# TEACHER’s guide

# ArrayList

**OBJECTIVES:** The student will understand Abstract Data Types (ADTs) and how an array implements the List ADT.

The student will create objects of type ArrayList using generics.

The students will use the methods of ArrayList to access, add and remove elements.

The student will learn casting.

The student will use wrapper classes to insert primitive data values in an ArrayList.

**ACTIVITIES/TIME:** Two Weeks

**MATERIALS:** Student Lesson A15: *ArrayList*

Lab Assignment A15.1, *IrregularPolygon*

Lab Assignment A15.2, *Permutations*

Lab Assignment A15.3, *Statistics*

Lab Assignment A15.3, Data File, *numbers.txt*

Worksheet A15.1, *ArrayList*

Handout A15.1, *ArrayList Methods*

Teacher’s Guide, Lesson A15: *ArrayList*

Lab Assignment A15.1 - Answers, *IrregularPolygon.java, driver.java*

Lab Assignment A15.2 - Answers, *Permutations.java, driver.java*

Lab Assignment A15.3 - Answers, *Statistics.java, driver.java*

Worksheet A15.1, *ArrayList – Answer Sheet*

Quiz A15

Quiz A15 – *Answer Sheet*

**REFERENCES:** **Too Many Daves**  
<http://bullard.esc.cam.ac.uk/~barnett/daves.html>

This short poem, "Too Many Daves" by Dr. Seuss, is from "The Sneetches and Other Stories."It is a fun way to introduce arrays and ArrayList.

**INSTRUCTOR**

**NOTES:** This lesson introduces the students to their first Abstract Data Type (ADT). Introducing the students to ArrayLists first helps them to think in OOP. Students already know how to use objects, so learning how to use ArrayList should be quite natural by this time. This lesson covers Java 1.5 features of generics and the for each loop. The student needs to understand when they can use a for each loop and when they need to use a for loop. Iterators are also introduced, but the subject may be skipped for A-level learners, since this is an AB topic. It is a good idea, however, to have students begin thinking about Iterators. Some of the solutions use the for each loop. A good exercise is to have the students convert between the for and for each loops when appropriate.

Lab Assignment A15.1, *IrregularPolygon* requires that students use the Point2D.Double class. Usually, students aren't interested in this until they see how much work will be saved. This makes a great point for OOP. Lab Assignment A15.2, *Permutations* is a short exercise using Random. Lab Assignment A15.3, *Statistics* calculates statistics for a data file. Encourage students to test their program's progress with known results, a small file they make themselves, before they use the large data file. This assignment also appears in Lesson A16, *Single Dimension Arrays.* You can do one or the other or both. Learning the content in this order - ArrayList first, then Arrays, usually makes students appreciate ArrayLists.

Quiz A15 is a short three-question assessment with a variety of ArrayList problems. The first answer uses a for each loop. Because the loops in the second two questions start at index 1, a for loop is used.

**WORKSHEET**

**NOTES:** Worksheet A15.1, *ArrayList* focuses on an ArrayList of Point2D.Double objects. The Point2D.Double class shows up in the lab assignments and this lesson without much discussion, so it’s helpful for students to practice using this class prior to proceeding into the lab assignments. Also, make sure students input the coordinate points in consecutive order - accurate area calculation in the calculateArea method depends on this.