Java instanceof

1. [java instanceof](https://www.javatpoint.com/downcasting-with-instanceof-operator#instanceof)
2. [Example of instanceof operator](https://www.javatpoint.com/downcasting-with-instanceof-operator#instanceofex)
3. [Applying the instanceof operator with a variable the have null value](https://www.javatpoint.com/downcasting-with-instanceof-operator#instanceofnull)
4. [Downcasting with instanceof operator](https://www.javatpoint.com/downcasting-with-instanceof-operator#instanceofdowncasting)
5. [Downcasting without instanceof operator](https://www.javatpoint.com/downcasting-with-instanceof-operator#instanceofdowncastingwithout)

The **java instanceof operator** is used to test whether the object is an instance of the specified type (class or subclass or interface).

The instanceof in java is also known as type *comparison operator* because it compares the instance with type. It returns either true or false. If we apply the instanceof operator with any variable that has null value, it returns false.

Simple example of java instanceof

Let's see the simple example of instance operator where it tests the current class.

1. **class** Simple1{
2. **public** **static** **void** main(String args[]){
3. Simple1 s=**new** Simple1();
4. System.out.println(s **instanceof** Simple1);//true
5. }
6. }

[**Test it Now**](https://www.javatpoint.com/opr/test.jsp?filename=Simple1)

Output:true

An object of subclass type is also a type of parent class. For example, if Dog extends Animal then object of Dog can be referred by either Dog or Animal class.

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Another example of java instanceof operator

1. **class** Animal{}
2. **class** Dog1 **extends** Animal{//Dog inherits Animal
4. **public** **static** **void** main(String args[]){
5. Dog1 d=**new** Dog1();
6. System.out.println(d **instanceof** Animal);//true
7. }
8. }

[**Test it Now**](https://www.javatpoint.com/opr/test.jsp?filename=Dog1)

Output:true

instanceof in java with a variable that have null value

If we apply instanceof operator with a variable that have null value, it returns false. Let's see the example given below where we apply instanceof operator with the variable that have null value.

1. **class** Dog2{
2. **public** **static** **void** main(String args[]){
3. Dog2 d=**null**;
4. System.out.println(d **instanceof** Dog2);//false
5. }
6. }

[**Test it Now**](https://www.javatpoint.com/opr/test.jsp?filename=Dog2)

Output:false

Downcasting with java instanceof operator

When Subclass type refers to the object of Parent class, it is known as downcasting. If we perform it directly, compiler gives Compilation error. If you perform it by typecasting, ClassCastException is thrown at runtime. But if we use instanceof operator, downcasting is possible.

1. Dog d=**new** Animal();//Compilation error

If we perform downcasting by typecasting, ClassCastException is thrown at runtime.

1. Dog d=(Dog)**new** Animal();
2. //Compiles successfully but ClassCastException is thrown at runtime

Possibility of downcasting with instanceof

Let's see the example, where downcasting is possible by instanceof operator.

1. **class** Animal { }
3. **class** Dog3 **extends** Animal {
4. **static** **void** method(Animal a) {
5. **if**(a **instanceof** Dog3){
6. Dog3 d=(Dog3)a;//downcasting
7. System.out.println("ok downcasting performed");
8. }
9. }
11. **public** **static** **void** main (String [] args) {
12. Animal a=**new** Dog3();
13. Dog3.method(a);
14. }
16. }

[**Test it Now**](https://www.javatpoint.com/opr/test.jsp?filename=Dog3)

Output:ok downcasting performed

Downcasting without the use of java instanceof

Downcasting can also be performed without the use of instanceof operator as displayed in the following example:

1. **class** Animal { }
2. **class** Dog4 **extends** Animal {
3. **static** **void** method(Animal a) {
4. Dog4 d=(Dog4)a;//downcasting
5. System.out.println("ok downcasting performed");
6. }
7. **public** **static** **void** main (String [] args) {
8. Animal a=**new** Dog4();
9. Dog4.method(a);
10. }
11. }

[**Test it Now**](https://www.javatpoint.com/opr/test.jsp?filename=Dog4)

Output:ok downcasting performed

Let's take closer look at this, actual object that is referred by a, is an object of Dog class. So if we downcast it, it is fine. But what will happen if we write:

1. Animal a=**new** Animal();
2. Dog.method(a);
3. //Now ClassCastException but not in case of instanceof operator

Understanding Real use of instanceof in java

Let's see the real use of instanceof keyword by the example given below.

1. **interface** Printable{}
2. **class** A **implements** Printable{
3. **public** **void** a(){System.out.println("a method");}
4. }
5. **class** B **implements** Printable{
6. **public** **void** b(){System.out.println("b method");}
7. }
9. **class** Call{
10. **void** invoke(Printable p){//upcasting
11. **if**(p **instanceof** A){
12. A a=(A)p;//Downcasting
13. a.a();
14. }
15. **if**(p **instanceof** B){
16. B b=(B)p;//Downcasting
17. b.b();
18. }
20. }
21. }//end of Call class
23. **class** Test4{
24. **public** **static** **void** main(String args[]){
25. Printable p=**new** B();
26. Call c=**new** Call();
27. c.invoke(p);
28. }
29. }

[**Test it Now**](https://www.javatpoint.com/opr/test.jsp?filename=Test4)

Output: b method