ORACLE

JAVA PUZZLE BALL

Lesson 2
Basic Puzzles 8-11
Static vs Instance Variables

www.oracle.com/goto/JavaGame

Variables

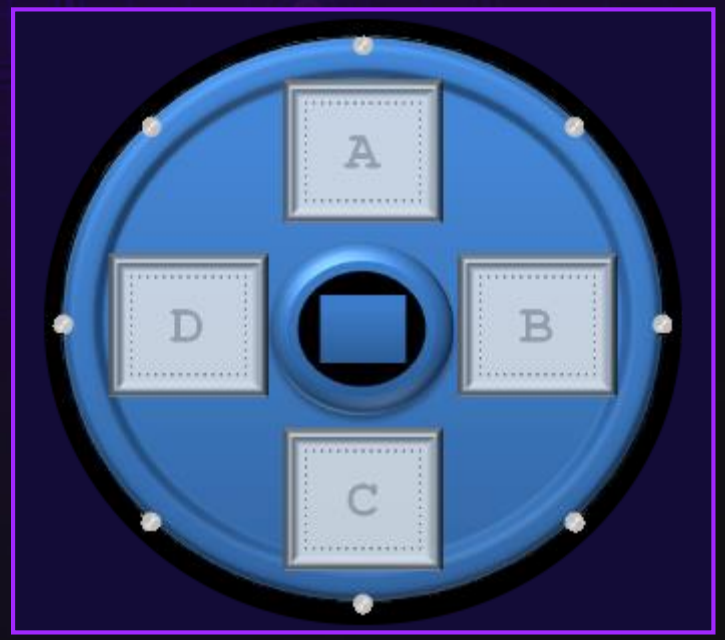
- A variable in math represents a number.
  - These are commonly named `x`, `y`, `z`...
- A variable in Java represents a value.
  - This value may or may not be a number, depending on the variable type.
  - Java variables can be named almost anything.
- Fields use variables to store information.
  - There are different ways fields can utilize variables.
  - We'll explore this in this lesson.

```
public class SavingsAccount {
    public String accountType;
    public String accountOwner;
    public double balance;
    public double interestRate;
 ...
}
```

Variable Type **Variable Name**

Did You Try Basic Puzzles 8-11?

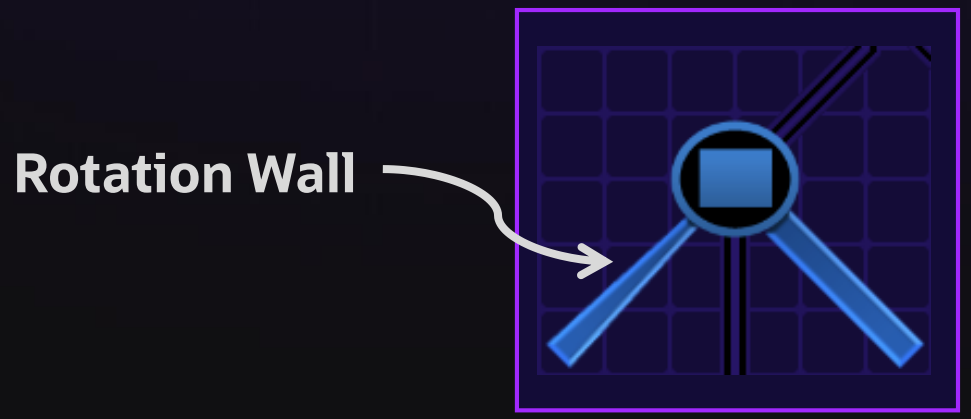
- What happens when you rotate the BlueWheel?



- How else can you affect the rotation of bumpers?

