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

To ease the understanding of problem under discussion and to ease the understanding of the program itself

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

Removing logical errors, testing for valid data, random data and actual data.

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

Existing classes can be reused Program maintenance and verifications are easy

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

At main

5. What is a variable?

Location in memory where a value can be stored.

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

inside the function scope and outside of the function scope in case of global variables

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

A do-while passes atleast 1 time before checking the condition, however, a while would fail to enter the loop if the condition fails in its first place.

8. What is typically included in a class definition?

a constructor and several data members, and at least one public data member or method

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

a local variable in a member function has to be static. a data member can change its value freely.

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

A constructor is a function used to initialize an object's data when it is created. It's call is made implicitly when the object is created and must be defined with the same name as the class. Constructor also cannot return a value like a function can.

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

When you do not provide your own constructor.

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

several

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

prototype states all functions in that class before compilation, where the definition actually holds the source for the functions

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

It contains reusable source code for use by other classes.

15. What does a function signature include?

The signature can include a result type and thrown errors.

16. What is the scope of global variables?

The scope of global variables is at the file level.

17. How does the compiler handle inline functions?

If the function is small enough it will expand it but it will run faster as it will avoid making so many calls to the 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.

19. How are overloaded functions differentiated by the compiler?

It examines the names, types, and order of arguments on each function.

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

Incorrect or missing base case. Must reduce to the base case. The function must get simpler each time it is run (converge to the base case).

21. What are the similarities between iteration and recursion?

Iteration and recursion have many similarities: both are based on a control statement, involve repetition, involve a termination test, gradually approach termination and can occur infinitely.

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

You can initialize and array by using an initializer list in its declaration or by initializing its size with a constant variable.

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

the type string uses less storage and you have to change the string all at once. with an array of characters you can make permutations of words using the characters stored in the array, without needing to actually access and change the variables. with an array of characters you can just change how they're accessed.

24. How are arrays passed to functions?

by reference only

25. How are arrays passed to functions?

The function reads the variables, stores them. then returns the what ever the variable reads. The function then prints the content of the array.

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

a static array is allocated when the program starts and is freed when the program exits but has limited scope, while an array that is not declared static is allocated and freed when it comes into and out of scope.

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

two or more

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

you take each element and insert it in the correct position with respect to all the elements before it

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

Find the minimum value in the list swap it with the value in the first position; repeat the steps above for remainder of the list(starting in the second position.

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

The base case for a recursive merge sort is one number. One number by itself is a sorted list, regardless of what number it is.

31. What is a pointer?

A pointer is a variable that contains a memory address as its value.

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

Returns the memory address of its operand.

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

The * operator returns the dereferenced pointer variable (ie: it returns the value of whatever variable the pointer is pointing to)

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

*f[3]

35. What does the sizeof operator return?

The sizeof operator returns the total number of bytes of its operand.

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

you can pass the reference or the dereference in a function

37. What is a function pointer?

a pointer that contains the address of the function definition

38. What is a linked list?

linear collection of self-referential nodes connected by pointers.

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

The size of array is restricted to declaration. Insertion/Deletion of values in middle of array is not possible.

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

- A function with access to a linked list's head pointer has access to the entire list. - Pass the head ponter to a function as a reference argument.

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

the circular linked list's last node points to the begining of the list while a standard linked list points to NULL

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

Double-linked lists require more space per node, and their elementary operations are more expensive; but they are often easier to manipulate because they allow sequential access to the list in both directions.

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

nodes take up more memory

44. What is a stack?

a stack is an Abstract data type which operates on a last in first out basis for storing a list of objects, and does not support (at least in the pure stack) peeking at a element without removing the rest of the stack first.

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

push and pop, push puts an object into the list, and pop takes the last object off.

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

Create an array, size N. N++ when one element is pushed. N-- when one element is popped.

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

A singly linked list can already be easily used for LIFO data storage. Members of a stack can simply be pushed and popped from a list, the first item in will be the last out.

48. How are infix expressions evaluated by computers?

When an operand is entered, the computer Pushes it onto a stack When an operator is entered, the computer Applies it to the top two operands of the stack Pops the operands from the stack Pushes the result of the operation onto the stack

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

you would pop each element and compare it to what you are looking for and then push it back on the stack so that it is not lost

50. What is a queue?

The queue is another data structure. A physical analogy for a queue is a line at a bank. When you go to the bank, customers go to the rear (end) of the line and customers come off of the line (i.e., are serviced) from the front of the line.

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

you create an array with the max size of your queue and adjust the items to make them follow FIFO procedure.

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

You can use list to represent the items in a queue.

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

push = enqueue pop = dequeue

54. What is a tree?

A set of one or more nodes that are hierarchically organized, with one special “root” node.

55. What is the height of a tree?

The intensity of the children. Say you begin with one node, Thats one height. Then you add two children to that node and then two children to each of those nodes and two children to each of THOSE nodes. Youre current height would be 4.

56. What is a leaf?

an endpoint on a tree that contains no pointers or pointers that are set to null

57. What is a binary tree?

a binary tree is a special type of tree where each node can only have at maximum 2 children

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

Its used to visit nodes of a binary search tree in a search key order.

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

n-1

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

The return value and the accepted value.

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

static, long, unsigned

62. How are objects initialized when they are created?

<variable type> <variable name>; or, if you want to initialize a variable to a certain value, <variable type> <variable name> = <value>;

63. What is a function signature?

The function signature tells what the function parameters and includes all the function calls

64. What is a recursive function?

A function that calls itself to perform a certain task

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

iterative

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

a static array has a predetermined size and that size cannot 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[]?

A string contains a null character at the end of the string, which makes it easily possible to get the string length. A char array can have a virtually unlimited length, therefore, its size must be declared/limited.

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

to divide one larger string/line of values and sepereate them into smallers lines to easily manipulate them and then replace them in the order in which they should be.

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

Merge sort uses the "divide and conquer" idea where it divides the array in half multiple times and then joins each element of the array back into one sorted array. This is one of the best sorting algorithms besides Quicksort.

70. What is a pointer?

A pointer is a variable that holds a memory address or location of another variable.

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

Experimental means you would actually write a prototype of the algorithm and measure the time it takes to run given certain parameters.

72. Briefly, how does selection sort work?

selection sort selects the smallest element out of the list then the second smallest ....and sorts them acordingly.

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

You do not have to predetermine your list size as you do with arrays. Linked list have the ability to be as large as you want them adding memory as needed.

74. What is a queue?

A queue is a data structure that inserts data into a FIFO configuration, that is, data input to the structure is always at it's end, and data taken is always from the beginning.

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

push and pop.

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

You travel the outside edge of the tree, clockwise, while naming each node.

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

delete node;

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

O(log n)