

HKOI Introduction 2020/21

October 10, 2020



Hong Kong Olympiad in Informatics

- Annual software programming competition for secondary students
- Organizers:
 - The Hong Kong Association for Computer Education
 - Education Bureau, HKSAR Government
- Co-organizers:
 - Department of Computer Science and Engineering, The Chinese University of Hong Kong
 - Department of Computer Science, College of Science and Engineering, City University of Hong Kong



About us

Executive Committee

Chairperson

Oa Yang Hau Chung, HKACE (Yan Oi Tong Tin Ka Ping Secondary School)

Ex officio member

Technology Education Section, Curriculum Development Institute, Education Bureau, HKSARG

Vice-chairperson

Lau Chi Yung
Wong Man Hang
Wong Tsz Chun (Head, HKOI Training Team)

Members

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Chan Wai Chi
Cheng Hei Chit
Cheng Tsz Ying
Chiu Long Hin Vincent

Choi Chun Ming
Chow King Wang
Chow Kwan Ting Jeremy
Chung Wai Jit
Lee Ching Hei

Liu Man Kai
Ng Yau Fu
Wai Ka Hei
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Yuen Lok Kan Ethen

Scientific Committee

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Li Minming, Professor, Department of Computer Science, CityU
Cheung Chung Kin, HKACE (Lok Sin Tong Ku Chiu Man Secondary School)
Yu Chi Wing, HKACE
Lai Lok Tin, HKACE (Shun Tak Fraternal Association Leung Kau Kui College)
Hui Chun Kit, HKACE (Carmel Secondary School)
Tang Kam Hon (Ying Wa Girls' School)
Kwok Hung I Henry, HKACE (SKH Lui Ming Choi Memorial Primary School)
Wong Hong Wah, HKACE (Chinese Y.M.C.A. Primary School)



Contents of HKOI

- Write console applications
- Solve problems within the specified time and memory limit
- Emphasize on problem solving techniques and programming skills



Benefits of Participating in HKOI

- Improve your problem solving skills
- Prizes
- Chances to represent Hong Kong in international competitions
- Make new friends



- Heat
 - 90 minutes written test
 - Top **90** contestants of each group advance
- Final
 - 3 hours practical test
 - Medalist (Top half of each group) will be invited to the HKOI Training Team
- Training
 - January to April/May 2021
 - Weekly on Saturdays
 - Team Formation Test



Heat Event

- 300 students in each group will be admitted on a first-come-first-serve basis.
- List of participating school list will be posted on HKOI website



Heat Event

- 90 minutes written test
- Consisting of multiple-choice questions and short questions
- Bring: Student ID, HKID, Health Declaration Form, basic stationery, HB pencils, eraser
- No calculators, electronic devices, notes, textbooks...
- At most top 90 students from each group advance to final



Heat Event Structure

- Junior:
 - 5 True or False Questions (@1 mark)
 - 20 Multiple Choice Questions (@1 mark)
 - 8-12 Fill in the blanks (Variable)
- Senior:
 - 20-25 Multiple Choice Questions (@1 mark)
 - 8-12 Fill in the blanks (Variable)
- No marks will be deducted for wrong answer



Sample Questions (True or False)

- The ASCII code of 'A' is smaller than that of 'a'.
- The random seek time of a solid state drive (SSD) is slower than that of a traditional magnetic disk drive.
- It takes the same time to execute each line of code in a program.

Sample Questions (Multiple Choice)

- For C and C++, some includes would be omitted

- C

```
#include <stdio.h>
#include <string.h>
#include <math.h>
#include <stdlib.h>
#include <stdbool.h>
```

- C++

```
#include <iostream>
#include <string>
#include <cstdio>
#include <cmath>
#include <cstdlib>
using namespace std;
```

Sample Questions (Multiple Choice)

Dry Run

4. Consider the following program segment: 考慮以下程序段：

Pascal

```
function g(n: longint): boolean; forward;
function f(n: longint): boolean;
begin
  f := (n = 0) or g(n - 1)
end;
function g(n: longint): boolean;
begin
  g := (n <> 0) and f(n - 1)
end;
```

C / C++

```
bool g(int n);
bool f(int n) {
  return (n == 0) || g(n - 1);
}
bool g(int n) {
  return (n != 0) && f(n - 1);
}
```

What are the return values of $f(72)$ and $g(107)$ respectively?

