# Access specifiers

<table>
<thead>
<tr>
<th>Specifier</th>
<th>class</th>
<th>subclass</th>
<th>package</th>
<th>world</th>
</tr>
</thead>
<tbody>
<tr>
<td>private</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>public</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>protected</td>
<td>X</td>
<td>X*</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>package</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>

* If a class is both a subclass of and in the same package as the class with the protected member, then the class has access to the protected member.

## private

- A class member declared to be private is accessible from within the class in which it is defined.

```java
class Circle {
    private float radius;
    public Circle(int r) {
        this.radius = r;
    }
    public boolean equals(Object o) {
        return o instanceof Circle &&
               this.radius == ((Circle)o).radius;
    }
}
```

## protected

- Members declared protected can be used from within the same package.

```java
package Greek;
import Greek.*;

class Alpha {
    protected int p;
    protected void protectedMethod() {
        ...
    }
}

package Greek;
class Gamma {
    void accessMethod() {
        Alpha a = new Alpha();
        a.p = 10; // legal
        a.protectedMethod(); // legal
    }
}
```

## protected

- Members declared protected can be used from within the same package.
package or default

- if no access modifier is given then the access is implicitly package.
- classes in the same package can access package/default members.

```java
package Greek;
class Alpha {
    int p;
    void pMethod() {
    }
    ...
}
```

```java
package Greek;
class Beta {
    void accessMethod() {
        Alpha a = new Alpha();
        a.p = 10; // legal
        a.pMethod(); // legal
    }
}
```

package/default classes

- default (unspecified) classes can live in the same file as a public class
  ```java
  public class LinkedList {
  }
  class Node {
  }
  ```
- two public classes cannot be put in the same file.