//Declare, Instantiate, Initialise

Pupil p=new PrimaryPupil(“Tom”);

Or

//Declare,

Pupil p;

Instantiate, Initialise

P=new PrimaryPupil(“Tom”);

The **type** of a **reference –Pupil;** determines how the referenced object **p**-- that is, the object that is the value of the reference -- can be used. For instance, in the example above, code using p could invoke any of the methods defined by the abstract class **Pupil**, or any of its superclasses, on the referenced object.

However, the method actually executed by a call is determined not by the type of the reference itself, but rather by the type of the referenced object -**PrimaryPupil**. This is a basic principle of polymorphism -- subclasses can override methods defined in the parent class in order to implement different behavior.

p.setName(“Dick”); //ok because setName defined in Pupil, may/may not be overridden

p.toString();//ok because toString() defined in Pupil, overridden in PrimaryPupil

p.setTeacherName(“Harry”); // not ok because setTeacherName defined in PrimaryPupil only, a subclass of Pupil

Casting is used to convert between types -- between reference types in particular, for the type of casting operation in which we're interested here. Upcast operations (also called widening conversions in the Java Language Specification) convert a subclass reference to an ancestor class reference. This casting operation is normally automatic, since it's always safe and can be implemented directly by the compiler.

Downcast operations (also called narrowing conversions in the Java Language Specification) convert an ancestor class reference to a subclass reference. This casting operation creates execution overhead, since Java requires that the cast be checked at runtime to make sure that it's valid. If the referenced object is not an instance of either the target type for the cast or a subclass of that type, the attempted cast is not permitted and a java.lang.ClassCastException is thrown.

The instanceof operator in Java allows you to determine whether or not a specific casting operation is permitted without actually attempting the operation.