

APCS Summer Assignment

Congratulations on being selected for AP Computer Science! In this course, you will continue to learn the fundamentals of computer science with a focus on Object-Oriented Programming Concepts.

Major topics to be discussed this year are classes, interaction of different classes to solve problems, inheritance, arrays, 2D arrays, ArrayList, polymorphism, sorting and searching algorithms, and Programming Labs.

This course will prepare you for further study of computer science and is the first step in preparing for a career in software engineering or information management or genetic engineering or any other field of study you want to pursue. Computer Science has a wide range of applications in biology, mathematics, physics, finance, history, social science, and can be combined with any field of study. More than anything else, this course will allow you to develop your logical reasoning and problem-solving ability.

This course is going to be very quick-paced, in the sense that it builds on your ability to understand and apply logical structures learned in Introduction to Computer Science. In addition to lab time in school, you will need to set up a working environment at home also. This is needed as every person learns at a different pace and time allotted in class might not be enough to develop and implement a solution.

Goal of APCS Summer Assignment is to help you review the concepts you have learned through the year in Introduction to Computer Science. This assignment is divided into three parts.

| | | | | |
|-----------------|---|---------------------------|---|------------|
| PART I | – | Set up eclipse | – | 10% |
| PART II | – | Review Introduction to CS | – | 40% |
| PART III | – | Practice Projects | – | 20% |
| PART IV | – | First Test | – | 30% |

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Part I

This part of the summer assignments deals with downloading and setting up eclipse IDE (Integrated Development Environment) on your computer. In the computer science learners community, setting up IDE is considered to be the biggest block in learning how to Code.

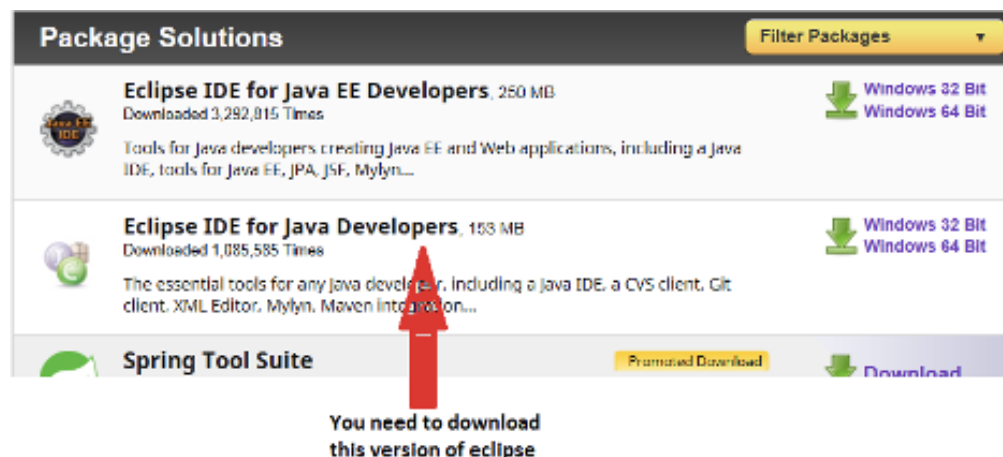
Set up your working environment

In order to set up your working environment you will have to install Java Software Development Kit and IDE (Integrated Development Environment), IDE we will be using for this course is Eclipse.

Directions to set up your working environment are as follows:

Working Environment Set up

1. Download: **Java SE Development Kit 8u5** from <http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html>
2. Run file you have just installed, example: jdk-8u5-windows-x64.exe (depending upon your operating system)
3. Download and install **Eclipse Integrated Development Environment (IDE)** form <http://eclipse.org/downloads/>



4. Create a folder on c drive, name is your last name java projects.

Example C:\SoinJavaProjects

5. Double click on the eclipse icon, you can find this in the folder where you have downloaded and unzipped eclipse.

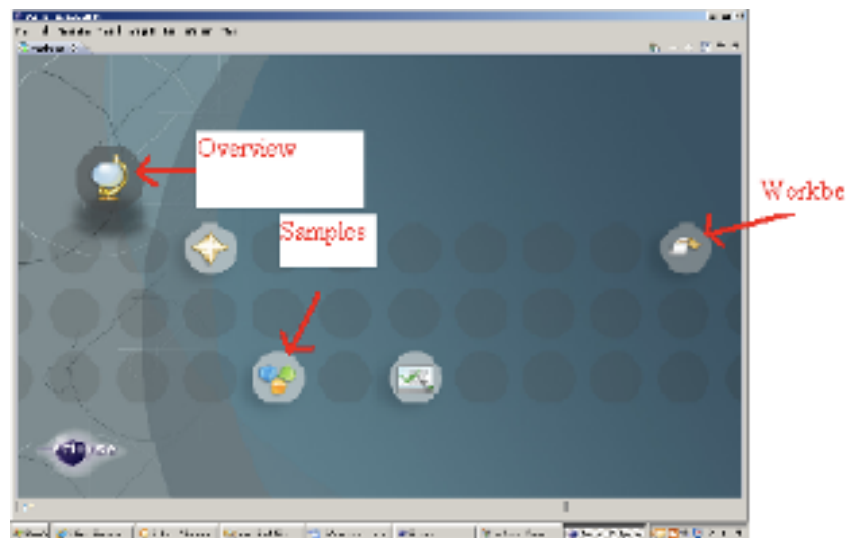
Example from C:\eclipse, if you have installed eclipse on C:\ drive.

