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

To simulate problem solving for parts of the problem

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

Refining.

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

Data encapsulation concept,the use of functions or methods to manipulate data.

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

In the main() function.

5. What is a variable?

A pointer to a location in memory.

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

Global variables are declared in the body of the code. Local variables are declared in the function they are to be used (unless the function is being passed a variable). Variables should always be declared before use.

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

Do ...while runs the embedded code at least once, the do command does not necessarily

8. What is typically included in a class definition?

A class definition typically includes function definitions.

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

Local variables are used only within the scope of its declaration

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

a constructor initialises everything so that nothing is left empty or with random varioubles and a function modifies those variables with data.

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

Before the main function of the code.

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

as many as you want

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

a function prototype is used to reference the compiler to a function that will be defined later on, a function definition is the actual function itself, complete with return type, parameters, etc...

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

Header files declares the class member functions.

15. What does a function signature include?

It includes a function name and parameter list. Does not include return type. Function signatures must be different.

16. What is the scope of global variables?

A global variable is an identifier that retains it's value throughout the execution of the program. It has file scope.

17. How does the compiler handle inline functions?

The inline keyword advises the compiler to copy the function's code in place to avoid function calls; however the compiler can and typically does ignore the inline qualifier for all but the smallest functions.

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

Overall the program has better performance (means it is faster) because it does not have to copy large amounts of data.

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

only the memory address is sent to the function, so no copy of the object sent needs to be made. It makes the function run faster, and saves memory.

20. How are overloaded functions differentiated by the compiler?

By the number, and the types and order of the parameters.

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

Either omitting the base case, or writing the recursion step incorerectly

22. What are the similarities between iteration and recursion?

They both use repetition, a control or test to terminate, and both can infinitely repeat if not defined correctly.

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

specify the number of elements in the array declaration with a constant or using a constant variable for future scalability

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

when using an array individual characters can be accessed and manipulated.

25. How are arrays passed to functions?

specifying array name and passing as reference in an argument into the function

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

Static arrays are created and initialized only once, and the values aren't destroyed when the function terminates in the program. Automatic arrays reset everytime the function is called.

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

at least 2, but it should always equal the number of dimensions that the argument is expecting... like... blah[][][][] will require 4 dimensional array input. blah[][][] will require a 3 dimensional array. blah[][] will require a 2 dimensional array.

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

Inserting array items in to their appropriate positions from smallest to largest at a pivot which starts on the second element of the array.

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

Search for the largest item in an array and swap it with the last unsorted item.

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

worst case its = O(n) time best case its = O(n^2) time

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

if (right > left) { mid = (right + left) / 2; m_sort(numbers, temp, left, mid); m_sort(numbers, temp, mid+1, right); merge(numbers, temp, left, mid+1, right); }

32. What is a pointer?

A pointer variable contains the number of a memory address as its value, which may be null or 0, or the address of some value stored in memory.

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

the memory address of its operand

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

The array itself can be signed to a pointer or each element of the array can be assigned to a pointer.

35. What does the sizeof operator return?

It returns the size of an array in bytes.

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

by address &bPtr; or directly bPtr.

37. What is a function pointer?

A pointer to a function that contains the addresses of the function.

38. What is a linked list?

A linked list is a data structure containing one or more data elements with a pointer to the next node.

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

They grow as needed, while arrays are of fixed size.

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

link lists only allow sequential access where arrays allow random access

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

by refrenece

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

in a circular linked list, the last object is linked back to the first object.

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

In a doubly linked list, there are more pointers to set and the mechanics of inserting and deleting are more difficult. Also, the special cases at the beginning or end of the list are more complicated.

44. What is a stack?

A list in which only the top (or last item added) can be modified.

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

Adding a new item and removing the item

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

Allocate an array of some size. The bottom stack element is stored at some element. Last index in the array is the top. Increment top when one element is pushed, decrement after pop.

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

make a list, make the bottom the head, add on the end and make the end top

48. How are infix expressions evaluated by computers?

By throwing variables into a postfix expression and operands onto a parentheses regulated stack until end parentheses and enough variables to operate on are encountered.

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

Depends on the type of stack, on a true stack you will haft to pop all of the elements of the stack until you find the element you want, and then after that you will need to push all the elements that where removed back in to the stack in the order that they where removed. With a Java style stack, where there is a peek function, it will return the element you wanted instead of requiring you to perform all the excessive actions that are required from a true stack.

50. What is a queue?

object that stores elements in order that follows first in first out. the first element added is the first one to come off.

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

enqueue, dequeue

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

Using an array for a queue, the size of the array allocated limits the size of the queue. An array based queue class must keep track of both the front and back of the queue, which may need to wrap around the array.

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

remove the first element and reference the second element as the new head 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 height of a tree is the number of nodes on the longest path from the root to a leaf.

56. What is a leaf?

A leaf is a node with children, it is a terminating node.

57. What is a binary tree?

a list of numbers that are ordered compared to how they compare to the other numbers already added in the tree

58. What is a binary search tree?

a set of numbers arranged by links. each node can contain two pointers to other elements. each node to the left of the parent is smaller and each node to the right is larger. recursive implementation implies that if traversed in order, the output would be sorted

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

it means that you traverse one subtree of a node, then look at the node itself before traversing the other subtree of the node

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

Class is user defined. It contains members, data and functions. The keyword class is used and includes brackets ({})

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

The access specifiers are public and private.

62. How are objects initialized when they are created?

They are initialized as a named instance of the template formed by the class. This named instance can then be modified to be different from the class that it was created from.

63. What is a function signature?

Name of the function, parameters it must receive in order to perform and a return type.

64. What is a function signature?

function sig is, is what is the class recognizes as the main function, or rather its specification

65. What is a recursive function?

A function that calls itself. Usually used to split a problem into several smaller problems of the same type.

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

iterative functions

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

A static array cannot be changed. A regular array can be changed when it is passed to a function or manually.

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[]?

an array of characters has one more element, its last element,the terminating element, or null, which doesnt exist in a variable of type string

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

Divide the big problem into small problem, solve small problem and join small solved elements of the problem. if there is two ore more elements in the array, divide the array into parts and compare the elements, after comperison, conquer the elements. If array have n element, first half have n/2 elements

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

merge sort uses the divide and conquer strategy, sorting an array in parts, then merging the sorted parts back together.

71. What is a pointer?

Pointer is a variable which have a memory address of a variable.

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

to measure the actual time of the program to run. and calculate the running time using the input and operations done

73. Briefly, how does selection sort work?

It starts at the first element and replaces it with the smallest element found to the right. It then repeats with the next element in the list.

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

linked lists do not have to have a specified size, they are easier to add to and remove from

75. What is a queue?

A queue is a data structure that holds a set of objects, which has a FIFO (first in first out) priority.

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

push and pop

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

if root, set root to NULL else if deleting right leaf, set rightPtr of parent node to NULL else if deleting left leaf, set leftPtr of parent node to NULL else if deleting a left or right subtree child node, set the max leaf child in the left subtree as the new child node.

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

log(n) steps