1. What is the role of a prototype program in problem solving?

the prototype program gives a general idea of what the end product will do, without the time and effort to write out the entire program.

2. What stages in the software life cycle are influenced by the testing stage?

Testing could affect all parts of the life cycle; it could make you go back to specification if it does not test well.

3. What are the main advantages associated with object-oriented programming?

Existing classes can be reused, program maintenance and verification are easier.

4. Where do C++ programs begin to execute?

C++ programs begin execution at the main function.

5. What is a variable?

A variable is a location in a computers memory where a value can be stored for use by a program.

6. Where are variables declared in a C++ program?

Variables are declared in the main function, before any operation is attempted with the variables.

7. What is the main difference between a while and a do...while statement?

A do...while loop will always execute atleast once, a while loop may never execute depending on teh conditions.

8. What is typically included in a class definition?

Data and functions

9. What is the difference between a data member and a local variable inside a member function?

data members local variables are declared in a function definition's body. they Cannot be used outside of that function body. When a function terminates, the values of its local variables are lost.

10. What is the difference between a constructor and a function?

A constructor cannot return values, not even void, but function get a return value.

11. When does C++ create a default constructor?

when a class does not explicitly include a constructor

12. How many constructors can be created for a class?

There can be infinite constructors as long as the signature is different.

13. What is the difference between a function prototype and a function definition?

Function prototypes describe the class's public interface

14. What is the role of a header-file?

To hide the definition and details of a class. Also to help readability of the main C++ file.

15. What does a function signature include?

the name of the function and the types of its arguments

16. What is the scope of global variables?

variables accessible anywhere in the program, as long as they are public.

17. How does the compiler handle inline functions?

For inline functions, the compiler creates a copy of the function's code in place so it doesn't have to make a function call and add to the function call stack.

18. What is the main advantage associated with function arguments that are passed by reference?

you don't make another copy and waste memory

19. How are overloaded functions differentiated by the compiler?

Compiler selects proper function to execute based on number, types and order of arguments in the function call.

20. When defining a recursive function, what are possible causes for infinite recursion?

Omitting the base case or incorrectly calling the recursive step.

21. What are the similarities between iteration and recursion?

anything you can do iterativly you can do recursively

22. What are the two different ways of specifying the length of an array?

In the declaration (int array [x]) or with an initilizer (int array[]={0,1,2,etc.}

23. What is the main difference between strings declared using the type string versus strings declared using an array of characters?

By using an array of characters, one can store and manipulate the strings rather than just having a type string variable.

24. How are arrays passed to functions?

#NAME?

25. What is the difference between an array declared as static, and one that is not?

An array declared as static is not created and and initialized each time the function and it is also not destroyed when the function terminates.

26. How many dimensions need to be specified when passing a multi-dimensional array as an argument to a function?

all of them.

27. In one sentence, what is the main idea implemented by insertion sort?

Takes an element of an array and compares it with the next element, depending on the values of the two elements they will switch and then the program will compare the new switched element with the next one in the array.

28. In one sentence, what is the main idea implemented by selection sort?

Selection sort searches the whole array for the largest item and puts it at the end of the array, then searches for the second largest item and puts it at the second to last spot and so on.

29. What is the number of operations for insertion sort under a best-case scenario, and what is the best-case scenario?

The number of operations for insertions sort, under best-case, is n(n-1)/2. The best case for insertion sort is on a sorted list where it runs is O(n).

30. What is the base case for a recursive implementation of merge sort?

The best case is the same as the worst case O(n log n) for a recursive merge sort.

31. What is a pointer?

A data type whose value refers to another value stored elsewhere in the computer memory using its address.

32. What does the address (&) operator return?

The & operator returns the address of a variable

33. What does the star (*) operator return?

it returns the information in the address the pointer points to.

34. How can an array be addressed in pointer/offset notation?

With int x[10]; int *xPtr; xPtr = x; Address &x;[1] is the same as xPtr + 1.

35. What does the sizeof operator return?

the size of the list object.

36. What are the different ways to pass a pointer to a function?

Nonconstant pointer to nonconstant data Nonconstant pointer to constant data Constant pointer to nonconstant data Constant pointer to constant data

37. What is a function pointer?

a pointer that contains the address of a function in memory.

38. What is a linked list?

A linked list is one of the fundamental data structures, and can be used to implement other data structures. It consists of a sequence of nodes, each containing arbitrary data fields and one or two references ("links") pointing to the next and/or previous nodes.

39. What is the main advantage of arrays over linked lists?

Access to a particular element is very fast, because its location in memory can be determined mathematically and accessed directly.

