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

it simulates the behavior of portions of the desired software product

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

1- specification 2- design 3- risk analysis 4- verification 5- coding 6- testing 7- refining 8- production 9- maintenance

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

1- Existing classes can be reused 2- Program maintenance and verification are easier

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

they beging to excute at main

5. What is a variable?

it is a location in memory where value can be stored

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

global variables are declared in the main function local variables are declared in any other function

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

a while loop checks if the condition is true or not first, if it was true, it excutes the statement. a do.. while loop executes the statement before it checks the condition. if the condition was true it would excute the statement again. so a do...while loop would excute the statement atleast once.

8. What is typically included in a class definition?

class name, two curly prenthesis, public and private

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

a local variable is only useable within the function it is defined, whereas a data member is available to any method within its class

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

A constructor is used to create an instance of a class and has the same name as that class. A function cannot have the same name as a class and computes data.

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?

One

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

Function prototypes tell the compiler the function names, its return type, and the types of its parameters where as, function definitions actually implement the member functions.

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

to separate the source code from the main function, allows the methods/classes to be included in the program without direct coding. allows re usability.

15. What does a function signature include?

function name, and input paramaters

16. What is the scope of global variables?

Global variables all have file scope.

17. How does the compiler handle inline functions?

it treats them as the same function

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

Gives called function the ability to access and modify the caller's argument data directly.

19. How are overloaded functions differentiated by the compiler?

unique function signatures

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

no base case no change in values.

21. What are the similarities between iteration and recursion?

Both rely on repetition, both have a base case, both can become an infinite loop. Anything recursive can also be solved with iteration.

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

Pass the length along with the array or use a vector.

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

Unlike in a string declared using type string, in a string declared using an array of characters the programmer must provide the null terminating character and must ensure the array is large enough to hold the string and null terminating character.

24. How are arrays passed to functions?

a reference pointer to an element in the array.

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

a static array will store the new values that were assigned to each of its elements. meaning if you call a function twice it will use the last values that were returned the first time. if you don't declare it static then the new values will not be stored and will be reset to their original value

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

if they are declared fixed or static that means they can't change size once their storage has been allocated, however one that is not or dynamic arrarys can be resized.

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

1 less than the total number of dimensions

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

Insertion sort is a simple sorting algorithm, a comparison sort in which the sorted array (or list) is built one entry at a time.

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

The run time for this sorting program is n^2. Best case is the list is already sorted, worst case is the list is sorted but in reverse.

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

The base case for a recursive implementation of merge sort is when the sequence being passed to merge sort has less than 2 elements.

31. What is a pointer?

A pointer is a variable which stores the address of another variable.

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

returns the place in memory of that element

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

The dereferencing operator returns the dereferenced object.

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

you can have a pointer to the front of the array and add to the memory location (or offset from the initial value).

35. What does the sizeof operator return?

The size of an operand in bytes. Used with variable names, type names, and constant values

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

1. nonconstant pointer to nonconstant data. Its delcaration does no include const qualifier. 2. nonconstant pointer to constant data. Provides the performance of pass-by-reference and the protection of pass-by-value 3. Constant pointer to nonconstant data. 4. Constant pointer to constant date.

37. What is a function pointer?

A function pointer contains the memory address of a function. Using a function pointer, a function can be passed to or returned by another function. Function pointers can also be stored in arrays.

38. What is a linked list?

the items of a data structure are linked to each other using pointers

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

Array can retrieve memory from any place in the list while in a link list you have to traverse through each individual node.

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

By using a node.

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

The last item in the list points to the head

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

You can traverse forwards and backwards through nodes.

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

Each node requires an extra pointer (space requirements increased), Insertion or deletion of a node takes a longer (more pointer operations).

44. What is a stack?

Stores a set of elements in a particular order based on the principle of Last In First Out (LIFO).

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

Push and Pop are the two main functions of a stack

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

define an array and keep track of a pointer to the last element as items are added

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

using pointer

48. How are infix expressions evaluated by computers?

Computers convert an infix expression into a postfix expression. They then push the numbers onto a stack and pop them out as they are needed.

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

you would need to perform a search through the list of elements (i dont really understand what this question is asking....its not very clear?)

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

enqueue which adds data to the queue and dequeue which deletes data from the queue

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

By implementing an array and only adding items to the end of the array and only removing items from the beginning of the array.

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

Have a pointer to the last element in the list and then use enqueue to insert items there. Link the first and last elements together to dequeue the list.

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 number of levels of a tree, like a tree can have at minimum a depth of 3 and at most a height of 8 for 8 nodes.

56. What is a leaf?

A leaf is a node with no children.

57. What is a binary tree?

A binary tree is a special type of inverted tree in which each element has only two branches below it.

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

(Left side of tree) (Root) (Right side of tree)

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

log(n)

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

A class definition typically includes the class name, the classes constructor(s), and any extra functions and class variables.

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

Private, Public, Protected, or Friend.

62. How are objects initialized when they are created?

variables are set to a given value, or 0 if none is given.

63. What is a function signature?

The function's name, as well as what it returns and what it accepts.

64. What is a recursive function?

A recursive function is a function that calls itself. Usually called the base case. If the base case is not correct it causes a infinite loop.

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

Using iteration loops.

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

Arrays declared static can not be changed. One not declared static can be altered.

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[]?

an array of characters stores a null character at the end

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

Split the problem into smaller, more manageable parts, and proceed to address the smaller problems.

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

divides the line in half coninuously until you get to only a single value then recombine the values to form a sorted line.

70. What is a pointer?

A data type that points to an address in memory which contains certain information. Used for pass-by-reference to save memory.

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

measuring the relationship of running an algorithm with different input sizes.

72. Briefly, how does selection sort work?

You select the smallest element and place it on the left. You select the smallest element and sort it with respect the the item already on the left. You continue this till the end of the collection of items.

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

The main advantage to a linked list is that it can have it's size adjusted during runtime.

74. What is a queue?

It is a particular set of entities that are put in to a certain order by the enqueue and the dequeue functions.

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

Push and Pop. Push adds an element to the stack, while Pop removes the top element from a stack.

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

children to root

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

the deletion of a node depends upon if it has children and if it is an AVL binary search tree. Assuming it is not an AVL tree, and the node being deleted has no children, you just set its pointer to null. If it has a left child or a right child exclusively, that child replaces the deleted node, if it has two children, the left most child of the right sub tree (or right most child of the left subtree)will replace it

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

O(Log (n))