注意：

允許學生個人、非營利性的圖書館或公立學校合理使用 IMC 各項試題及其解答。**可直接下載而不須申請**。

重版、系統地複製或大量重製本資料的任何部分，必須獲得 IMC 行政委員會的授權許可。

申請此項授權請電郵 IMC 行政委員會主席孫文先

ccmp@seed.net.tw

Notice:

Individual students, nonprofit libraries, or schools are permitted to make fair use of the papers and its solutions. Republication, systematic copying, or multiple reproduction of any part of this material is permitted only under license from the IMC Executive Board. Requests for such permission should be made by e-mailing Mr. Wen-Hsien SUN ccmp@seed.net.tw

International Mathematics Competition 2008 (IMC 2008)

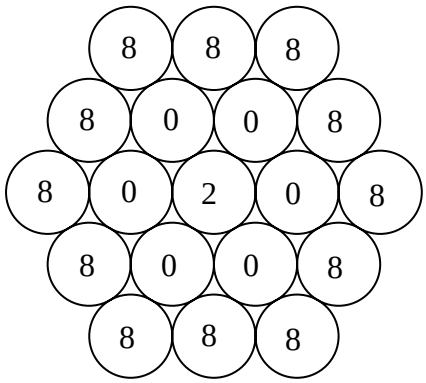
Elementary Mathematics International Contest

Individual Contest Time limit: 90 minutes 2008/10/28

Instructions:

- Write down your name, team name and candidate number on the answer sheet.
- Write down all answers on the answer sheet. Only Arabic NUMERICAL answers are needed.
- Answer all 15 problems. Each problem is worth 1 point and the total is 15 points.
- For problems involving more than one answer, points are given only when ALL answers are corrected.
- No calculator or calculating device is allowed.
- Answer the problems with pencil, blue or black ball pen.
- All materials will be collected at the end of the competition.

1. Starting from the central circle, move between two tangent circles. What is the number of ways of covering four circles with the numbers 2, 0, 0 and 8 inside, in that order?



2. Each duck weighs the same, and each duckling weighs the same. If the total weight of 3 ducks and 2 ducklings is 32 kilograms, the total weight of 4 ducks and 3 ducklings is 44 kilograms, what is the total weight, in kilograms, of 2 ducks and 1 duckling?

3. If 25% of the people who were sitting stand up, and 25% of the people who were standing sit down, then 70% of the people are standing. How many percent of the people were standing initially?

4. A sedan of length 3 metres is chasing a truck of length 17 metres. The sedan is travelling at a constant speed of 110 kilometres per hour, while the truck is travelling at a constant speed of 100 kilometres per hour. From the moment when the front of the sedan is level with the back of the truck to the moment when the front of the truck is level with the back of the sedan, how many seconds would it take?

5. Consider all six-digit numbers consisting of each of the digits '0', '1', '2', '3', '4' and '5' exactly once in some order. If they are arranged in ascending order, what is the 502^{nd} number?

6. How many seven-digit numbers are there in which every digit is '2' or '3', and no two '3's are adjacent?

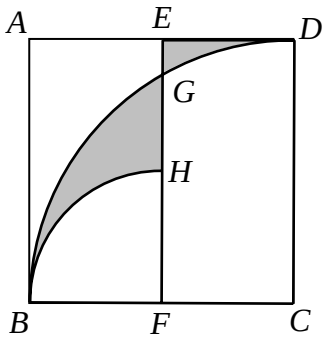
7. The six-digit number $\overline{abcabc}$ has exactly 16 positive divisors. What is the smallest value of such numbers?

8. How many five-digit multiples of 3 have at least one of its digits equal to '3'?

9. $ABCD$ is a parallelogram. M is a point on AD such that $AM=2MD$, N is a point on AB such that $AN=2NB$. The segments BM and DN intersect at O. If the area of $ABCD$ is 60 cm^2, what is the total area of triangles BON and DOM?

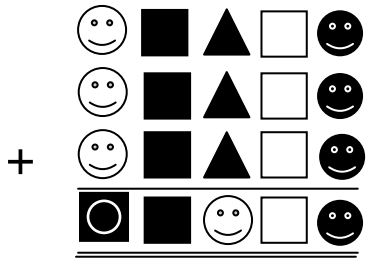
10. The four-digit number $\overline{ACCC}$ is $\frac{2}{5}$ of the four-digit number $\overline{CCCB}$. What is the value of the product of the digits A, B and C?

11. $ABCD$ is a square of side length 4 cm. E is the midpoint of AD and F is the midpoint of BC. An arc with centre C and radius 4 cm cuts EF at G, and an arc with centre F and radius 2 cm cuts EF at H. The difference between the areas of the region bounded by GH and the arcs BG and BH and the region bounded by EG, DE and the arc DG is of the form $m\pi - n$ cm^2, where m and n are integers. What is the value of $m+n$?



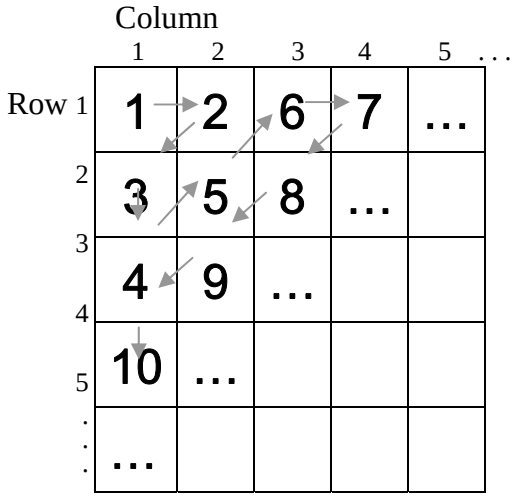
12. In a chess tournament, the number of boy participants is double the number of girl participants. Every two participants play exactly one game against each other. At the end of the tournament, no games were drawn. The ratio between the number of wins by the girls and the number of wins by the boys is 7:5. How many boys were there in the tournament?

13. In the puzzle every different symbol stands for a different digit.



What is the answer of this expression which is a five-digit number?

14. In the figure below, the positive numbers are arranged in the grid follow by the arrows' direction.

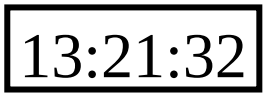


For example,

"8"is placed in Row 2, Column 3.
"9" is placed in Row 3, Column 2.

Which Row and which Column that "2008" is placed?

15. As I arrived at home in the afternoon. The 24-hour digital clock shows the time as below (HH:MM:SS). I noticed instantly that the first three digits on the platform clock were the same as the last three, and in the same order. How many times in twenty four hours does this happen?



Note: The clock shows time from 00:00:00 to 23:59:59.