Java™
ORACLE®
Java Puzzle Ball
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Lesson 1-1
Educational Games
What is Java Puzzle Ball?

• An educational game used across several Oracle courses:
  – Oracle University (various)
  – Oracle Academy Java Foundations

• Game modes are designed to teach Java programming concepts:
  – Basic
  – Inheritance
  – Lambda

• Developed entirely in Java FX
Can I *Really* Learn from a Game?

• Yes, if they're designed and implemented properly.
• Let's examine...
  – A bad use of an educational game
  – A good use of an educational game
  – How Java Puzzle Ball is used in this course
  – What makes this implementation effective
Introducing: Pig Pounder!

- Solve fun questions to save the pigs!
- Maximize your score!
- Earn badges and increase your rank!
- Brag to your friends on social media!
Find the # to save the Pigs!

• 2 # 6 = ____
• 7 # 5 = ____
• 11 # 3 = ____
You Lose...
End Demo
Where Pig Pounder Fails

• Despite having trendy features...
  – Cute Characters!
  – Points!
  – Badges!
  – Social Media!

• Pig Pounder does nothing to help you understand the # operation.

• # represents a mathematical operation.

• Maybe you'd do better if # was something you already knew, like % (modulus).
The Problem with most "Educational" Games

• They're not fun.

• They're not educational.
  – It's a mistake to drill content. This creates a glorified quiz.
  – People don't learn new skills.
  – People aren't prepared to think through new situations.
  – To succeed, people must arrive already understanding what the game tests for.

• They improve existing skills or recognition ability.
How to Fix Pig Pounder

• If we want people, with no prior understanding, to learn the % operator...
• Create an experience where they can learn through exploration.
  – Group a number of objects.
  – Identify when a full group can't be formed.

11 % 3
- When taking 11 objects...
- And creating groups of 3's...
- There are 2 remaining
Explorative Learning through Java Puzzle Ball

• Java Puzzle Ball is similar.
• But instead building an understanding for a simple mathematical concept...
• Java Puzzle Ball builds your understanding of complex computer science concepts:
  – Object oriented thinking and class design
  – Static vs Instance variables
  – Inheritance
  – Lambda expressions in GUI applications and collection sorting/filtering
Misconceptions about Java Puzzle Ball

• You won't come away knowing...
  – Java syntax.  
  – How to write code.  
  (with the exception of Lambda puzzles)

• Students who play come away...
  – With a robust conceptual foundation to build from.  
  – More receptive to technical information.  
  – Able to participate in discussions and ask insightful questions.

• To achieve this, the course debriefs and provides coding exercises after you play.
  – Debriefing contextualize your observations in terms of Java.  
  – This is where everything 'clicks' for students.  
  – This process accelerates learning and your ability to understand how to program.
The Approach used with Java Puzzle Ball

• Play a set of puzzles.
• Become familiar with the game mechanics.
• Consider questions as you play.
• Listen to the lesson's debriefing on what you’ve observed.
• Apply your observations to understand Java concepts and work with code.
Exercise 1

• Play **Basic Puzzles 1 through 5.**
  – Your Goal: Design a solution that deflects the ball to Duke.

• Consider the following:
  – What objects do you find on the field of play?
  – What happens when you put a triangle wall or simple wall icon on the blue wheel?

Triangle Wall Icon  Simple Wall Icon