**Polymorphism is Fun**

**Assume that the following classes have been defined:**

|  |
| --- |
| **public class Quadrilateral** |
| **{** |
| **public String name = "Quadrilateral";** |
|  |
| **public void method1()** |
| **{** |
| **System.out.println("Quadrilateral 1");** |
| **}** |
| **public void method2()** |
| **{** |
| **System.out.println("Quadrilateral 2");** |
| **}** |
| **public void method3()** |
| **{** |
| **System.out.println("Quadrilateral 3");** |
| **}** |
| **public void method4()** |
| **{** |
| **System.out.println("Quadrilateral 4");** |
| **}** |
| **public String toString(){** |
| **this.method4();** |
| **return "This is Quadrilateral Class";** |
| **}** |
| **}** |

|  |
| --- |
| **public class Trapezium extends Quadrilateral** |
| **{** |
| **public String name = "Trapezium";** |
|  |
| **public void method1(){** |
| **System.out.println("Trapezium 1");** |
| **}** |
|  |
| **public String toString(){** |
| **return "This is a "+ name;** |
| **}** |
| **}** |

|  |
| --- |
| **public class Kite extends Quadrilateral** |
| **{** |
| **public String name = "Kite";** |
|  |
| **public void method1()** |
| **{** |
| **System.out.println("Kite 1");** |
| **}** |
| **public void method3()** |
| **{** |
| **System.out.println("Kite 3");** |
| **}** |
| **public void method4()** |
| **{** |
| **System.out.println("Kite 4");** |
| **}** |
| **}** |

|  |
| --- |
| **public class Parallelogram extends Quadrilateral** |
| **{** |
| **public String name = "Parallelogram";** |
|  |
| **public void method3()** |
| **{** |
| **System.out.println("Parallelogram 3");** |
| **super.method2();** |
| **method4();** |
| **}** |
| **}** |

|  |
| --- |
| **public class Rhombus extends Parallelogram** |
| **{** |
| **public String name = "Rhombus";** |
|  |
| **public void method1(){** |
| **System.out.println(this);** |
| **System.out.println("Rhombus 1");** |
| **}** |
|  |
| **public void method3(){** |
| **super.method2();** |
| **System.out.println("Rhombus 3");** |
| **}** |
|  |
| **}** |

|  |
| --- |
| **public class Rectangle extends Parallelogram** |
| **{** |
| **public String name = "Rectangle";** |
|  |
| **public void method2(){** |
| **method4();** |
| **System.out.println("Rectangle 2");** |
| **System.out.println(this);** |
| **}** |
|  |
| **public int compareTo(Rectangle a){** |
| **if(a instanceof Rectangle){** |
| **return 1;** |
| **}else{** |
| **return 0;** |
| **}** |
| **}** |
|  |
| **}** |

|  |
| --- |
| **public class Square extends Rectangle** |
| **{** |
| **public String name = "Square";** |
|  |
| **public void method1(){** |
| **method3();** |
| **System.out.println("Square 1");** |
| **}** |
|  |
| **public void method2(){** |
| **super.method2();** |
| **System.out.println("Square 2");** |
| **method3();** |
| **}** |
| **}** |

**And assume that the following variables have been defined:**

**Quadrilateral shape1 = new Quadrilateral();**

**Object shape2 = new Kite();**

**Quadrilateral shape3 = new Trapezium();**

**Object shape4 = new Parallelogram();**

**Parallelogram shape5 = new Rhombus();**

**Quadrilateral shape6 = new Rectangle();**

**Parallelogram shape7 = new Square();**

**Rectangle shape8 = new Square();**

**In the table below, indicate in the right-hand column the output produced by the statement in the left-hand column. If the statement produces more than one line of output, indicate the line breaks with slashes as in "a/b/c" which indicates three lines of output with "a" followed by "b" followed by "c". If the statement causes an error, fill in the right-hand column with either “CT” for “compile time error" or RE for "runtime error" to indicate when the error would be detected.**

