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

To simulate portions of the desired final product with a quick and easy program that does a small specific job. It is a way to help see what the problem is and how you may solve it in the final project.

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

The implementation phase and the maintenance phase are effected

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

This type of programming is more flexible, making it easier to add and modify the program. It is also a type of a fail safe program, you check each individual module. This eliminates redundant code and makes the program easier to read for other programmers. When debugging the program it is easier to track down the source of a problem within a module rather than a 2 million line program.

Where do C++ programs begin to execute?

the Function main().

What is a variable?

In programming, a structure that holds data and is uniquely named by the programmer. It holds the data assigned to it until a new value is assigned or the program is finished.

Where are variables declared in a C++ program?

In the Function main() before using the variable.

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

do...while statements evaluate whether or not to loop after running the block contained within it at least once. So the main differance is that while statements have a possibility of never being used. Do ... while statements on the other hand are always run at least once before evaluating whether to run again.

What is typically included in a class definition?

The attributes of said class. Also whether or not it is a subclass. Also whether it is public private or protected.

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

Data members are the data components of a particular class. A member function are the functioning components of the class.

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

a Data member is encapsulated within a class or object, it is static and can be shared by all instances of that class. however local variable's are only used from the function or block in which it is declared and not the whole class. other wise they would be called global variables.

What is the difference between a constructor and a function?

a constructor is called when the class is created, a function can be called any time.

When does C++ create a default constructor?

when one is not explicitly included by a class

How many constructors can be created for a class?

As many as the programmer wants to create.

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

in a function prototype you include the return type, the name of the function, and its parameters if any are needed. in a function definition you write the code of what the function will do.

What is the role of a header-file?

Allow compiler to recognize the classes when used elsewhere

What does a function signature include?

the function's name and parameters

What is the scope of global variables?

The entire program.

How does the compiler handle inline functions?

tells the compiler to make a copy of function's code in place to avoid a function call. it typically ignores it, except for the smallest functions.

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

less overhead overall, and you modify the variable directly.

How are overloaded functions differentiated by the compiler?

The compiler selects the right function to execute from the number, types and order of arguments in the function call.

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

no base case, or the recursive calls do not converge to the base case

What are the similarities between iteration and recursion?

Both are based on a control statement, Both involve repetition, Both involve a termination test, Both gradually approach termination, Both can occur infinitely

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

Array lengths can be explicitly specified by inputing the number of elements between the brackets [ ] during declaration, or implicitly by including an initializer list WITHOUT specifying a number between [ ], the compiler will automatically declare the array with the proper number of elements needed for the list.

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

By using an array of characters, you are limited to the size of the array of characters. By declaring by type the end of the string is acknowledged by white space.

How are arrays passed to functions?

you pass a pointer to the first item and also pass the size.

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

An array declared as static is available from beginning of program to end. One w/o static declaration disappears if it is not accessed within the right scope.

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

all but the first

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

Compare two numbers at a time and swap until the entire list is sorted.

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

Cycle through the unsorted list, place the minimum in the next slot in the sorted list, and repeat.

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

O(n)

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

Best case is one element. One element is sorted.

What is a pointer?

a pointer is a programming language data type whose value refers directly to (or points to) another value stored elsewhere in the computer memory using its address

What does the address (&) operator return?

Returns the address location in memory of the item.

What does the star (*) operator return?

The value of the object that the operand points to

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

using the star operator. array: b[n] can be accessed by *(bpointer +n)

What does the sizeof operator return?

It returns the size of an operand in memory, which is checked at compiler-time.

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

pass by value, pass by reference with reference arguments, pass by reference with pointer arguments

What is a linked list?

Consists of sequence of nodes, each containing a number of data fields and one or two links called pointers that point to the next or previous nodes.

What is the main advantage of linked lists over arrays?

You can insert into and delete items from a pointer-based linked list without shifting data.

What is the main advantage of arrays over linked lists?

You have to keep up with the head of the list.

How are linked lists passed as arguments to a function?

