COMP2026 Problem Solving Using Object Oriented Programming

# Laboratory 8

**Part A Discovery Exercises**

**Task 1: Bee Object**

Refer to the **Bee.java** example and answer the following questions.

1. Write statements to create 3 Bee objects with the following values.

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| Object name | x-coordinate | y-coordinate | dx |
| b1 | 50 | 60 | 2 |
| b2 | 97 | 54 | 5 |
| b3 | 7 | 8 | 7 |

Then, write statements to move the Bee objects horizontally and print the Bee objects.

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| *//Create two Bee objects* Bee b1 = new Bee(50, 60, 2); Bee b2 = new Bee(97, 54, 5); Bee b3 = new Bee(7, 8, 7);  *//Move the Bee objects to the right* b1.moveHorizontally(); b2.moveHorizontally(); b3.moveHorizontally();  *//Print the Bee objects after moving* System.*out*.println("After moving horizontally:"); System.*out*.println("b1: " + b1); System.*out*.println("b2: " + b2); System.*out*.println("b3: " + b3); System.*out*.println(); |

1. Create a project in IntelliJ and put **Bee.java** and **BeeTester.java** into the **src** folder of the project. Test part (a) in the **runApp()** method in **BeeTester.java**. Run the program and paste the screenshot of the output below.

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1. Write statements to update the x and y coordinates of the Bee objects in part (a) by using the **setX()** and **setY()** methods and then print the objects.

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| Object name | New x-coordinate | New y-coordinate |
| b1 | 12 | 34 |
| b2 | 56 | 78 |
| b3 | 90 | 11 |

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| b1.setX(12);  b1.setY(34);  b2.setX(56);  b2.setY(78);   b3.setX(90);  b3.setY(11);  System.*out*.println("After update:"); System.*out*.println("b1: " + b1);  System.*out*.println("b2: " + b2);  System.*out*.println("b3: " + b3); |

1. Test part (c) in the **runApp()** method in **BeeTester.java**. Run the program and paste the screenshot of the output below.

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1. Write statements to get the x coordinates of the 3 Bee objects by using **getX()** and then print the sum of them.

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| int b1X = b1.getX(); int b2X = b2.getX(); int b3X = b3.getX();  System.*out*.println(b1X+b2X+b3X); |

1. Test part (e) in the **runApp()** method in **BeeTester.java**. Run the program and paste the screenshot of the output below.

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1. In **Bee.java**, add a new instance variable called **dy**, which stand for the vertical velocity of the bee, as follows.

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1. In **Bee.java**, add a new constructor to construct a bee with the specified x and y coordinates, the horizonal and vertical velocities as follows.

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1. In **Bee.java**, add a **moveVertically()** method that moves the bee vertically by **dy**.

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1. In **Bee.java**, add the get and set methods for **dy**.

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1. In **Bee.java**, modify the **toString()** methods to make it also prints the vertical velocity **dy**.

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1. In **BeeTester.java**, write statements to create 3 more Bee objects with the following values.

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| Object name | x-coordinate | y-coordinate | dx | dy |
| b4 | 11 | 22 | 1 | 2 |
| b5 | 33 | 44 | 3 | 4 |
| b6 | 55 | 66 | 5 | 6 |

Then, write statements to move these Bee objects vertically and print the Bee objects.

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| Bee b4 = new Bee(11, 22, 1,2);  Bee b5 = new Bee(33, 44, 3 , 4);  Bee b6 = new Bee(55, 66, 5,6);   b4.moveVertically();  b5.moveVertically();  b6.moveVertically();    *//Print the Bee objects after moving* System.*out*.println("After moving Vertically:");  System.*out*.println("b1: " + b4);  System.*out*.println("b2: " + b5);  System.*out*.println("b3: " + b6);  System.*out*.println(); |

1. Test part (l) in the **runApp()** method in **BeeTester.java**. Run the program and paste the screenshot of the output below.

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**Task 2: toString Method**

1. Add the following print statement to the **main** of the given **Person.java** to print the person object p.

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1. Run the program and paste the screenshot of the output below.

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1. Add the following **toString** method to the Person class.

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1. Run the program again and paste the screenshot of the output below.

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1. Modify the **toString** method in the Person class as follows.

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1. Run the program again and paste the screenshot of the output below.

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**Task 3: equals Method**

1. Add the following if statement to the **main** of the given **Square.java** to check whether the squares are equal.

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1. Run the program and paste the screenshot of the output below.

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1. Add the following **equals** method to the Square class.

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1. Run the program again and paste the screenshot of the output below.

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**References**

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