

## Bereich: Vererbung (1)

### Fahrzeuge, Wettrennen

### Musterlösung

**Package:**

de.dhbwka.java.exercise.classes.vehicles

**Klasse:** Race

```
package de.dhbwka.java.exercise.classes.vehicles;

/**
 * @author DHBW lecturer
 * @version 1.01
 *
 * Part of lectures on 'Programming in Java'. Baden-Wuerttemberg
 * Cooperative State University.
 *
 * (C) 2016 by J. Sidler, T. Schlachter, C. Schmitt, W. Suess
 */
public class Vehicle {

    private int wheels;
    private double speed;
    private double maxSpeed;
    private double position;

    public Vehicle() {
        this(0.0);
    }

    public Vehicle(double speed) {
        this(0, speed, 0.0, 0.0);
    }

    protected Vehicle(int wheels, double speed, double maxSpeed,
        double position) {
        setWheels(wheels);
        setMaxSpeed(maxSpeed);
        setSpeed(speed); // after setMaxSpeed!
        setPosition(position);
    }

    public void drive(double minutes) {
        this.position += speed / 60.0 * minutes;
    }

    @Override
    public String toString() {
        return this.getClass().getSimpleName() + " at " + position +
            " km with " + wheels + " wheels at speed " + speed +
            " km/h of max. " + maxSpeed + " km/h.";
    }

    public int getWheels() {
        return wheels;
    }
}
```

```
    public void setWheels(int wheels) {
        this.wheels = wheels;
    }

    public double getSpeed() {
        return speed;
    }

    public void setSpeed(double speed) {
        this.speed = Math.min(this.maxSpeed, speed);
    }

    public double getMaxSpeed() {
        return maxSpeed;
    }

    public void setMaxSpeed(double maxSpeed) {
        this.maxSpeed = maxSpeed;
    }

    public double getPosition() {
        return position;
    }

    public void setPosition(double position) {
        this.position = position;
    }
}
```

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 */
public class Bicycle extends Vehicle {

    public Bicycle() {
        this(0.0);
    }

    public Bicycle(double speed) {
        super(2, speed, 30.0, 0.0);
    }
}
```

```
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 */
public class Car extends Vehicle {

    public Car() {
        this(0.0);
    }

    public Car(double speed) {
        this(speed, 140.0);
    }

    protected Car(double speed, double maxSpeed) {
        super(4, speed, maxSpeed, 0.0);
    }

}
```

```
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 */
public class RacingCar extends Car {

    public RacingCar() {
        this(0.0);
    }

    public RacingCar(double speed) {
        this(speed, 220.0);
    }

    protected RacingCar(double speed, double maxSpeed) {
        super(speed, maxSpeed);
    }

}
```

```
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 *
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 */
public class Ambulance extends Car {

    private boolean signal;

    public Ambulance() {
        this(0.0, false);
    }

    public Ambulance(double speed) {
        this(speed, false);
    }

    public Ambulance(double speed, boolean signal) {
        super(speed);
        setSignal(signal);
    }

    @Override
    public String toString() {
        return super.toString()+
            " Signal " + (signal ? "on":"off") + ".";
    }

    public boolean hasSignal() {
        return signal;
    }

    public void setSignal(boolean signal) {
        this.signal = signal;
    }
}
```

```
package de.dhbwka.java.exercise.classes.vehicles;

/**
 * @author DHBW lecturer
 * @version 1.0
 *
 * Part of lectures on 'Programming in Java'. Baden-Wuerttemberg
 * Cooperative State University.
 *
 * (C) 2016 by J. Sidler, T. Schlachter, C. Schmitt, W. Suess
 */
public class Race {

    public static void main(String[] args) {
        Vehicle[] vehicles = new Vehicle[4];
        vehicles[0] = new Bicycle(20.0);
        vehicles[1] = new Car(150.0);
        vehicles[2] = new RacingCar(200.0);
        vehicles[3] = new Ambulance(80.0, true);
        // 4 hours lead for the bike
        vehicles[0].drive(240.0);
        // 1 hour of driving for everyone
        for (int i = 0; i < vehicles.length; i++) {
            vehicles[i].drive(60);
        }
        // Output Race
        for (int i = 0; i < vehicles.length; i++) {
            System.out.println(vehicles[i].toString());
        }
    }
}
```