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

it provides a limited proof of concept to verify with the client before actually programming the whole application.

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

Depending on how the work is done, Testing is spread throughout the process as to prevent errors from showing up later on due to lack of foresight.

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

Data Abstraction and control... it is possible to isolate elements from other elements a lot easier and prevent tampering of data.

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

The main function.

5. What is a variable?

a placeholder to hold information used in the program... for example: int can hold: 1, 2, 3, 4, 68, 72, 256, etc. float can hold: 1.54, 55.55, 1.24, 5.657, 8.8123, et. char can hold: A, B, C, D, E, F, !, 4, 5, 6, P, etc.

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

In the declaration of Functions, for statements, and while statements. in the body of If, For, while, do while, statements, in namespaces, headers, etc (almost anywhere.) anywhere in the program, as long as it is on it's own line.

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

a do... while loop will always run through once, while an while loop performs a test before running through the loop.

8. What is typically included in a class definition?

Member functions and data members.

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

The local variable is lost once it exits the block of code, while the data member is not.

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

a constructor initializes data members but the functions actually perform tasks. Constructors cant return values either.

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

When no constructor was specified in the constructor's class, but the class is instantiated in a program.

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

As many as are needed, depending on how many variables one wishes to directly modify or leave as default when instantiating an object.

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

a prototype declares what will be used in the program and the definition

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

create a comon area to contain reusable functions.

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?

Global variables have file-scope. The variable is know to all functions throught the file

17. How does the compiler handle inline functions?

It expands a small function out... making your code longer, but also makes it run faster.

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

Pass by reference is good for performance reasons, because it can eliminate the pass by value overhead of copying large amounts of data.

19. How are overloaded functions differentiated by the compiler?

The compiler distinguishes overloaded functions by their signatures. It encodes each function identifier with the number and types of its parameters to generate type-safe linkage, which ensures the proper overloaded function is called.

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

A base case that is the simplest case for a problem so that the function will lead to it, if this does not happen then it will end up as an infinite loop. And a condition to know when to terminate.

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

it has no base case, or the base case is never met

22. What are the similarities between iteration and recursion?

Based on control statement; involve repetition; involve a terminal test; both can occur infinitly

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

1-Initializing an array in a declaration with an initializer list 2-Specifying an arrays size with a constant variable

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

declaring a string, it includes white spaces but declaring a array of character does not include white spaces

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?

an array declared as static can only be declared once

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

all dimensions but the first

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

Every iteration of an insertion sort takes away an element from the input data, inserting it at the right position in the sorted list.

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

the selection sort chooses the largest or smallest value in an unsorted list and creates a new list using the selection depending on how it is sorted.

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

insertion sort will make zero operations (and length - 1 comparisons) in the best case scenario, that is, when the array its given is already in order.

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

the array has one element

32. What is a pointer?

it is a type that points to something else. It is the memory address of something else

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

The star operator returns a synonym for the object to which its pointer operand points.

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

An element b[3] can be referenced by using *(bPtr + 3) instead.

35. What does the sizeof operator return?

sizeof returns the size of the operand in bytes

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

pass by value and pass by reference with reference or pointer arguments.

37. What is a function pointer?

They are pointers that contain the addresses to functions, they can be passed and returned from functions, as well as stored in arrays and assigned to other function pointers.

38. What is a linked list?

A linked list is a chain of structs or records called nodes. Each node has at least two members, one of which points to the next item or node in the list.

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

A linked list may be increased in size as needed, while an array's size is set when it is created

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

You can go up and down an array , but you can only go one direction while traversing a linked list.

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

Linked lists permit insertion and removal of nodes at any point in the list in constant time,[1] but do not allow random access.

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

A doubly-linked list allows you to delete a node without traversing the list to establish a trailing pointer.

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

a node in a doubly linked list takes up more memory than a node in a singly linked list.

44. What is a stack?

Stores a set of elements in a particular order. Stack principle: LAST IN FIRST OUT. It means: the last element inserted is the first one to be removed.

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

pop and push

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

Use an index value called top to keep track of the last element in the array.

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

have the head of the list be the last item added, and a push just adds a new head.

48. How are infix expressions evaluated by computers?

by converting them to postfix expressions and putting the operations in a stack

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

createStack, push, isEmpty, pop, and a boolean return value.

50. What is a queue?

A Queue is a "first in first out" data structure, such that the first element added is also the first removed.

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

dequeue and enqueue

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

an array is a type of queue with a fixed length

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

temp->next= NULL; if (front) { (rear) -> next= temp;} else front = temp; rear = temp; }

54. What is a tree?

A tree is a finite set of one or more nodes with a specially designated node called the root and the remaining nodes are partitioned into disjoint sets where each of these sets is a tree.

55. What is the height of a tree?

The height is the number of generations (levels) from the root.

56. What is a leaf?

the last child on any branch

57. What is a binary tree?

a tree that has a maximum of 2 children per node

58. What is a binary search tree?

a binary search tree is a special tree in which each node has at most two children, labeled left child and right child

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

n-1/2 is the algorithm to compare and find an element.

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

return type and input parameters

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

Public and Private

62. How are objects initialized when they are created?

objectname classname(); to call a function from the class: objectname.funciton();

63. What is a function signature?

A function signature is a declaration of the function that includes the parameter types and the number of parameters.

64. What is a recursive function?

A base case that calls upon itself until the problem becomes smaller and terminates.

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

An alternative to solving a problem using recursive functions is to solve the problem using iteration.

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

A static array only has a specific size and it cannot grow. Also static arrays cannot be accessed outside the program which created it.

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[]?

the type char[] has a null ('\n') element at the very end.

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[]?

string of characters that is read into a variable of type string includes,

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

When a problem is too big, split it into smaller problems of the same type, and solve those, then from the solutions of the smaller problem, give the solution to the larger original problem.

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

merge sort splits an array into two halves and then sorts the two smaller arrays, and then merges them back together to form a sorted array

71. What is a pointer?

A data type that stores the memory address of another variable.

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

running the input with various inputs measuring the running time with system time

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

A link list can grow to a infinite size as a array has a fixes size.

74. What is a queue?

A queue is an abstract data type that performs operations on both ends of the list and exhibits first-in first-out behavior.

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

Push and pop

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

It is a tree that shows how it functions. It contains parents, children, siblings, ancestors and descendents. The use of tree type algorithm is also an alternative sorting algorithm.

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

Must delete the information that the node contains (to free up memory/ "garbage collect") and also delete the pointer (in that node's "parent") that points to the node you wish to delete.

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

log n