

Answers to the 'Concepts & Basics' questions

- Question 3.1: A compiled language is a language that to run the code, the code is compiled by the compiler to machine code and then this machine code is specific to the computer and can only be run on that machine. An interpreted language is a language that to be run on a machine is interpreted by a program (a virtual machine) that runs the code. And is not directly run as machine code.
- Question 3.2: The java code is compiled into byte code (.class) which is then run on the Java Virtual Machine (JVM), the JVM is a 'hypothetical computer' which the java code runs on. This means that the instructions are not executed directly on the computer, and because of this compiled java files can run on any platform. This also means that it is very secure due to one class file for multiple platforms but also that the JVM can do automatic garbage collection.
- Question 3.3: Variables and constants can both be assigned values and used in the program; however, variables can be changed and have values re-assigned while the program is running, constants cannot be changed while the program is running. For example, in a program if you want to hold a value for pi it would be a constant because pi does not change. But if you want to hold a value for the score in a match then that would be a variable because the score will change.
- Question 3.4: Boolean: stores a true or false, and it 1 bit; Eg. boolean fact = true;
Char: stores an individual character, and it is 16 bits; Eg. char init = 'a';
Byte: stores integers from -127 to 127 inclusive, it is 8 bits; Eg. byte b1 = 67;
Short: stores integers from -32768 to 32767 inclusive, it is 16 bits; Eg. short s1 = 99;
Int: stores integers from -2,147,483,648 to 2,147,483,647 inclusive, it is 32 bits; Eg. int i1 = 1000;
Long: stores integers from -2^{63} to $2^{63}-1$ inclusive, it is 64 bits; Eg. long l1 = 140000;
Float: Stores fractional numbers, 6 to 7 decimal digits, it is 32 bits; Eg. float f1 = 1.2;
Double: Stores fractional numbers, 15 decimal digits, it is 64 bits;
Eg. double d1 = 1.3333;
- Question 3.5: Casting is converting variable from one type to another. If a conversion to another type cannot be made without risk of losing data, then it is explicit casting. If a conversion to another type can be made without the risk of losing data, then it is implicit.
- Question 3.6: Overflow operators with integer types may produce number that are too big to be stored in smaller data types. Eg. byte d = (byte) 130; //This will cause overflow and store -126 because a byte can only store up to 127.
- Question 3.7: The four main features are:
Encapsulation: A mechanism of wrapping attributes and methods together as a single unit. Also known as data hiding, as the attributes of one class will be hidden from another.

Data Abstraction: Hiding all but relevant data in order to reduce complexity and increase efficiency.

Polymorphism: Is the concept of different classes being used within the same interface. And each class can have its own implementation of the interface. I.e. Performing a single action in different ways.

Inheritance: classes can be derived from other classes thereby inheriting fields and methods from those classes.