$f(72)$ 和 $g(107)$ 的傳回值分別是甚麼？

- | | f(72) | g(107) |
|----|--|---------------|
| A. | false | false |
| B. | true | false |
| C. | true | true |
| D. | The program will not terminate on both calls. 程序皆不會終止。 | |

Sample Questions (Multiple Choice)

Mathematics

19. Two players are playing a game. In every independent round, both players have equal probability to win, and winner gets one point. What is the probability that, the first tie occurs at the end of the sixth round?

兩個玩家正在玩遊戲。在每一獨立回合中，雙方有均等機率獲勝，勝方取得一分。在第六回合結束時出現第一次打和的機率是多少呢？

- A. $\frac{1}{32}$
- B. $\frac{1}{16}$
- C. $\frac{3}{32}$
- D. $\frac{3}{16}$

Sample Questions (Multiple Choice)

Exhaustion

20. There are four doors numbered from 1 to 4. A gift is placed behind one of these four doors. You have the following information:

已知有四道編號為 1 至 4 的門，一份禮物被放置於其中一道門後。現有以下資訊：

Door 門	Time to unlock this door 解鎖此門所需時間	Probability of the gift behind this door 禮物被放置於此門後的機率
1	10 seconds 秒	0.1
2	10 seconds 秒	0.2
3	15 seconds 秒	0.2
4	40 seconds 秒	0.5

You are going to unlock the doors one by one in any order you want, until you find the gift. What is the best strategy to unlock the doors so that the expected time required can be minimized? (The time walking between doors can be omitted)

你正要按你所想的次序逐一解鎖這四道門，直至你找到禮物為止。若要將所需時間的期望值降至最低，解鎖這些門的最佳策略是甚麼呢？(可以忽略在門與門之間行走的時間)

- A. Door 1 → Door 2 → Door 3 → Door 4
1 號門 → 2 號門 → 3 號門 → 4 號門
- B. Door 4 → Door 3 → Door 2 → Door 1
4 號門 → 3 號門 → 2 號門 → 1 號門
- C. Door 1 → Door 4 → Door 3 → Door 2
1 號門 → 4 號門 → 3 號門 → 2 號門
- D. Door 2 → Door 3 → Door 4 → Door 1
2 號門 → 3 號門 → 4 號門 → 1 號門

Sample Questions (Multiple Choice)

Logic

8. Which of the following boolean expressions are logically equivalent?

以下哪些布爾表達式是邏輯上等價的？

- i. $((\text{NOT } a) \text{ AND } b) \text{ OR } (a \text{ AND } (\text{NOT } b))$
- ii. $\text{NOT } (a = b)$
- iii. $\text{NOT } ((\text{NOT } a) = (\text{NOT } b))$

- A. i and ii only 只有 i 和 ii
- B. i and iii only 只有 i 和 iii
- C. ii and iii only 只有 ii 和 iii
- D. i, ii and iii i、ii 和 iii

Sample Questions (Multiple Choice)

Data structures

21. Which of the following best describes the behaviors of stack and queue?
以下哪項最能描述棧和隊列的特性？

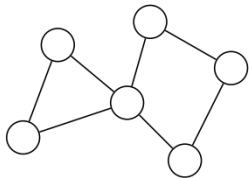
	Stack 棧	Queue 隊列
A.	First in, first out 先進先出	First in, first out 先進先出
B.	First in, first out 先進先出	First in, last out 先進後出
C.	First in, last out 先進後出	First in, first out 先進先出
D.	First in, last out 先進後出	First in, last out 先進後出

Sample Questions (Multiple Choice)

Graphs

21. How many ways are there to color all the vertices in the following graph in either red, green or blue, such that no adjacent vertices share the same color?

有多少種方法可以以紅、綠、藍填滿下圖的每一個點，使沒有兩個相鄰的點是同一個顏色？



- A. 18
- B. 24
- C. 36
- D. 48

Sample Questions (Fill in the Blanks)

Reminder

No marks will be given if length of answer is greater than the designated number of boxes

SECTION B 乙部

A

B

C

Final Event

- Duration: 3 hours



Final Event Structure

- Write solutions (complete and compilable programs) on computer
- C++11 (Dev-C++ 5.11)
- 2nd-class Language:
 - Pascal (Free Pascal 3.0.4)
 - C (C99) (Dev-C++ 5.11)
 - Java 8 (JDK 1.8.0)
 - Python 3.5 (Python 3.5.2)
- The program should be able to:
 - Input data from standard input (keyboard)
 - Solve the problem within limited time and memory
 - Output the answer to standard output (screen) strictly followed the format specified in the problem



Final Event Structure

Problem

Given two integers a and b . Calculate $a + b$.