6. Workspace Launcher will open; click Browse to select your project folder, the one you have created in step 4.



7. This will open up welcome screen.

You may want to click on overview, samples, and tutorial to know more about Eclipse. Once done click on the **workbench icon to start writing programs** (on the right).



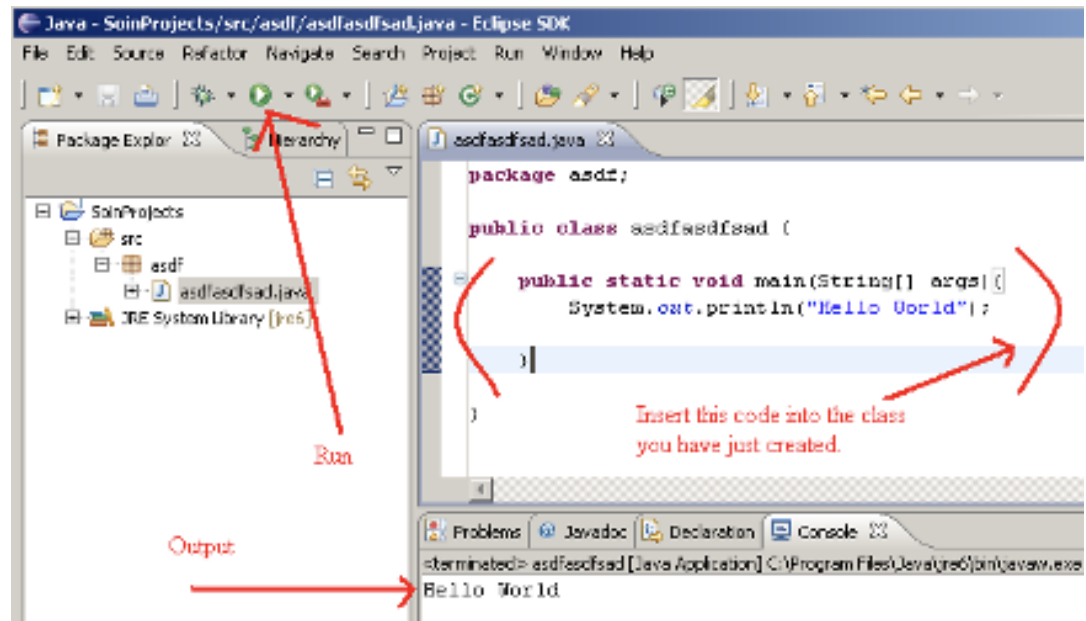
8. This will open eclipse workbench. Click on File->new->Java Project; You may want to call it your name projects, for example, SoinProjects and click OK.
9. Your workspace is ready to create a summer package. Click on File->new->package. (package names are lower case). Name it: summerProject.
10. Now you are ready to create the first program in Java. Each document in Java is called a class.

Click on File → new → class (Class names always start with upper case letter). In this window, select an appropriate package by clicking on Browse, and choose a file name.

11. Copy the following code inside your code. Click run and look for output in the console window. See the picture below.

CODE:

```
public static void main(String[] args){  
    System.out.println("Hello World");  
}
```



12. If you see the output “Hello World”, your Eclipse is correctly configured. Every time you need to do a new program, just create a new class in the summerProject package.

Part II

This is the most important part of the summer assignment. This part of the assignment will be doing the guided practice of the concepts you have learned last year. In order to get started, follow the steps below:

Go to <https://codehs.com/go/7E3C7> and create an account.

Note that the Class Code is: 7E3C7

1. Once you have joined the course, “AP Computer Science in Java (Mocha)”, proceed to the next step.
2. Your task will be to complete the first two topics of the AP Java course on codehs.com.
- I. **Introduction to Programming in Java with Karel the Dog:** This part is optional for the students who have taken Introduction to Computer Science

Who should do this part?

- Any student who is having trouble with Basic Java. If you are having any difficulty with any part of Basic Java, you should first finish this chapter.
 - Any student who has been approved to skip “Introduction to Computer Science”, must do this chapter.
 - Any student who is unsure of the concepts of problem solving, must do this.
- II. **Basic Java:** This part is mandatory for every student who is taking APCS-A this year. More than 50% of 1st marking period grade is based upon these concepts. First 2 tests of the marking period will be based upon these concepts.
 - III. **Methods:** This part is also mandatory for every student who is taking APCS-A this year. More than 50% of 1st marking period grade is based upon these concepts. First 2 tests of the marking period will be based upon these concepts.

Part III

The purpose of this part of the summer assignment is to get comfortable with using Eclipse IDE. In this part, you will be writing few programs on eclipse.

