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

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

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

The second half of the Elaboration phase, Construction phase, and the Transition phase.

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

One of the main advantages is you can hide inner details a technique known by encapsulation. Objects combine the data and operations but you cannot see how it works. Another advantage is you can reuse classes that have been defined earlier in the program, a method known as inheritance. Finally another advantage is objects can determine appropriate operations at execution time a technique known as polymorphism.

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

They begin to execute at the funcion main().

5. What is a variable?

It is a location in the computer's memory where it can be stored for use by a program.

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

They are usually declared at the beginning before they can be used in the program. They always contain a name and a data type.

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

The main difference between a do and a do...while statement is in a do...while statement is the statements in a do block are always executed atleast once. The while statement will only execute if its condition is true.

8. What is typically included in a class definition?

Member functions and data members belonging to the class.

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

data members are declared in a class definition but outside the bodies of a class's member-function definitions. Local variables are declared in a function definition's body

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

A constructor is automatically called whenever an instance of a class is created, a function must be explicitly called by the user.

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

When it the programs compiles

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

any number you want

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

A prototype shows only return types and necessary parameters. The definition includes names for those parameters and defines what the object is actually capable of doing.

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

A header file consists of "reusable" source code such as a class in a file that by convention has a .h filename extension. This differs from .cpp files that contain "source-code."

15. What does a function signature include?

A function signature consists of the function prototype. This tells you the general information about a function, its name, parameters, what scope it is in, and other miscellaneous information.

16. What is the scope of global variables?

they can be accessed by any C++ file anywhere.

17. What is the scope of global variables?

variables that exist throught the entire script. their values can be changed anytime in the code and fucntions.

18. How does the compiler handle inline functions?

it generates a copy of the functions code in place to avoid a function call

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

it takes less memory, thus it would make the program faster

20. How are overloaded functions differentiated by the compiler?

By the number, types, and order of their arguments

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

Either omitting the base case, or writing the recursion step incorrectly so that it does not converge on the base case

22. What are the similarities between iteration and recursion?

Both are bases on a control statement. Both involve repetition. Both involve a termination test. Both gradually approach termination. Both can occur infinitely.

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

Supply an integer inside the brackets or the compiler counts the number of elements in the initializer list. int n[5]; int n[] = { 1,2,3,4,5 }

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

the array of characters has a set length, while the type string has virtually unlimited length.

25. How are arrays passed to functions?

They are called by the function then the function must loop through the array to get the set of characters.

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

A static local array exists for the duration of the program and its elements are initialized to 0 if not explicitly initialized. So a static local array's elements will still be the same when called later unless specifically initialized to something else. This doesn't happen for automatic arrays.

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

when passing (in main) a multidimensional array to a function, no dimensions need be specified

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

The main idea behind insertion sort is to take a random variable from the right and insert it in order to the left.

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

Find the smallest value in the list and make it the first element, then find the smallest value of the leftover list and make it the first element of the leftover list and continue until the list is sorted.

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

1 where there is a list of two ints and only one must be moved.

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

A single Element on the Array.

32. What is a pointer?

An element that references a memory cell

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

It returns the memory address of it's operand. That is, if applied to a normal variable, it gives the variable's memory address, just as a pointer variable might.

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

a synonym for the object to which its pointer operand points

35. What does the sizeof operator return?

the number of bytes of an array during program compilation.

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

Four different ways: Nonconstant pointer to nonconstant data, a nonconstant pointer to constant data, a constant pointer to nonconstant data and a constant pointer to constant data.

37. What is a function pointer?

a pointer to a function

38. What is a linked list?

A data structure in a sequence of nodes, each containing arbitrary data fields and one or two references ("links") pointing to the next and/or previous nodes.

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

Linked lists can be grown dynamically, items don't require shifting, and they have a greater awesome factor than that of arrays.

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

Array items are accessed directly with equal access time

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

the pointer to the first element is passed to a function

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

in a circular linked lists, the last element points to the first

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

Gives faster times for some operations such as insertion and deletion

44. What is a stack?

A stack is an abstract data type that is based on the principle that the last element inserted into the stack will be the first element removed from the stack.

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

Pop function and Push function

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

if you used an array to implement a stack when you add an element just add it to the end of an array and remove items from end of array also.

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

Declare a pointer that points to the head of the linked list, only add and remove nodes from the beginning of the list.

48. How are infix expressions evaluated by computers?

The computer translates the infix expression to a postfix expression, then solves.

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

pop all elements off stack until you find that element and then push the popped elements back on the stack

50. What is a queue?

Its like a stack, but uses the linked list to stack a little differently. It's FIFO so the first thing enqueued is the first thing dequeued

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

enqueue and dequeue

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

To use and array to implement a Queue, element or item 0, should be the top element in the array. Every time an element is inserted, all the items in the array are pushed back one space. The top element is always removed first.

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

a queue can be implemented in a list by keeping track of two pointers, a head and a tail

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

FIFO: First in First out

55. What is a tree?

A type of data structure in which each element is attached to one or more elements directly beneath it.

56. What is a leaf?

And end point of the tree... a node that does not have any children.

57. What is a binary tree?

a tree with only 2 joints, left and right

58. What is a binary search tree?

A binary tree where the value in any node n is greater than the value in every node n's left subtree, but less than every value in n's right subtree.

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

left middle right

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

The name of the class file, the parameters it must take to perform its function. Also a brief description of what the class does.

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

input & return type elements

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

public - can be accessed from outside the class private - accessible only from inside the class, not inherited protected - accessible only from inside the class, inherited

63. How are objects initialized when they are created?

objects are initialized by giving the object a type, name, and initial value

64. What is a function signature?

The parameters needed, the return type, and name of the function.

65. What is a recursive function?

a function that solves a problem by dividing the problem into smaller problems, by calling its self again and again, until a base case is reached.

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

by iteration

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

Standard arrays terminate when the functions that call them finish. A static array is not removed from memory when it's parent function terminates, leaving it available for other functions (or new instances of the original 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 variable can change in size and is passed to functions by value, whereas a type char[] cannot change in size and is passed to functions by reference only

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

The idea of divide and conquer is to take a large problem, split it into n smaller problems, making the program easier to read and modify.

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

Divides the data into twor separate arrays, sorts the two arrays and merges them back to back together recursively.

71. What is a pointer?

an object that points to a specific place in memory, where a variable or value is stored.

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

running an algorithm on a specific set of data

73. Briefly, how does selection sort work?

Selection sort sorts an array one element at at time. It first finds the element with the smallest key and puts it into the first location within its array or list, then finds the next smallest and puts it in the second location, and so on.

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

Array have fixed size, in Link List are flexible for adding or deleting an element.

75. What is a queue?

a queue is a set of elements where the first element inserted is the first element to be removed

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

Push, Pop

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

the euler tour is a way to traverse a tree where you come into contact with each node three times, from the left, from the right, and from the bottom

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

if it has no children, you just delete it. if it only has one child, just replace the node with whichever child it has. if it has both children, replace it with one of its children, and send the other child down along the other side of the new node.