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

A prototype program simulates the behaviors of portions of the desired software product to allow for error checking.

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

Verification, coding, refining the solution and maintenance are all influenced by the testing stage.

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

The main advantages to object-oriented programming are that existing classes can be reused and program maintenance and verification are easier.

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

c++ programs begin to execute in the main method.

5. What is a variable?

A variable is a location in memory where a value can be stored.

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

Local variables are declared inside the method or function they will be used in at the beginning of the method. Global variables are declared outside of any function or method, generally before functions are defined.

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

The main difference between a while and a do...while loop is that the do...while loop always cycles through the loop at least once, but the while loop does not always do so.

8. What is typically included in a class definition?

Information telling the compiler what data members and member functions belong to the class.

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

A field variable is a variable that is declared as a member of a class. A local variable is avariable that isdeclared local to a method.

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

A constructor initializes an object or objects of a class. A function of a class performs a task such as display a line of text or do some kind of mathematical operations.

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

constructor is a special block of statements called when an object is created, either when it is declared statically or constructed on the stack. However a function is a portion of code within a larger program, which performs a specific task and independent to the rest of the code.

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

When you dont specify any constructors.

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

one

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

A function definition contains all the code for a function to work. A function prototype just shows the output, input and function name.

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

Allow compiler to recognize the classes when used elsewhere

16. What does a function signature include?

The name of the function and the types of its arguments.

17. What is the scope of global variables?

throughout the execution of the program

18. How does the compiler handle inline functions?

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

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

The original variable being referenced can be modified directly by the called function.

20. How are overloaded functions differentiated by the compiler?

it creates a set of candidate functions then a set of viable functions

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

No base case, or an incorrectly written recursion step that does not converge on the base case will lead to infinite recursion.

22. What are the similarities between iteration and recursion?

not answered

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

Specify an arrays size with a constant variable. And setting array elements with calculations.

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

The data class type string are designed to handle character data, and has many functions built into the class library to deal with them. An array of characters however is subject to all the same rules of any other array with no real additional functionality. Another difference is that the string class deals with the null character implicitly, unlike an array of characters, which must handle the null character explicitly.

25. How are arrays passed to functions?

By reference.

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

a static array has pre-runtime size and that size cannot be changed. A dynamic array gets its size at runtime.

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

All of the dimensions must be specified.

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

Assume the first number is sorted, then move down the list and 'insert' the numbers you come across into the corresponding place on the sorted side of the list.

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

find the minimum value in the list swap it with the first element in the list the find the second largest and swap it with the second element in the array continue like this until the array is sorted.

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

Best case is all elements sorted. n-1.

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

If the array being sorted has 0 or 1 elements

32. What is a pointer?

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

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

The address operator returns the memory address of its operand.

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

The value stored in the object being pointed to.

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

Element A[n] can be accessed by *(APtr + n)

36. What does the sizeof operator return?

Return size of operand in bytes

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

you can pass it where either the pointer cant be moved, the data pointed to cant be changed, or both or neither

38. What is a linked list?

A linked list is a list in which each item in the list points to the next item in the list.

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

Arrays must be of a defined size... elements can be added to a linked list w/o defining any size.

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

Arrays are easier to implement and require less memory

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

not answered

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

a basic linked list has an end with a null value where a circular linked list has a pointer from the end to the beginning

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

The advantage is that each node points to bothe its predecessor and its successor. There are no special cases for insertion and deletion.

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

The process of adding and removing Nodes in a Doubly linked list is more complex than in a basic linked list

45. What is a stack?

is a list of element where the first one to be removed is the last one inserted

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

pop and push

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

Stack usually holds a bunch of items with the same type, therefore u can use an array, to hold the content of the stack and an integer top that holds the index of the element at the top of the stack. u Choose an array size. Then the sequence of operations used. u have to decide what data types are needed for this stack data structure.

48. How are infix expressions evaluated by computers?

They are first converted to postfix expressions and then evaluated.

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

Using linked lists and stacks, you would need a temp stack to retain the values. Then you would use the Pop( ) function to pop off each element and then compare it. If its not the element your looking for, Push ( ) it to the temp stack. Repeat until the element is found. When you find it, Pop ( ) off the temp stack back onto the regular stack to have a complete stack again.

50. What is a queue?

Last in, last out architecture. It works the same way a line at the bank would work, the person that's been waiting the longest gets served first.

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

Remove the item added first, add items to the back.

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

It is an array of fixed size. A queue of maximum N elements.

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

by making the head of the list the beginning of the queue and the last listed item the insertion point of the queue

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

push

55. What is a tree?

A tree is a finite set of one or more nodes such that there is a specially designated node called the root. The remaining nodes are partitioned into n>=0 disjoint sets T the n plus 1, where each element set is a tree.

56. What is the height of a tree?

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

57. What is a binary tree?

A binary tree is a set of nodes that is either empty or partitioned into a root node and one or two subsets that are binary subtrees of the root. Each node can have no more than two children, a right and a left child.

58. What is a binary search tree?

a special binary tree that has a rule that all the subtrees on the right are smaller than the node value and all the subtrees on the left are larger than the node value

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

Left Child -> Parent -> Right Child

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

log (n) where n equals the number of nodes.

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

constructor, and function definitions.

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

public , private, protected

63. How are objects initialized when they are created?

with the default constructor for that object in its class. if no constructor is specified, it uses the default system constructor.

64. What is a function signature?

The order, number, and type of data items included inside the function parameters.

65. What is a recursive function?

a function that calls itself until the base cases are met.

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

iteratively

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

An array that is static does not change or uninitialize if called later unless explicitly acted upon. It does not terminate or change across objects. An automatic local array will be cleared and uninitialized if called later outside of it's specific scope.

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[]?

Type char[] may contain a null value as the last element, whereas type string will not.

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

The idea is to split the problem into half and solve for the smaller split-problems.

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

Take an array and split it into two, then solve these simpler problems and merge the two answers in correct order.

71. What is a pointer?

a pointer is a reference to a memory location.

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

Running the program with various input data and measuring the running time with system time.

73. Briefly, how does selection sort work?

Selection sort traverses an unsorted array looking for the smallest value, when it's found it is put at the beginning of the unsorted array. Performed several times, this will output a sorted array.

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

linked lists have an indefinite size, whereas arrays are a specific size.

75. What is a queue?

a first in first out list of items, like if you put 5, 4, 3, 2, and 1 in the queue it will when you dequeue items remove the items in the same order as put in, so thus it will put out, 5, 4, 3, 2, and 1 in that exact order.

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

push and pop

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

has preorder, in order, and postorder of a tree. preorder = puts the parent node in front of the child node(s). in order = puts the parent node between the left child and right child node(s). postorder = puts the parent node after the child node(s).

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

Set the nodes to NULL, where that it doesn't point to anything, and the use the DELETE opertator to clear space from memory.