

Open Computer Science Test  
Solution Sketches

1. Ternary if-then-else, throws a NullPointerException() because Java require unboxing of value.
2. The tests for the first 3 if statements are false,
  - $A \&\& B \parallel C$  is false because  $A \&\& B$  is false and  $C$  is false.
  - $B \parallel C \&\& D$  is false because  $B$  is false and  $C \&\& D$  is false.
  - $(B \parallel C) \&\& D$  is false because  $B \parallel C$  is false.and the last test is true because  $D$  is true. So 4 is the value returned.
3. Easily checked.
4. Easily checked.
5. Tracing through the code with the given inputs results in "15 10".
6. Well-known fact about said algorithm.
7. Proper observation of Java's order of operations and data type/string concatenation will result in an answer of C.
8. Tracing through the loop, recognizing that Java integer division rounds down leaves the final value of total as 10 when the loop terminates. The loop terminates after the 5<sup>th</sup> cycle, so number is 5.
9. Starting at index 1 the loop goes over the array and if the index before the  $i$  th index is even, then it increments both the  $i$  th and  $i-1$  st entry.
10. The best response is A because it most appropriately stores each piece of information within each book. The others are non-intuitive and would be highly ineffective.
11. Doubles the input and prints in a comma-separated list until the number is above 100.
12. XOR returns false with input of two true.
13. Fact about binary search trees.
14. There are two possible configurations of nodes, but one of them results in a linked list not a binary tree. So the tree must be: A



15. Merge sort is  $n \log(n)$ , Bubble sort is  $n^2$ , and Bogosort is  $n*n!$ .
16. Constant, logarithmic, linear,  $n \log(n)$ , quadratic, cubic, exponential.
17. How a Queue is defined.
18. Prints  $1\%2$ , then  $2\%2$ , then  $4\%2$ , "100".
19. Definition.
20. Standard traversals.
21. Standard traversals.
22. Standard traversals.
23. Famous algorithm.
24. Char, byte, short, int, long, float, double, Boolean.
25. All are legal because you can cast up the inheritance tree, just not down.
26. Trivia.
27. Cannot cast a "Cliff" as an Object, caught by complier.
28. Legal cast, has method2 of "Hill".
29. Legal cast, has method1 of "Peak".
30. Legal cast, has method1 of "Peak" and method3 of "Gorge".