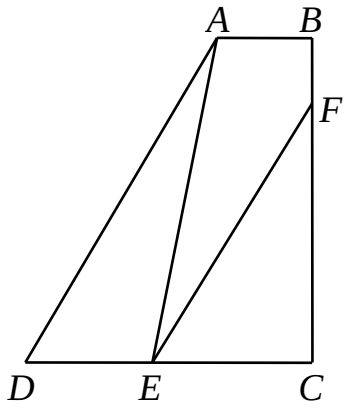
10. A rectangle is divided into 12 unit squares such that 10 are white and 2 are black, as shown in the figure below. To form a centrally symmetric picture by adding some white squares but no black squares, what is the least number of white squares needed?



Answer： _____ white unit squares

UP 4

11. In the figure below, $ABCD$ is a right trapezoid where $\angle ABC = \angle BCD = 90°$, $AB = 3\,\text{cm}$, $CD = 9\,\text{cm}$. Points E and F are on CD and BC respectively. If $BF = 2\,\text{cm}$ and AE with EF divides the trapezoid into three parts with equal area, what is the area, in cm^2, of $ABCD$?



Answer : _____ cm^2

12. A factory produces an order of parts. If the output per hour is 4 parts more than the original speed, the time spent is $\frac{1}{10}$ less than the originally estimated time. If the speed is 6 parts less than the original, the time spent is $\frac{1}{5}$ more than the original estimate. How many parts does the factory originally produce per hour?

Answer : _____ parts

13. A three-digit number is said to be "lucky" if it is divisible by 6 and by swapping its last two digits will give a number divisible by 6. How many "lucky" numbers are there?

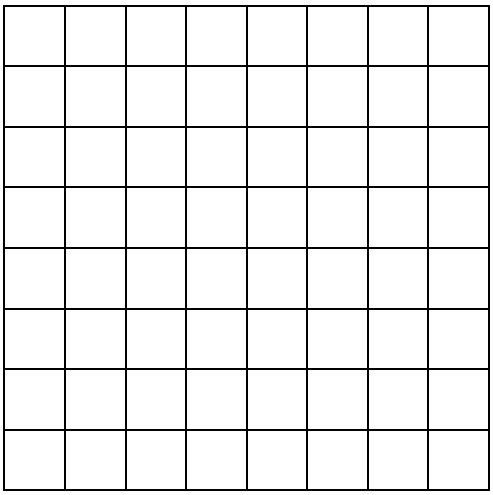
Answer : _____

Questions 14 to 15, 20 marks each
(Detailed solutions are needed for these two problems)

14. There is a sequence of five positive integers. Each number right after the first term is at least twice the number before it. If the sum of the five numbers is 2018, what is the least possible value of the last number?

Answer：_____

15. Some chess pieces are put on a 8×8 chess board, with at most 1 piece in each square. After taking all pieces on any chosen 4 rows and 4 columns, there is at least 1 piece left on the board. Find the least number of pieces originally on the board.



Answer : _____ pieces