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

A prototype program provides a basic groundwork from which to further enhance and improve a solution to a problem.

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

The testing stage has a direct influence on the final version of a program, being as it is the debugging and finalization of a software revision.

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

Modular, reusable code, allowing faster deployment of solutions, and a more general view of a solution.

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

C++ programs begin execution at main.

5. What is a variable?

A variable is the memory address for a specific type of stored data, or from a mathematical perspective, a symbol representing a fixed definition with changing values.

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

Variables are usually declared at the beginning of a module of C++ code.

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

While tests for true first before running, do...while runs once first before checking.

8. What is typically included in a class definition?

It begins with Class, followed by the class name, then usually a constructor, data members and member functions that delineates the class is included in any class's definition.

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

A data member is a more general term describing all objects instantiated within a member function. "Local" in local variables refers more to the scope of a variable, which may be located in anything from a control structure to a class. Local variables whose scope are in a member function are the same as data members of member functions.

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

A constructor initialized values at the execution of its instantiation. It provides default values.

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

whenevery you dont specifiy your own

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

As many as you want, with different parameters.

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

A function prototype describes a class's public interface without revealing the class's member function implementations

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

A header file allows for the separation of declaration and implementation into separate files.

15. What does a function signature include?

input parameters and return type

16. What is the scope of global variables?

Global Variables can be used in any function as long as the appropriate .h file that holds the variable is included

17. How does the compiler handle inline functions?

The compiler can ignore the inline qualifier and typically does so for all but the smallest functions.

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

because you can't change the original and passing by reference limits memory needed for the program.

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

Actual arguments are associated with dummy arguments when a function or subroutine is referenced. In a procedure reference, the actual argument list identifies the correspondence between the actual arguments provided in the list and the dummy arguments of the subprogram

20. How are overloaded functions differentiated by the compiler?

by the number and type of arguments

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

no base case or if the programmar does not define the base case as the simplest case and it never gets reached

22. What are the similarities between iteration and recursion?

Both are based on a control statement; both gradually approach termination ending with a termination test; both involve repetition, and can both repeat infinitely if their termination requirements are not met.

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

with a number and with a variable

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

strings declared using an array of characters could result in data loss if character array not initialized large enough.

25. How are arrays passed to functions?

1st you must specify the array name without brackets and then the array name and size are passed as two arguments in the function call.

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

its not created and initialized each time program calls the function, and is not destroyed every time the function ends in the program.

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

None, just pass the array name.

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

Insert the item into its proper position by shifting larger sorted array values to the right.

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

finds the smallest element and places in 1st position. then the process is repeated on the rest of the array.

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

O(n)

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

The sequence of numbers has zero or one elements.

32. What is a pointer?

A pointer is a variable that contains a memory address of anther variable

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

returns the address of what it is put in front of

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

An array can be addressed in pointer/offset notation by setting a pointer variable equal to the variable name of the array. Elements of the array can then be accessed by adding an offset value to the pointer variable.

35. What does the sizeof operator return?

Returns the size of the array in bytes during the program compilation.

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

Nonconstant pointer to nonconstant data, constant pointer to nonconstant data, nonconstant pointer to constant data, constant pointer to constant data.

37. What is a function pointer?

a pointer that contains the address of a function

38. What is a linked list?

A series of "Nodes" structures with a value and a pointer that point to a similar "Node". Not quite an array, but still can carry a list of values.

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

Does not have a fixed size. Linked list is able to grow as needed. The time to access an array bases list takes a contant amount of time where as an linked-base like depends on 'i'

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

Any entitiy in an array may accessed immediately, whereas a linked list must be traversed one item at a time because each object only points adjacent objects

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

By passing the head pointer and going through the list as needed inside the function.

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

In the case of a non circular link list, if you are at the last node of the list and u want to move to first u need to go to one, step back till u reach to first. But in circular link list from last to first you need to make only one move. In a single link list u can move only in one direction but in double link list u can move in any direction back or forward or forward.

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

There are more pointers to set, the mechanics of inserting into and deleting from a doubly linked list are a bit more involved than for a singly linked list.

44. What is a stack?

a stack is a data structure that uses push to insert an item and pop to remove ad item. The stack use a last in first out structure for inserting and removing items.

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

Push (insert) and pop (retrieve).

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

You allocate an pre-defined array, the bottom element is stored at element 0, and the last index is the head.

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

use the add function with a list as the beginning of the stack and remove for pop

48. How are infix expressions evaluated by computers?

by being passed to the function by a leading term

49. What operations would you need to perform to find a given element on a stack?

if top item != given element pop the stack. Repeat until item is found or stack is empty

50. What is a queue?

A quese is an list that stores a set of elements in a particular order. It has Stack principle, but in this case, its "First In, First Out". The first element inserted is the first element to be removed.

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

enqueue, that adds an item to the queue dequeue, that takes the first item out of the queue

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

A pointer based implementation of a queue could use a linear linked list with two external pointers, one to the front and one to the back

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

By creating and adding nodes at the end of the list and removing the nodes from the beginning of the list.

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

push

55. What is the height of a tree?

The number of nodes on the longest path from the root of the tree to a leaf.

56. What is a leaf?

The node with degree 0.

57. What is a binary tree?

a tree where each node can have at most 2 children.

58. What is a binary search tree?

A binary search tree is a special binary tree arranged such that every left child node contains a value less than its parent, and every right child node contains a value greater its parent.

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

Level order traversal is a traversal method by which levels are visited successively starting with level 0 (the root node), and nodes are visited from left to right on each level, with Push and Pop methods.

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

Member functions and data members.

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

public private protected

62. How are objects initialized when they are created?

not answered

63. What is a function signature?

a function signature is the elements that make it unique such as the variables it calls for and also I suppose this includes the program it is in.

64. What is a recursive function?

A function that calls upon it self to solve a problem. Each time it calls upon it self it splits up a problem into a simplier form until it reaches a 'base case' which is the most simplest form of the problem.

65. What is a recursive function?

function that calls it self till the base case is met

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

iteration

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

a static array can be can be edited throughout the program, while a non-static array can only be edited within a given function

68. 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[]?

A string of characters is a specific variable type that has no extra data at the end. A string of type char[] is all the characters and a null ('\0')

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

divide the array in half, sort each half, then sort them back in one array

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

Divide recursuivly big array into two arrays, sort two array and merge them togather recuruivly.

71. What is a pointer?

a pointer points to a location in memory where data is stored

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

adding up the number of operations performed based on the worst case possible.

73. Briefly, how does selection sort work?

selection sort is when you pick a data member and put it in a new array, then you pick another data member and put it in order with the new array, then pick another and insert it in the correct place in the new array, etc etc

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

they dont have a fixed size, no shiftnig needs to be done for insertion/deletion.

75. What is a queue?

like a linked list expect first in last out

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

When you traverse a tree of any size you will visit each node three times. Its on the order of 3n or O(n) running time.

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

Traverse the tree and find the node, if the node has no children, simply delete it; otherwise set the node's data equal to the data of one of its children then set the pointer for that child to NULL.

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

The number of levels and the height of the tree