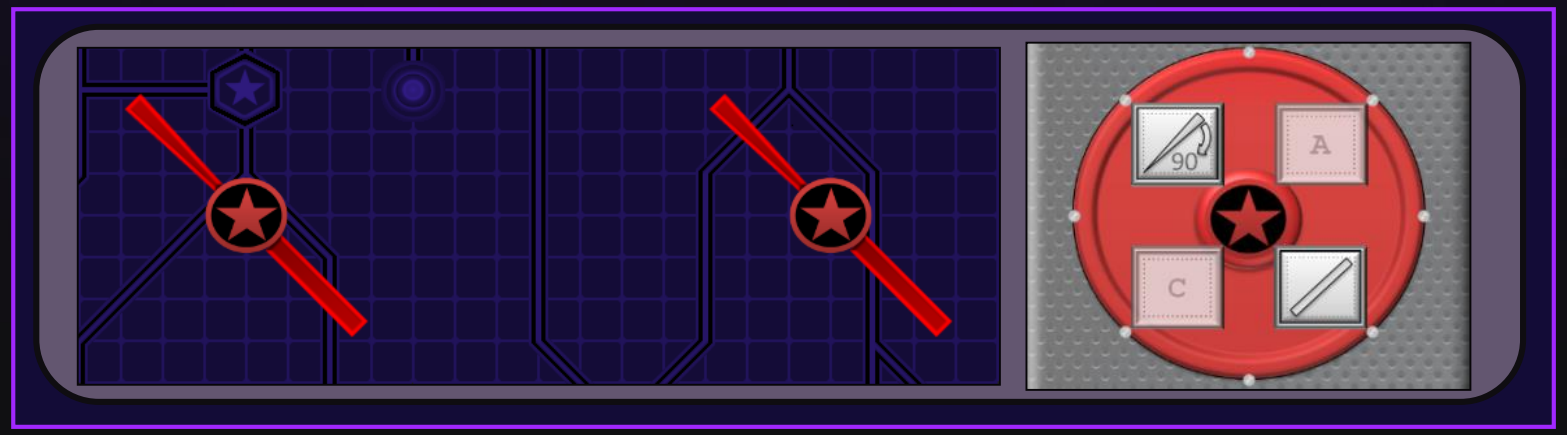
Java Puzzle Ball Observations

- What happens when you rotate the BlueWheel?
  - The orientation of **all** BlueBumpers change.
  - **All** BlueBumpers share the orientation property.
  - Orientation can be represented by a **static variable.**
- How else can you affect the rotation of bumpers?
  - After the ball strikes a rotation wall, the rotation of an **individual** bumper changes.
  - Rotation can be represented by an **instance variable**.



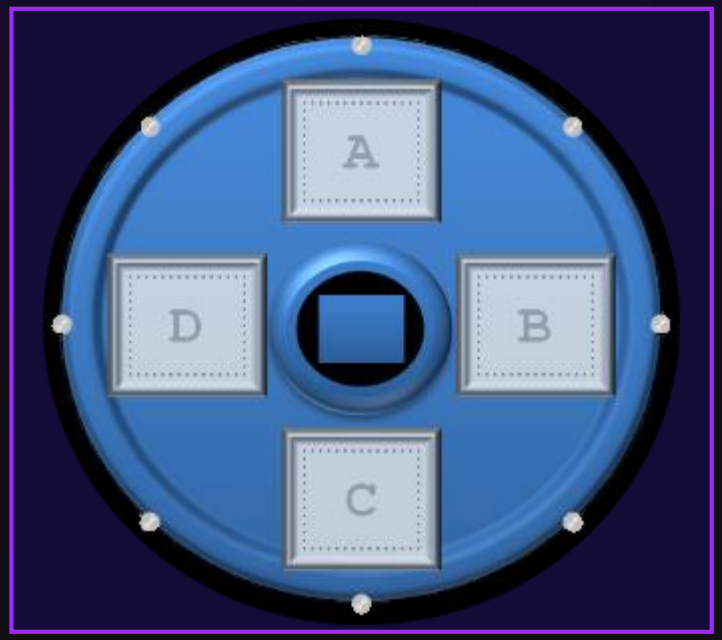
Static Variable: Orientation

- All instances share the same orientation.
- A static variable applies to the entire class, not to any individual instance.
- A static variable is changed only once for every instance to be affected.
- In Basic Puzzle 11, rotating the RedWheel changes the orientation of all RedBumper objects.



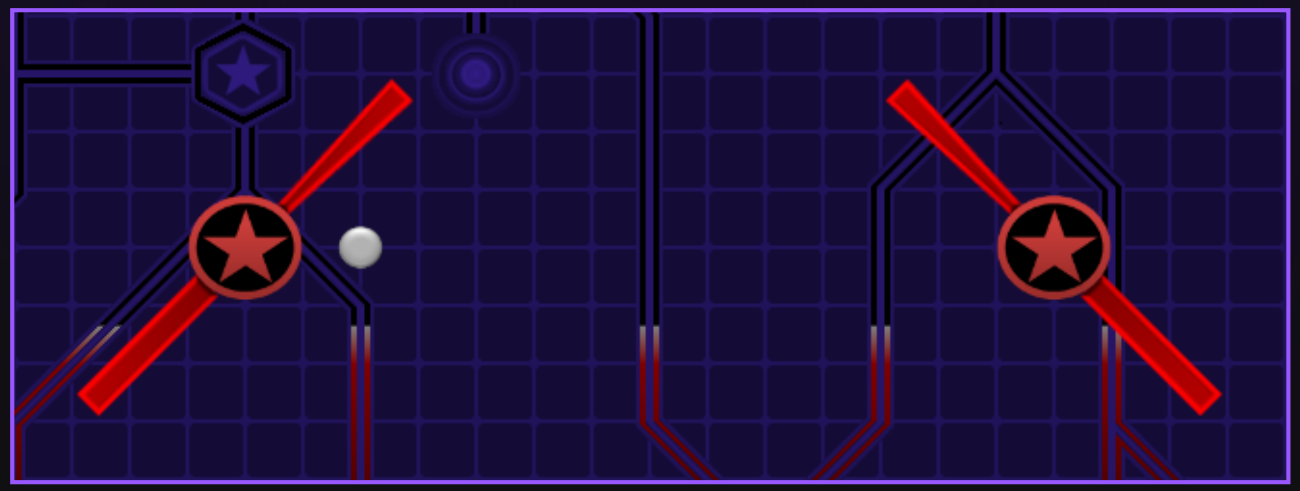
Static Variables with No Instances

- Static variables can be accessed, even if instances don't exist.
- In Basic Puzzle 11, rotating the BlueWheel changes the orientation of all BlueBumper objects.
  - There just aren't any BlueBumpers to show this change.



