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package com.example.raytrace;

import java.lang.Math.*;           //Imports the "Math" class from the
"java.lang" package, which provides mathematical operations.

public class Vector {              // A "Vector" class which represents
the 3 dimensional vector in space.

    double x, y, z;                //Declares 3 instance variables of
the "Vector" class "x", "y" and "z". Reresenting the coordinates of the vector.

    public Vector() {}             //Default constructor for the
"Vector" class. Initializes a vector with all coordinates set to 0.

    public Vector(double i, double j, double k) {           //Declares constructor for the "Vector"
class.

        x = i;                                                  //Takes 3 parameters, "i", "j" and
"k" representing the "x", "y" and "z" coodinates.

        y = j;                                                  //Initializes a vector to those values.

        z = k;

    }

    public double magnitude() {           //Declares a method "magnitude".

        return Math.sqrt(x * x + y * y + z * z);           //Returns the magnitude of the vector, calculated
by the sqaure root of the sum of the sqaures of the coordinates.

    }

    public void normalise() {             //method "normalise" normalizes
the vector to have a magnitude of 1.

        double mag = magnitude();        //divides each coordinate by the
magnitude of the vector, but only if the magnitude is set to 0.

        if (mag != 0) {

            x /= mag;

            y /= mag;

            z /= mag;

        }

    }

    public double dot(Vector a) {          //Method "dot" calculares the dot product
of the vector with another vector "a".

        return x * a.x + y * a.y + z * a.z;           // "dot" product is calculated by the sum of
all products of the corresponding coordinates of the two vectors.

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    }

    public Vector sub(Vector a) {                                     // "sub" method, returns a new vector that
is the result of subtracting another vector "a" from the current vector

        return new Vector(x - a.x, y - a.y, z - a.z);

    }

    public Vector add(Vector a) {                                     // "add" method returns a new vector that is
the result of adding another vector "a" to the current vector.

        return new Vector(x + a.x, y + a.y, z + a.z);

    }

    public Vector mul(double d) {                                     // "mul" method returns a new vector, the
result is by multiplying the vector by the scalar "d"

        return new Vector(d * x, d * y, d * z);

    }

    public void print() {

        System.out.println("x=" + x + ", y=" + y + ", z=" + z);

    }

    public double getX() {

        return x;

    }

    public double getY() {

        return y;

    }

    public double getZ() {

        return z;

    }

    public void setX(double x) {

        this.x = x;

    }

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```
public void setY(double y) {  
    this.y = y;  
}
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```
public void setZ(double z) {  
    this.z = z;  
}
```