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

A program that simulates the behavior of portions of the desired software product.

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

The refining step, the production step, and the maintenance stage.

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

Existing classes can be reused, and program maintenance and verification are easier.

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

The main method.

5. What is a variable?

A location in memory where value can be stored.

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

Inside the method.

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

The loop of a do...while statement always executes once.

8. What is typically included in a class definition?

a public and private area that includes the functions and variables that are used in the class

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

A data member is globally accessible, while a local variable is only accessible inside the member function.

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

constructors cannot return values, so they cannot specify a return type like functions can.

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

when a constructor is not provided by the programmer of the class

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

One

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

prototype only tells the user what data types go into a function and what type is returned.

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

To provide information about the contents of a library. It includes the definition of classes, declarations of functions, data types, and constants.

15. What does a function signature include?

It includes the name of the function and the types of its arguments.

16. What is the scope of global variables?

Global variables have file scope.

17. How does the compiler handle inline functions?

It expands the function's definition in that place. Once the functions is called you can use it as many times as you need. The compiler just expands on the function.

18. How does the compiler handle inline functions?

the function call will be replaced by the code that was defined in the inline function

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

You are able to modify the variable that is referenced directly.

20. How are overloaded functions differentiated by the compiler?

Compiler selects proper function to execute based on number, types and order of arguments in the function call.

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

Infinite recursion may occur if no base case is defined or if the call is not varied.

22. What are the similarities between iteration and recursion?

both based on a control statement, both involve repitition, both involve a termination test, both gradually approach termination, both can potentially occur infinetly.

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

either initializing the array with a specific length or initializing an array while declaring its contents.

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

Char array - Individual letters can be accessed directly with array subscript notation. String array - array subscript will return the entire string.

25. How are arrays passed to functions?

by reference by default, unless you specify const, at which the later will make the array unmodifiable.

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

Static arrays are those with a declared size, that is known to the program, whereas non-static arrays leave the size undeclared and open so it can be assigned later. Usually used for input purposes.

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

All dimensions except for the first one need to be specified when passing an array to a function, the compiler needs to know how many memory addresses to skip to make it back to the 2nd element in the first dimension. The size of the first dimension does not need to be specified.

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

Insertion sort progresses through a list of elements and determines where the next element should be inserted into an already sorted array starting with sorting and using the first two elements.

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

It runs through and finds the lowest (or highest) value and puts it in its desired position.

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

Best case is N, while the worst case is N factorial.

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

There is only one element in the subarray.

32. What is a pointer?

Is a reference call to the place in memory where the object is stored.

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

The & is a unary operator that returns the memory address of its operand

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

it returns the actual data at the address pointed to

35. What does the sizeof operator return?

The sizeof operator returns the size of the operand.

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

Pass-by-value or pass-by-reference.

37. What is a function pointer?

A pointer to a function itself, contains the address of the function and can be used to call that function

38. What is a linked list?

Information in memory linked to the next piece of information and can only be linked forwards and not backwards.

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

Linked lists have an indefinite size. They can be added to and taken away from very easily with little difficulty in the shifting of data.

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

Array-bases implementations require less memory than a pointer-bases one.

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

linked lists are passed by reference, specificly the Head pointer

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

A circular linked list does not have a last element. Instead, it's last item points to the head of the list.

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

The primary disadvantage of doubly linked lists are that (1) each node requires an extra pointer, requiring more space, and (2) the insertion or deletion of a node takes a bit longer (more pointer

operations).

44. What is a stack?

Stores a set of elements in a particular order.

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

push and pop.

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

You predetermine the size of the stack as you would an array. This type can not grow.

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

Creating a linked list. Add an element to the top of the stack when pushing and deleting an element when popping.

48. How are infix expressions evaluated by computers?

in postfix format

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

Keep popping nodes and storing them in an alternate stack until the given element is found, then pop the given element and push the previously popped nodes back onto the stack.

50. What is a queue?

A first in, first out Abstract Data type that can be used to store values.

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

enqueue and dequeue

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

fixed size array with max N elements. Need to keep track of front and rear of array.

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

each element of a queue can be allocated in the nodes of an linked list. New elements should be added to the head of the list, with each dequeued element coming off the tail.

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

push

55. What is the height of a tree?

Each level of a generation in the tree, some people do not count the root as a generation

56. What is a leaf?

a node with no children.

57. What is a binary tree?

A binary search tree is a tree that also has the condition that each node may have at maximum 2 children

58. What is a binary search tree?

A binary search tree is a finite set of nodes that is either empty or consits of a root and two disjoint binary trees call the left and right subtrees.

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

You traverse all the nodes to the left, then visit the root, then traverse all the nodes on the right.

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

access specifiers and functions, oftentimes a constructor.

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

Public and private specifiers.

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

public private protected

63. How are objects initialized when they are created?

they are initialized to 0

64. What is a function signature?

the signature of a function includes the name of the function, the number and types of parameters, and the return type

65. What is a recursive function?

A function that calls itself over and over again till a base case is reached, then it returns back to the original function.

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

itteration, like a for loop, a while loop, or a do while loop

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

by defining static array it doese not lose scope in locala function. static array makes programm more scalable. non static array lose scope inside the local function.

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[]?

A string type string acts as a single object, with individual char entities accessible only through specific string class functions. A char array is less robust, but allows direct access to specific char entities.

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

the divide and conquer paradigm is a recursive solution that keeps dividing the problem into halves until a base case is reached.

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

Take the initial array and split it into two, temporary, smaller arrays, sort the two smaller arrays, and merge them back into a single array.

71. What is a pointer?

a variable that stores the address of a memory location

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

In experimental terms, the running time of an algorithm is measured by the number of operations required to complete the function. This number can usually be expressed in big-O notation.

73. Briefly, how does selection sort work?

select an element compare it with 2nd element if it is greater, swap it

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

they are resizeable

75. What is a queue?

Is a list of items where the the user only has access to the first element and each new element is added at the end.

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

push and pop

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

traversing a tree level by level

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

pointer to the child and delete it has 2 children set the node to the child and delete it. the node to th middle will then take its place