Projects and Assignments:

1. In this assignment, you will create a program that computes the distance an object will fall in Earth's gravity.
 - a. Create a new class called GravityCalculator
 - b. Copy and paste the following initial code in the class.

```
public class GravityCalculator {  
  
    public static void main(String[] args){  
  
        double gravity = -9.81; // Earth's gravity in m/s^2  
        double initialVelocity = 0.0;  
        double fallingTime = 10.0;  
        double initialPosition = 0.0;  
        double finalPosition = 0.0;  
        System.out.println("The object's position after " +  
            fallingTime + " seconds is " + finalPosition+ " m");  
    }  
}
```

- c. Run it in Eclipse (Run → Run As → Java Application)

What is the output of the unmodified program? Include this as a comment in the source code of your submission.

2. Modify the above program to compute the position of an object after falling for 10 seconds, output the position in meters. The formula in Math notation is: $x(t) = 0.5 * at^2 + v_i t + x_i$

where

a → Acceleration = -9.81
 t → Time(in seconds) = 10
 v_i → Initial velocity = 0
 x → Initial position = 0

Note: The correct value is -490.5m. Java will output more digits after the decimal place. You can use the DecimalFormat class from the java.text package to format your output.

3. Write and run a program that displays a table of 20 temperature conversions from Fahrenheit to Celsius. The table should start with a Fahrenheit value of 20 degrees and be incremented in values of 3 degrees. Recall that $Celsius = (5.0/9.0) * (Fahrenheit - 32)$
4. Write and run a program that calculates and displays the amount of money available in a bank account that has \$1000 deposited in it and that earns 8% interest per year. Your program should display the amount available at the end of each year for a period of 10 years. Use the relationship that the money available at the end of each year equals the amount of money in the account at the start of the year plus 0.08 times the amount available at the start of the year.
5. A child's parents promised to give the child \$10 on her twelfth birthday and double the gift on every subsequent birthday until the gift exceeded \$1000. Write a Java program to determine how old the girl will be when the last amount is given, and the total amount she received including the last gift.
6. Write a program to reverse the digits of a positive integer number. For example, if the number 6573 is entered, the number displayed should be 3756 [Hint: Use a do statement and continuously strip off and display the units digit of the number. If the variable num initially contains the number entered, the units digit is obtained as $(num \% 10)$. After a units digit is displayed, dividing the number by 10 sets up the number for the next iteration. Thus, $(6573 \% 10)$ is 3, and $(6573 / 10)$ is 657. The do statement should continue as long as the remaining number is not zero.

You will be submitting these programs using Schoology during the first week of the school.

Part IV

Read and complete chapter 2 as attached with this document.

You can also find these documents by visiting: [**https://goo.gl/YrETuq**](https://goo.gl/YrETuq)

In order to complete this part of the assignment, you will be reading and answering all of the questions in the attached lesson. You will be tested on this material during the first week of school.

This lesson has 3 assignments

1. Self-Review
2. Exercise
3. Programming Projects.

Self-Review and **Exercise** must be done in a notebook. You will use this same notebook throughout the school year.

Programming Projects should be done using eclipse and will be submitted on Schoology.

Submitting the Summer Assignment

This is what you need to email me before the first day of school. My email is bsoin@pway.org

I. Proof (Screen Shot) that you have downloaded and installed Java SDK on your home computer or accessible computer if there is no home computer. (5% of grade)

II. Proof (Screen Shot) that you have downloaded and installed and configured eclipse on your home computer. (5% of grade)

III. Codehs.com - I will access these assignments directly from codehs.com. You do not need to submit anything.

IV. Programming Projects: You will submit this using Schoology during the 1st week of the school.

Resources

1. **Installing JDK and ECLIPSE :**
<http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-092-introduction-to-programming-in-java-january-iap-2010/syllabus/>
2. **Introduction to Programming Using Java.** It is advised that you should read chapters 1, 2 and 3 over the summer. If this is your first year in programming (meaning you have skipped introduction to computer science), you will have to read these chapters in order to complete summer assignments. <http://math.hws.edu/javanotes/>
3. **A very good collection of java tutorial videos.** Highly recommended.
<http://www.youtube.com/playlist?list=PLFE2CE09D83EE3E28&feature=plcp>
4. **The Java Tutorials,** by oracle.
<http://docs.oracle.com/javase/tutorial/>
5. <http://www.bentobox.io/java>
6. <http://www.learnjavaonline.org/>
7. http://www.tutorialspoint.com/java_technology_tutorials.htm
8. **Java Software Solutions,** Textbook we will be using for the course. This is a collection of PowerPoint collection of the chapters in the textbook. We will start the year with chapter 4. You are expected to know chapters 1, 2, and 3 before the start of the school.
<http://duke.csc.villanova.edu/jss1/slides.html>
9. **Free Java Course Online:** Students who have not taken Introduction to Computer Science must complete at least 60X of this course. This course is highly recommended for any student who has trouble completing part 4 of the summer assignment.
<https://www.udemy.com/course/java-tutorial/>