40. How are linked lists passed as arguments to a function?

you send a pointer to an object of the LinkedList class

41. What is the difference between a circular linked list and a basic linked list?

Circular linked lists are most useful for describing naturally circular structures, and have the advantage of regular structure and being able to traverse the list starting at any point.

42. What is the main advantage of a doubly-linked list over a basic linked list?

You can go backwards in the linked list and access previous data easier without having to keep track of the previous item

43. What is the main disadvantage of a doubly-linked list over a basic linked list?

increased actions to add and remove elements to the linked list.

44. What is a stack?

An ADT that stores a set of elements in a particular order. The stack principles are LIFO. The last item inserted in the list is the first out.

45. What are the two main functions defined by a stack?

push, which adds an element to the stack... and pop which takes an element off the stack

46. How can you implement a stack with an array?

Allocate an array of some size, bottom stack element stored at element 0

47. How can you implement a stack with a list?

Keep a pointer pointing to the last element entered at the front of the array and move the pointer "back" when you delete an element.

48. How are infix expressions evaluated by computers?

they are transformed into post-fix expressions, then evaluated with a stack.

49. What is a queue?

A data structure in c++ which is a collection of data that is kept in order. First in first out.

50. What are the two main functions defined by a queue?

The two main functions are enqueue which inserts an item at the back of the queue and dequeue which removes an item from the front of the queue.

51. How can you implement a queue with an array?

Keep track of the front and the back of the array as you increase and decrease the elements inside the array.

52. How can you implement a queue with a list?

you use the first element in the list as the remove point for the queue and insert items at the end of the list.

53. What is the stack operation corresponding to the enqueue operation in queues?

Enqueue is the queue equivalent of push, and dequeue is the queue equivalent to pop.

54. What is a tree?

A tree is a data structure where nodes are linked to each other in a hierarchical manner.

55. What is the height of a tree?

The height of a tree is the number of nodes on the longes path from the root to a leaf.

56. What is a leaf?

A node with no children.

57. What is a binary search tree?

A binary search tree is a binary tree where the value in any node 'n' is greater than the value in every node in n's left subtree but less than every node in n's right subtree.

58. What is the inorder traversal of a binary tree?

The in order is to go from left,root,right

59. How many comparisons does it take to find an element in a binary search tree?

nLog(n)

60. What are the elements typically included in a class definition?

data members, class variables, and functions

61. What are the access-specifiers that can be used in a C++ class definition?

local, global, local-variable, function specific

62. How are objects initialized when they are created?

Objects are initialized essentially as copies of the corresponding classes, complete with their own separate variables.

63. What is a function signature?

A function signature is the return type and accepted pass value type it takes

64. What is a recursive function?

a function that calls itself over and over until it finds the simplest form of solution, or the base case.

65. What is the alternative way to solve a problem that could be solved through recursive functions?

A recursive function can often be solved using an iterative function, which runs faster, but is often more complicated.

66. What is the difference between an array that is declared as static and one that is not?

An array that is declared static causes anything that is not initialized to be set to 0.

67. What is the main difference between a string of characters that is read into a variable of type string versus a variable of type char[]?

Character arrays will terminate at any whitespace, including spaces. Strings terminate when they encounter the new line character.

68. Briefly describe the divide-and-conquer paradigm.

Dividing a larger problem into the smallest incident of the problem and solving the smallest incident.

69. Briefly describe in one sentence how does merge sort work?

merge sort splits the array of elements into smaller arrays until the arrays reach size 1 and then the merge sort merges the smaller arrays into arrays of size 2 then it moves to the next step and merges the next arrays.

70. What is a pointer?

A pointer is a variable that points to the address location of another variable. Represented by (*).

71. What is the experimental approach for measuring the running time of an algorithm?

not answered

72. Briefly, how does selection sort work?

Selection sort works by finding the smallest element and then compares it with the largest and sorts the elements.

73. What is the advantage of linked lists over arrays?

Linked lists are not confined to a specific size, and can have elements added and removed far easier. They are also easier to traverse.

74. What is a queue?

like a linked list except it is first in last out

75. What are the main operations associated with a stack?

push,pop,search,isEmpty

76. What is the Euler tour traversal of a tree?

The Euler tour traverses through the tree in a rubber-band style shape.

77. How do you delete a node from a binary search tree?

In a binary search tree, you must first establish a proper replacement for the node you are about to delete, usually a child from the soon to be deleted node. Once that replacement node has been found, you simply reassign it to where the node that is going to be deleted is. After the deleted node has been usurped, you remove the deleted node from memory so it may be used again.

78. How many steps does it take to search a node in a binary search tree?

N, n being the number of nodes.