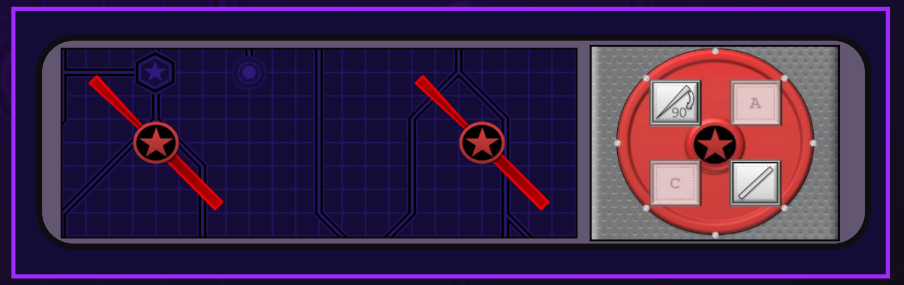
Instance Variables: Rotation

- An individual bumper’s rotation may differ.
- Unique instance variables exist for every instance of an object.
- Instance variables are changed one-at-a-time for each instance.
- In Basic Puzzle 11, an individual RedBumper's rotation changes 90-degrees after being struck by the ball.

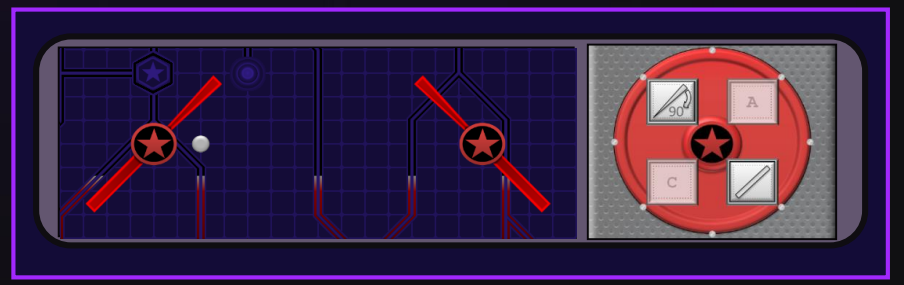


Static Vs Instance

- A Static Variable…
  - Applies to the entire class.
  - Exists once.
  - Needs to be changed once to affect all instances.
  - Example: The orientation of all Bumpers



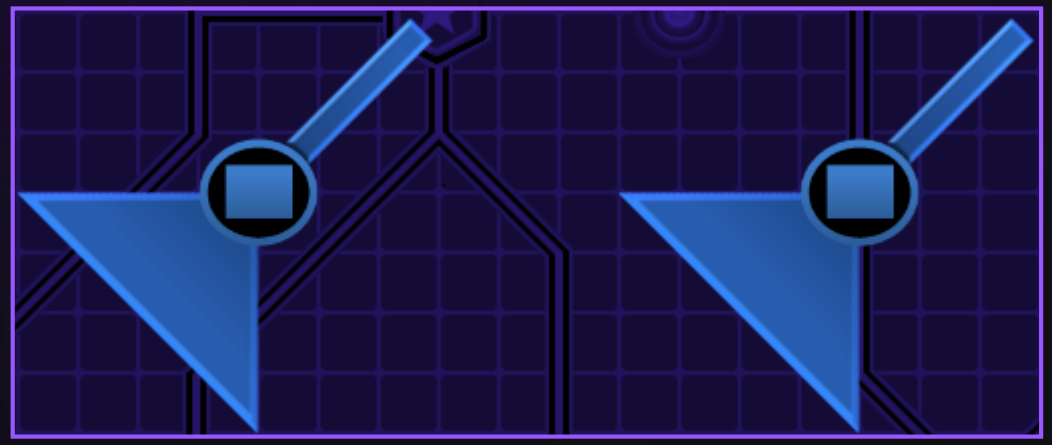
- An Instance Variables…
  - Applies to a particular instance.
  - Exists for every instance.
  - Is changeable one-at-a-time for every instance.
  - Example: The additional rotation applied to an individual Bumper.



Static or Instance?

- Which BlueBumper fields could be represented by static variables?
- Which BlueBumper fields could be represented by instance variables?

  - Color (???)
  - Shape (???)
  - Orientation (static)
  - Rotation (instance)
  - x-position (???)
  - y-position (???)



Translating into Java Syntax

- To make a field static, simply include the **`static`** keyword when the variable is declared.

```
1 public class BlueBumper {
2     public static Color color = Color.BLUE;
3     public static Shape shape = Shape.RECT;
4     public static double orientation = 0;
5     public double rotation;
6     public int xPosition;
7     public int yPosition;
8
9     …
  }
```

Further Learning

Edit code and learn more in the multi-day version of this course:

- www.oracle.com/goto/JavaGame