



奧冠教育中心

OLYMPIAD CHAMPION EDUCATION CENTRE

Room 309-310, 8 Jordan Road, Yau Ma Tei, Kowloon, Hong Kong SAR, CHINA

Tel (852) 3153 2028 / 9310 1240 Fax (852) 3153 2074

Website: www.olympiadchampion.com Email: olympiadchampion@gmail.com

香港國際編程競賽初賽 2019 – 2020 (香港賽區)



HONG KONG INTERNATIONAL COMPUTATIONAL OLYMPIAD

HEAT ROUND 2019 - 2020 (HONG KONG REGION)

C++

時限：60 分鐘

Time allowed: 60 minutes

模擬試題

Mock Paper

考生須知：

Instructions to Contestants:

1. 本卷包括 試題 乙份，試題紙不可取走。
Each contestant should have ONE Question-Answer Book which CANNOT be taken away.
2. 本卷共 20 題，答對得 2 分，空題得 0 分，答錯倒扣 1 分。
There are a total of 20 questions in this Question-Answer Book. Two points for correct answers. No points for incorrect answers. **ONE penalty point will be deducted for incorrect answers.**
3. 請將答案寫在 答題紙 上。
All answers should be written on ANSWER SHEET.
4. 比賽期間，小學組不得使用計算工具，中學組可以使用計算工具。
During the contest, NO calculators can be used for PRIMARY GROUP but calculators can be used for SECONDARY GROUP.
5. 本卷中所有圖形不一定依比例繪成。
All figures in the paper are not necessarily drawn to scale.
6. 比賽完畢時，本試題會被收回。
This Question-Answer Book will be collected at the end of the contest.

本試題不可取走。

THIS Question-Answer Book CANNOT BE TAKEN AWAY.

未得監考官同意，切勿翻閱試題，否則參賽者將有可能被取消資格。

請將答案寫在

答題紙

 上。

All answers should be written on the ANSWER SHEET.

DO NOT turn over this Question-Answer Book without approval of the examiner.
Otherwise, contestant may be DISQUALIFIED.

請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

選擇題 (第 1 至 20 題) (答對得 2 分, 空題得 0 分, 答錯倒扣 1 分)

Multiple Choice Questions (1st ~20th) (Two points for correct answers. No points for incorrect answers. **ONE penalty point will be deducted for incorrect answers.**)

1. What is C++?

- A. A out-dated language
- B. a interpreted language
- C. a compiled language
- D. a low level language
- E. None of the above

2. What is the expected output of the following code?

```
1 #include <iostream>
2
3 using namespace std;
4
5 int main(int argc, char **argv) {
6     cout << argc;
7 }
```

- A. 0 B. 1 C. Null D. Undetermined E. Compile Error

3. What is the value of this statement `true * false + (false + true) / 2.0`?

- A. false
- B. true
- C. 0
- D. 0.5
- E. 1

請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

4. What is operator overloading?
- A. Using the operator for too many times
 - B. Add user-defined action for a operand type
 - C. It has no specific meaning in C++
 - D. When operator is used not in its designed purpose
 - E. None of the above

Refer to the following code for question 5 to 6

```
1  #include <iostream>
2
3  using namespace std;
4
5  int main(int argc, char **argv){
6      int a = 2;
7      int b = a * a;
8      a *= b;
9      cout << a << b + a;
10 }
```

5. What is the expected output of the code?
- A. 24
 - B. 246
 - C. 248
 - D. 812
 - E. None of the above
6. What is the type of `a *= b`?
- A. It is an expression and does not have a type
 - B. int
 - C. Undetermined at compile time, determined at runtime
 - D. float
 - E. None of the above

請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

7. What is the expected output of the program?

```
1  #include <iostream>
2  #include <string>
3
4  using namespace std;
5
6  class Foo
7  {
8  public:
9      string bar = "Hello World";
10     Foo(string bar = "Hello"){
11         this->bar = bar;
12     }
13
14     Foo foo(){
15         cout << this->bar;
16         return *this;
17     }
18 };
19
20 int main(int argc, char **argv){
21     Foo f("bar");
22     f.bar = "foo bar";
23     cout << f.foo().bar;
24 }
```

- A. Hello Worldfoo bar
 - B. Hello WorldHello World
 - C. foo barfoo bar
 - D. foo barfoo barfoo bar
 - E. None of the above
8. Continue on question 7, is `f.foo().foo().foo().foo().foo()`; a valid expression? If not, why?
- A. Yes, this is a valid expression
 - B. No, this is not a valid expression because C++ does not allow expression without left-hand assignment
 - C. No, this is not a valid expression because `.bar` is not accessed
 - D. No, this is not a valid expression because it reaches maximum call stack
 - E. None of the above

請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

9. What is the expected output of the following code?

```
1  #include <iostream>
2  #include <string>
3
4  using namespace std;
5
6  class Foo
7  {
8  private:
9      string bar;
10 public:
11     Foo(string bar){
12         this->bar = bar;
13     }
14 };
15
16 int main(int argc, char **argv){
17     Foo f("bar");
18     f.bar = "foo bar";
19     cout << f.bar;
20 }
```

- A. foo bar
 - B. bar
 - C. bar foo bar
 - D. Compile Error
 - E. None of the above
10. Which of the following is the valid definition of a for-loop?

