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

you can break the whole program into prototype programs to simulate parts of the final program

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

Refining the solution

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

Encapsulation-objects combine data and operations Inheritance- classes can inherit properties from other classes Polymorphism- Objects can determine appropriate operations at execution time

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

in the testing phase

5. What is a variable?

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

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

local variables are declared inside the method while global variables are declared in the body.

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

a do while loop always executes once. A while loop's conditional statement has to be true for it to run.

8. What is typically included in a class definition?

A class definition usually contains the function and its data members

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

A local variable can only be accessed within the scope of its declaration.

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

A constructor is a method that starts new instances of a class. (Example: Employee employee1(parameters) starts a new instance of object of type Employee). A function is simply a module w/in a program that completes its single desired task.

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?

It depends what type of class is being defined. Typically you would have a constructor call for each object.

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

A function prototype tells the compiler the function name, return type and the number and type of parameters without revealing the implementations contained in the function definition.

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

The main role of header file is it is used to share information among various files.

15. What does a function signature include?

It includes the name of the program, the type of parameters it can take. It should also include a brief description of what the function does.

16. What does a function signature include?

a function's return type and parameter list

17. What is the scope of global variables?

File scope

18. How does the compiler handle inline functions?

Compiler generate a copy of the function's code in place (when appropriate) to avoid a function call

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

The data can be modified directly instead of making a copy of the data. Improves execution time with large amounts of data.

20. How are overloaded functions differentiated by the compiler?

They are differntiated by number, types and order of arguments in the function call.

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

no base case, as in a single return that does not include calling the function again. a static value to end at.

22. What are the similarities between iteration and recursion?

they are methods of repeating the same task.

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

You can use an initializer list, or simply tell the compiler how many elements you want in the array. For an Initializer list: int a[] = {10, 2, 3, -4, 5}; For an elemental declaration: int b[5]; Both arrays have 5 elements in them, but array a is already initialized.

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

if by type string, the array contains an additional terminating null character

25. How are arrays passed to functions?

specify the array name without brackets.

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

static cannot be changed

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

Every dimension after the first.

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

Insertion sort removes an element from the data, and inserts it at the correct position in the already sorted list.

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

Select the minimum number from the array and put it in the current position, then move on

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

O(n), the list is already sorted.

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

n * log(n)

32. What is a pointer?

It is a variable that contains not only a *value but has a memory address associated with it, and can be moved along a string or an array by jumping up one memory address.

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

returns the memory address of its operand

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

It dereferences a pointer, meaning it returns the value stored in the memory address a pointer refers to.

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

&b;[3] bPtr + 3

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

They can be passed by value or by reference

37. What is a function pointer?

A pointer to a function is the address where the code for the function resides. They can be passed to functions, returned from functions, stored in arrays and assigned to other pointers.

38. What is a linked list?

A list of items linked together. Each item is linked to its successor.

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

A linked list is not fixed in size, and does not require the shifting of items during insertions and deletions.

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

Arrays, being fixed, are less error prone.

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

A method with access to a linked list's head pointer as access to the entire list

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

in a circular linked list the last element points to the head of the list

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

given a node in the list, one can navigate easily in either direction

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

increased memory requirements, slightly more complicated when modifying elements in the list

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

Push and pop are two main functions defined in a stack

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

If you use a dynamically allocated array, you must provide a destructor and copy constructor.

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

Use the head as the top of the stack, only modify the head when you push/pop... push would add a new item to the head, pop would remove the item from the head.

48. How are infix expressions evaluated by computers?

they are converted to postfix

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

Basically pop the stack until you find the given element.

50. What is a queue?

Like a linked list but first in first out

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

enqueue and dequeue

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

create a fixed array size, with with 2 integers to point to the beginning and the end of the que, and special cases to know when the que is empty or full.

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

create a node with the input data, continue to add to the list. when dequeueing - get the first elements data and set the next element in the list as the new first element

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

push

55. What is a tree?

A nonlinear, two-dimensional data structure.

56. What is a leaf?

A leaf is a node with no children.

57. What is a binary tree?

a tree with up to two children or a right subtree and/or a left subtree

58. What is a binary search tree?

a binary tree in which the data is in order from left to right.

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

the root is in the middle. The left subtree is traversed first, then the root, and finally the right subtree.

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

(n^k)-1 where k is the height of the tree

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

Data variables and Functions, Data members

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

public or private

63. How are objects initialized when they are created?

using constructor

64. What is a function signature?

A function signature, used in a function's prototype, is the set of object types it take in as parameters, with or without names given for the objects.

65. What is a recursive function?

a function that calls itself in the definition code

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

Using an iterative solution. For, while, or do while loop.

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

an array that is declared as static can only be used in the function that its being called in. Its a constant array. Static is another way of say const.

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[]?

char array needs an end character signature and is made up of characters each separate from each other, a string is an object in itself, with a value that the user enters.

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

It divides the problem into singular units and works on the problem piece by piece until the problem is solved.

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

it splits a large array into small arrays and recurs until the array is a size of 1, and then merges all of the arrays back together until the source array is completely sourted.

71. What is a pointer?

it contains a object's memory address

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

adding a time marker at the before the algorithm is called and another time marker immediately after so that you have the change in time, then you can calculate the efficiency by the speed of the computers cpu.

73. Briefly, how does selection sort work?

Selection sorts works by going through a certain list. Goes through the unsorted list and selecting the largest item in the list and placing it in a sorted array. There are two arrays, unsorted and sorted. Complete these steps until the list is sorted.

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

Linked lists have a dynamic size, where as arrays have a static size.

75. What is a queue?

an ordered list that performs task in the order of first in first out. adding items to the queue places items behind the rest of them. taking items off the queue takes the one that has waited the longest.

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

the main functions defined for a stack are push, which puts an element on the top of the stack, and pop, which removes an item from the top.

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

not answered

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

you cannot delete a node because that can cause a node to have more than 2 children