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

It tests the main function of the program while leaving out the finer details.

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

Elaboration, construction, and transition.

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

Encapsulation - Objects use operations without knowing how the operation works. Inheritance - cuts redundancy by reusing earlier classes. Polymorphism - objects select the correct operation to use in the situation.

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

The function main

5. What is a variable?

a stored value used by the program

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

After declaration of the variable's data type.

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

A while statement tests the condition before it can start. A do...while statement loops through once before the condition is tested.

8. What is typically included in a class definition?

public section and private section, and there must be a semicolon to set the end

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

Every member function can access and modify a data member. A local variable can only be used from the line of declaration to the next closing } before it is lost from memory.

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

a constructor does not need a type, and it is used to initialize the variables.

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

When no constructor exists when one is needed, a parameterless default constructor is declared.

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

A very large amount of constructors can be created for any given class through overloading. When two constructors with a different type or number of parameters are created, they are said to be overloaded, and C++ can recognize which constructor to use based on the type of the variables that are passed/returned.

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

A function prototype lays out the name, return type, and the number and types of parameters the function expects to receive in a certain order. The details for function prototypes are in the function definition.

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

to declare the functions being used in the classes

15. What does a function signature include?

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

16. What is the scope of global variables?

The entire program

17. How does the compiler handle inline functions?

the function is not treated as a separate unit like other functions

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

You do not alter the original value of the variable that was passed.

19. How are overloaded functions differentiated by the compiler?

Overloaded functions are distinguished by their signatures, Name mangling or name decoration, and type-safe linkage ensures that proper overloaded functions is called and types of the arguments conform to tpes to the parameters.

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

badly designed algorithyms. using recursion for a non recursive problem.

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

recursion refers to situations in which functions call themselves. These types of functions are known as recursive functions. That being said Infinite recursion occurs when the function is designed in such a way as to call it self forever without stopping possible causes

22. What are the similarities between iteration and recursion?

repetition, termination test, eventually terminate, occur infinately

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

Initializing the size in the brackets: int a[100]; Initializing the length by assigning variables: int a[] = {1,2,3};

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

an array of characters has one element a string doesnt have. it is the termination element, or "null"

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 exists in memory until the program terminates, whereas an automatic (or normal) array is removed when the function that created it terminates

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

the first needs to be specified by size and the rest need only be stated(first like this [3] then [][][])

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

the insertion sort creates a new array and inserts each item in its place with respect to the new array.

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

Selection sort finds the smallest number left unsorted in an array, and puts it at the end of what it has sorted

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

theta(n) the best case senario is that everything is already sorted

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

When there is only one element in the array, or when the starting element in the array is the same as the ending element.

32. What is a pointer?

A pointer is a way to get at another object. Essentially it is a way to grab an instance of an object and then either pass that instance a message or retreive some data from that object. A pointer is actually just an address of where an instance is held in memory.

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

Returns synonym for the object its operand points to.

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

you get the memory location of the first element and the you add an offset to it to get other elements.

35. What does the sizeof operator return?

The amount of memory required for a specific parameter such as ints, doubles.

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

you can pass them with the pointer (*) or the memory address (&)

37. What is a function pointer?

Pointer variables that point to function addresses.

38. What is a linked list?

An array based list that uses an implicit ordering scheme, often using pointers.

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

Array has a fixed size, but linked list is able to grow in size as needed

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

arrays allow for the random access of any item cotained a any time, linked lists must be gone through toget to the desired item

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

They are passed by reference because you want the function to change the pointer

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

A doubly linked list allows you to traverse the list in either direction. Each node points to its successor as well as to its predecessor.

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

You have to keep up with where you are and you have to consider the predecessor and successor connections when inserting/deleting.

44. What is a stack?

A stack is an ADT that stores a set of elements in a particular order.

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

push (add an element) pop (remove an element)

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

create an array and implement pointers that point to the next list item down and stack them up.

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

Create a new list. Pop elements in the stack as needed. Push the stack to remove items, unless the stack is empty. The top item is at the head of the list. The last item is at the end.

48. How are infix expressions evaluated by computers?

The computer converts the infix expression to postfix form. Then evaluates the postfix expression.

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

you would have to traverse the stack popping each element to search it

50. What is a queue?

Queue is a buffer, which store element in a particular order

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

enqueue and dequeue

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

your storage class has an array, and you keep track of the index of the first and last item in the array, and wrap around when end of the array is full

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

Push.

54. 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.

55. What is the height of a tree?

The height of a tree is the number of levels between the root and the leaf farthest away from it.

56. What is a leaf?

The last value in the tree. A value with no children attatched.

57. What is a binary tree?

a tree with elements that can contain at most two pointers

58. What is a binary search tree?

it is a binary tree where each node has a unique key, the left child of a node has only values less than that node, and the right child of each node has higher values than that node.

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

At most its equivalent to the height of the tree.

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

Constructor Data members Methods

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

public private and protected

62. How are objects initialized when they are created?

If the object refers to a class, the constructor(s) will initialize the objects based on return type and parameters passed. Compiler will auto-create one if one is not provided.

63. What is a function signature?

the declaration of the function.

64. What is a recursive function?

It's a function that calls itself. It runs multiple times until the base case is reached.

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

Iteration, this would be more efficient and has repetition structure.

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

Arrays declared as static are not created and initialized when a function is called and destroyed when the function terminates.

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[]?

a variable char is basically any non command key on the keyboard that you can press. A string is a collection of letters or numbers that is stored together to be used later. Comonly strings are used for words. Chars can be used for less but can have opperations performed on them in a useful way.

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

For example we have an array on n elements, the divide and conquer splits up the array into equal halves and repeats this process until each element is by itself

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

it is the separating of large program into smaller classes then until target is reached.

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

the merge sort continually divides the array (or set of containers) into halves, until it reaches the point where there is just one element left, then merges each of the sets of two sorted arrays (containers).

71. What is a pointer?

its like a variable but only holds an address in meomrry not the physical address.

72. Briefly, how does selection sort work?

it scans the list and selects the smallest(largest) element and places it in the front, increment the curPtr by one, scan the list again for the next smallest(largest) element and place it in with respect with the other sorted elements.

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

The advantage of linked lists is that they are not limited in size like arrays.

74. What is a queue?

First in first out.

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

The Push function and the Pop function.

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

Start from the root, circle around the _whole_ "tree", naming each node as you see it.

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

you replace the node with the largest element of its left subtree or replace it with the smallest element of the right subtree.

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

Depends on the location of the node you are looking for. If it is the root it is one step. else If it is smaller than the current you are on node you go to the left. If it is larger than the current node you are on go to the right.