Input

Two integers a, b ($0 \leq a, b \leq 1000000$) separated by a single space.

Output

Output the sum of a and b .

Final Event Structure

Problem

Given two integers a and b . Calculate $a + b$.

Sample Input

5 15

Sample Output

20

Correct Solution (100%):

```
1 #include <stdio>
2 int a, b;
3 v int main() {
4     scanf("%d%d", &a, &b);
5     printf("%d\n", a + b);
6     return 0;
7 }
```

Wrong Answer (0%):

```
1 #include <stdio>
2 int a, b;
3 v int main() {
4     scanf("%d%d", &a, &b);
5     printf("%d\n", a - b);
6     return 0;
7 }
```

Wrong Format (0%):

```
1 #include <stdio>
2 int a, b;
3 v int main() {
4     scanf("%d%d", &a, &b);
5     printf("A+B=%d\n", a + b);
6     return 0;
7 }
```



Final Event Structure

- Required techniques:
 - Mathematics
 - Control structures
 - String processing
 - Array processing
 - Errors and debugging
 - Data structures



Awards

- Only the performances in the Final Event count towards awards
- Medals for each group are awarded separately
- At most half of all finalists in the group receive a medal
- The ratio of gold, silver and bronze medals is about 1:2:3
- The minimum score for a Gold medal is the highest score such that at least one twelfth of all finalists in the group receive a gold medal.
- The minimum score for a Silver medal is the highest score such that at least one quarter of all finalists in the group receive a gold or silver medal.
- The minimum score for a Bronze medal is the lowest score such that at most one half of all finalists in the group receive a medal.



Awards

- Honourable Mentions
- Awarded to contestants who achieve a positive score but do not receive medals
- The minimum score for Honourable Mention is the highest score such that at least 70% of all finalists in the group receive either a medal or and Honourable Mention



Awards

- Best Young Contestant Award
 - The highest-scoring Junior Group finalist who is F.3 or below
- Best First-Time Contestant Award
 - The highest-scoring finalist who applied to participate for the first time in each group
- Eligible contestants who tie for the same highest score will all be awarded



Awards

- Each Gold, Silver and Bronze medalist will be awarded 5, 2 and 1 point(s) respectively
- The sum of points for all medalists in a school will constitute the school score
- The three schools with the highest school scores will be awarded Grand School Prizes



Tips and Preparation

- Do
 - Read the questions carefully
 - Watch out for tricks
 - Try fill-in-the-blanks, some of them are easy (Heat)
 - Score points for as many subtasks as possible (Final)
- Do not
 - Leave blanks
 - Stick with a single question for too long
 - Make presumptions for the problems
 - Exceed the provided spaces for fill-in-the-blanks (Heat)
 - Be obsessed by full solutions (Final)



Tips and Preparation

- Past papers (<http://hkoi.org/en/past-problems/>)
- Ask HKOI trainers for guidance
- Practice environment — HKOI Online Judge



Facebook Page

HHO
香港電腦奧林匹克競賽 HKOI
@hkoi.org

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BUSINESS INFO

Founded in 1997

CONTACT DETAILS

Info@hkoi.org
http://hkoi.org

MORE INFO

About
Hong Kong Olympiad in Informatics (HKOI) is an annual programming competition for secondary students in Hong Kong.
香港電腦奧林匹克競賽是一年一度的中學生電腦編程比賽。

Founding date
1997

Education



Facebook Group

f 香港電腦奧林匹克 HKOI 🔍

結果類型

- ★ 熱門搜尋結果
- 👤 用戶
- 🚩 專頁
- 📍 地點
- 👥 群組
- 📱 應用程式
- 📅 活動



HKOI 香港電腦奧林匹克

公開群組

This is a group for discussion of HKOI stuff. Welcome all to ...

240 位成員

Hackson Leung、Sunny Chow 和其他 55 位朋友 都在此...

✓ 已加入



香港電腦奧林匹克 HKOI

教育

417 個人對這個讚好

Leung Man Ho、Jonathan So 和其他 38 個朋友 都對此...

👍 讚好