You pass the head pointer to a function as a reference argument.

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

The circular linked list's tail points to the head, whereas the basic linked list's tail points to a NULL.

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

You can move forwards and backwards in the double-linked list. Basic only moves forwards.

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

in a doubly linked list there are twice as many pointers for each element , therefore more memory is used

What is a stack?

Stores a set of element in a particular order

What are the two main functions defined by a stack?

Pop and push

How can you implement a stack with an array?

by having a max number of elements, allocating an array with that number of elements, storing the elements starting at 0, and keeping track of how many elements are currently in the list

How are infix expressions evaluated by computers?

They are converted to post fix expressions. It still follow the order of precedence for the operators.

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

Push adds a given node to the top of the stack leaving previous nodes below. Pop removes and returns the current top node of the stack.

What is a queue?

An ADT whose first inserted item is the first item removed. This uses the FIFO idea where items enter a queue at its back and leave at its front.

What are the two main functions defined by a queue?

enqueue - insert into queue dequeue - remove element

How can you implement a queue with an array?

Declare two variables, "front" and "rear", to be used to denote which elements in the array can be accessed. Increment "rear" whenever data is enqueued to the end and increment "front" whenever data is dequeued.

How can you implement a queue with a list?

make a linked list and add on to the front and delete from the back, keep track of both to do so.

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

push

What is a tree?

It organizes data in a nonlinear, hierarchical form, where items can have more than one successor. Partitioned into a root node and subsets are general subtrees of the root.

What is the height of a tree?

is the number of generations in the tree

What is a binary tree?

A tree data structure in which each done has at most two children, typical called left and right nodes. The right node is usually greater than the left node and the parent node.

What is a binary search tree?

a tree where each node has at most two nodes and the node on the left is less than the root and the node on the right is greater than the root.

What is the inorder traversal of a binary tree?

in order starts with the root then does right child then left child recursively

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

It takes at most 3 comparisons to find and element in a binary search tree

What are the elements typically included in a class definition?

member functions and data members

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

public - can be accessed by any of the program private - can only be accessed by the class functions themselves and no outside functions or calls

How are objects initialized when they are created?

The value is specified after declaration, It can initialized anywhere between the declaration and the corresponding }.

What is a function signature?

the unique identifier of a function, which includes input variables along with the function name, but excludes the output type.

What is a recursive function?

a function that calls itself into a loop with a base case for a loop exit.

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

Using an iterative function, which repeats a specified operation or set of operations until a terminating point or base case is reached.

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

A static array has class scope, allowing it to remain where other arrays might be recycled.

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[]?

The character array has an end of line character at the end of it.

Briefly describe the divide-and-conquer paradigm.

Take a problem and divide it into a smaller problem and solve that smaller problem, or divide it into a smaller problem and solve it, thus solving the whole problem in the process.

Briefly describe in one sentence how does merge sort work?

Merge sort divides the problem in half, organizes each half, then brings the two halves together again.

What is a pointer?

Its like a variable except it only holds the address in memory of the variable not the physical information.

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

BIG-OH

Briefly, how does selection sort work?

Selection sort iterates through the array one element at a time, seeking the least value from the right and replacing the current value with it.

What is the advantage of linked lists over arrays?

Linked lists are very dynamic in that they can change and be added/subtracted to very easily because they are not linear in memory. Arrays are pre-specified in size to be cast over a certain amount of disk

space. This makes insertion into Arrays difficult because all elements must be shifted, and if you reach the end of the array, you are done even if you have more data to input. Linked Lists do not run into these problems.

What is a queue?

its a lot like a stack, except that the first item put into the list is the first item to be taken from the list.

What are the main operations associated with a stack?

isempty, push and pop, along with usually,

What is the Euler tour traversal of a tree?

Travel from the root to the farthest left child Backup, travel the leftmost children in the right side repeat until reaching the rightmost child.

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

by searching down the tree until you find the node, and replacing the link to that node with the greatest child node on the left subtree or the least child node on the right subtree.