|  |  |
| --- | --- |
| **Statement** | **Output** |
| **System.out.println(shape1.name);** |  |
| **System.out.println(shape2.name);** |  |
| **System.out.println(shape3.name);** |  |
| **System.out.println(shape4.name);** |  |
| **System.out.println(shape5.name);** |  |
| **System.out.println(shape6.name);** |  |
| **System.out.println(shape7.name);** |  |
| **shape1.method1();** |  |
| **shape1.method2();** |  |
| **shape1.method3();** |  |
| **shape1.method4();** |  |
| **shape2.method1();** |  |
| **shape2.method2();** |  |
| **shape2.method3();** |  |
| **shape2.method4();** |  |
| **shape3.method1();** |  |
| **shape3.method2();** |  |
| **shape3.method3();** |  |
| **shape3.method4();** |  |
| **shape4.method1();** |  |
| **shape4.method2();** |  |
| **shape4.method3();** |  |
| **shape4.method4();** |  |
| **shape5.method1();** |  |
| **shape5.method2();** |  |
| **shape5.method3();** |  |
| **shape5.method4();** |  |
| **shape6.method1();** |  |
| **shape6.method2();** |  |
| **shape6.method3();** |  |
| **shape6.method4();** |  |
| **shape7.method1();** |  |
| **shape7.method2();** |  |
| **shape7.method3();** |  |
| **shape7.method4();** |  |
| **System.out.println(shape8.compareTo(shape8));** |  |
| **((Quadrilateral) shape1).method1();** |  |
| **((Quadrilateral) shape2).method1();** |  |
| **((Quadrilateral) shape3).method1();** |  |
| **((Quadrilateral) shape4).method1();** |  |
| **((Quadrilateral) shape5).method1();** |  |
| **((Quadrilateral) shape6).method1();** |  |
| **((Quadrilateral) shape7).method1();** |  |
| **((Quadrilateral) shape1).method2();** |  |
| **((Quadrilateral) shape2).method2();** |  |
| **((Quadrilateral) shape3).method2();** |  |
| **((Quadrilateral) shape4).method2();** |  |
| **((Quadrilateral) shape5).method2();** |  |
| **((Quadrilateral) shape6).method2();** |  |
| **((Quadrilateral) shape7).method2();** |  |
| **((Quadrilateral) shape1).method3();** |  |
| **((Quadrilateral) shape2).method3();** |  |
| **((Quadrilateral) shape3).method3();** |  |
| **((Quadrilateral) shape4).method3();** |  |
| **((Quadrilateral) shape5).method3();** |  |
| **((Quadrilateral) shape6).method3();** |  |
| **((Quadrilateral) shape7).method3();** |  |
| **((Object) shape1).method1();** |  |
| **((Object) shape2).method1();** |  |
| **((Object) shape3).method1();** |  |
| **((Object) shape4).method1();** |  |
| **((Object) shape5).method1();** |  |
| **((Object) shape6).method1();** |  |
| **((Object) shape7).method1();** |  |
| **((Object) shape1).method2();** |  |
| **((Object) shape2).method2();** |  |
| **((Object) shape3).method2();** |  |
| **((Object) shape4).method2();** |  |
| **((Object) shape5).method2();** |  |
| **((Object) shape6).method2();** |  |
| **((Object) shape7).method2();** |  |
| **((Object) shape1).method3();** |  |
| **((Object) shape2).method3();** |  |
| **((Object) shape3).method3();** |  |
| **((Object) shape4).method3();** |  |
| **((Object) shape5).method3();** |  |
| **((Object) shape6).method3();** |  |
| **((Object) shape7).method3();** |  |
| **((Kite) shape1).method1();** |  |
| **((Kite) shape2).method1();** |  |
| **((Kite) shape3).method1();** |  |
| **((Kite) shape4).method1();** |  |
| **((Kite) shape5).method1();** |  |
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| **((Kite) shape7).method1();** |  |
| **((Kite) shape1).method2();** |  |
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| **((Kite) shape7).method3();** |  |
| **((Parallelogram) shape1).method1();** |  |
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| **((Parallelogram) shape7).method3();** |  |
| **((Trapezium) shape1).method1();** |  |
| **((Trapezium) shape2).method1();** |  |
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| **((Rhombus) shape1).method1();** |  |
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