- A. `int i = 0; for(i < 5; ++i){}`
- B. `for(int i = 0;;){}`
- C. `for(int i = 0){ i < 5; if(i > 2) break; }`
- D. All of the above
- E. None of the above

請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

11. There are 3 access modifiers for class members. One is 'public' the other two are?
- A. private; none
 - B. privileged; preferred
 - C. private; protected
 - D. preferred; private
 - E. None of the above
12. State the truthfulness of the statement "recursion is always slower than for-loop and should be avoided at all cost"
- A. It is true, for-loop should be used all the time instead
 - B. It is true because compiler often cannot optimize against recursion
 - C. It is false because there is some cases only recursion is the only possible implementation
 - D. It is false because for-loop and recursion are interchangeable with comparable speed
 - E. None of the above

Refer to the following code for question 13 to 14.

```
1  #include <iostream>
2  #include <string>
3
4  using namespace std;
5
6  int foo = 2;
7  void func(int &foo){
8      foo *= foo;
9  }
10
11 int main(){
12     int bar = 5;
13     func(bar);
14     cout << bar + foo << bar << endl;
15 }
```

13. What is the output?
- A. 75
 - B. 95
 - C. 275
 - D. 2725
 - E. None of the above

請將答案寫在 **答題紙** 上。

All answers should be written on the ANSWER SHEET.

14. Which of the following is the equivalent implementation of the above code in pointers?

```
1 #include <iostream>
2 #include <string>
3
4 using namespace std;
5
6 int foo = 2;
7 void func(int *foo){
8     *foo *= *foo;
9 }
10
11 int main(){
12     int bar = 5;
13     func(&bar);
14     cout << bar + foo << bar << endl;
15 }
```

A.

```
1 #include <iostream>
2 #include <string>
3
4 using namespace std;
5
6 int foo = 2;
7 void func(int &foo){
8     *foo *= *foo;
9 }
10
11 int main(){
12     int bar = 5;
13     func(*bar);
14     cout << bar + foo << bar << endl;
15 }
```

B.

```
1 #include <iostream>
2 #include <string>
3
4 using namespace std;
5
6 int foo = 2;
7 void func(int *foo){
8     foo->foo *= foo->foo;
9 }
10
11 int main(){
12     int bar = 5;
13     func(*bar);
14     cout << bar + foo << bar << endl;
15 }
```

C.

D. All of the above

E. None of the above

15. Can the program entry point main() be replaced by another name?

A. No, it is required by the compiler

B. Yes, but only capitalized any characters from “main”

C. Yes, it can be changed to any name, just tell the compiler

D. Yes, main() is not recognized by all compilers anyway

E. None of the above

請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

16. What is std in `using namespace std;`?

- A. It is meaningless
- B. It is a namespace for standard library
- C. It is a namespace for user-defined functions
- D. It is declaring a namespace that encapsulates all user-written below the statement
- E. None of the above

17. Which of the following is/are correct import/include statement?

- A. `#import <string>`
- B. `from <string> import string`
- C. `#include "string"`
- D. B & C
- E. None of the above

18. What is the expected output of the following code?

```
1 #include <iostream>
2
3 using namespace std;
4
5 int main(){
6     int arr[] = { 72, 101, 108, 108, 111 };
7     for(char c : arr){
8         cout << c;
9     }
10 }
```

- A. 72, 101, 108, 108, 111
- B. 500
- C. Hello
- D. H E L L O
- E. None of the above

請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

19. The max value of a 32-bit int is 2147483647, what is the max value of a 64-bit long?

- A. 2147483647
- B. 4294967294
- C. 4611686014132420609
- D. 9223372036854775807
- E. None of the above

20. What is the expected output of the program?

```
1 #include <iostream>
2 #include <string>
3
4 using namespace std;
5
6 int main(){
7     cout << string("abc\0\1\2\3").length() << endl;
8 }
```

- A. 0
- B. 1
- C. 3
- D. abc
- E. None of the above

~ 全卷完 ~
~ End of Paper ~

請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

APPENDIX I: ASCII TABLE

Dec	Char	Dec	Char	Dec	Char	Dec	Char
0	NUL (null)	32	SPACE	64	@	96	`
1	SOH (start of heading)	33	!	65	A	97	a
2	STX (start of text)	34	"	66	B	98	b
3	ETX (end of text)	35	#	67	C	99	c
4	EOT (end of transmission)	36	\$	68	D	100	d
5	ENQ (enquiry)	37	%	69	E	101	e
6	ACK (acknowledge)	38	&	70	F	102	f
7	BEL (bell)	39	'	71	G	103	g
8	BS (backspace)	40	(	72	H	104	h
9	TAB (horizontal tab)	41	)	73	I	105	i
10	LF (NL line feed, new line)	42	*	74	J	106	j
11	VT (vertical tab)	43	+	75	K	107	k
12	FF (NP form feed, new page)	44	,	76	L	108	l
13	CR (carriage return)	45	-	77	M	109	m
14	SO (shift out)	46	.	78	N	110	n
15	SI (shift in)	47	/	79	O	111	o
16	DLE (data link escape)	48	0	80	P	112	p
17	DC1 (device control 1)	49	1	81	Q	113	q
18	DC2 (device control 2)	50	2	82	R	114	r
19	DC3 (device control 3)	51	3	83	S	115	s
20	DC4 (device control 4)	52	4	84	T	116	t
21	NAK (negative acknowledge)	53	5	85	U	117	u
22	SYN (synchronous idle)	54	6	86	V	118	v
23	ETB (end of trans. block)	55	7	87	W	119	w
24	CAN (cancel)	56	8	88	X	120	x
25	EM (end of medium)	57	9	89	Y	121	y
26	SUB (substitute)	58	:	90	Z	122	z
27	ESC (escape)	59	;	91	[	123	{
28	FS (file separator)	60	<	92	\	124	|
29	GS (group separator)	61	=	93	]	125	}
30	RS (record separator)	62	>	94	^	126	~
31	US (unit separator)	63	?	95	_	127	DEL