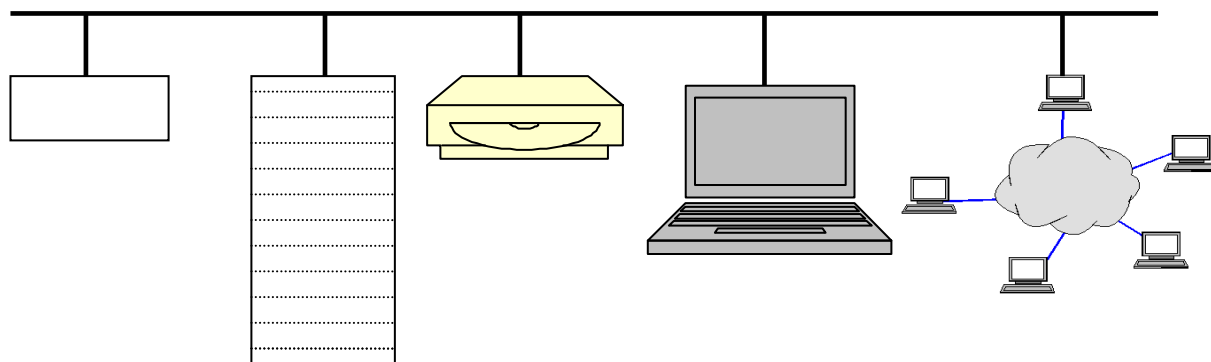Name _____ Per ____

Introduction

Computer Science is the science of _____ _____ where the solutions

happen to use a computer.

A computer program is a set of _____ to a computer to allow it to _____

some data. These programs are generically known as _____.

Hardware Basics

Memory

Memory is where actively running _____ reside. Access to this area is very fast and is

referred to as _____ or _____ _____ _____. Any

information stored in this area is _____ when the computer is turned _____.

Each memory location is 8 _____ or 1 _____ long. Each bit is either a _____ or _____. Data that cannot

fit in one byte can use consecutive locations. Each memory location has a unique address represented by a

hexadecimal number. The memory address is like the address of your home. With the address, the software can

locate the information it needs.

0109	
010A	
010B	
010C	
010D	
:	

:	
5851	
5851	
5853	
5854	
:	

Number Systems

Binary (base 2) 0 or 1									Decimal (base 10)
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0		
128	64	32	16	8	4	2	1		
0	1	1	0	0	1	0	1	=	
									= 123

Octal (base 8) 0,1,2,3,4,5,6,7					Decimal (base 10)
8^3	8^2	8^1	8^0		
512	64	8	1		
0	0	2	7	=	
					= 257

Hexadecimal (base 16) 0,1,2,3,4,5,6,7, 8,9,A,B,C,D,E,F					Decimal (base 10)
16^3	16^2	16^1	16^0		
4096	256	16	1		
4	0	F	B	=	
					= 321

Solve and express answer as a decimal:

1. 12(octal) + 42 (decimal) =

2. 1E(hex) + 17 (octal) + 2 (decimal) =

Algorithms

Algorithms are a _____ for _____ a problem. These _____ solutions will be the core of the programs you write. At first the algorithms will be simple and come right to mind. As you move through the course, they will become more complex and will require more thought and planning. Write an algorithm to print the minimum of two numbers, x & y:

Programming Process

There are two steps to the programming process:

1. Develop or choose an existing algorithm. This is called _____ _____.
2. Express the algorithm as a computer program in a programming language. This is called _____.
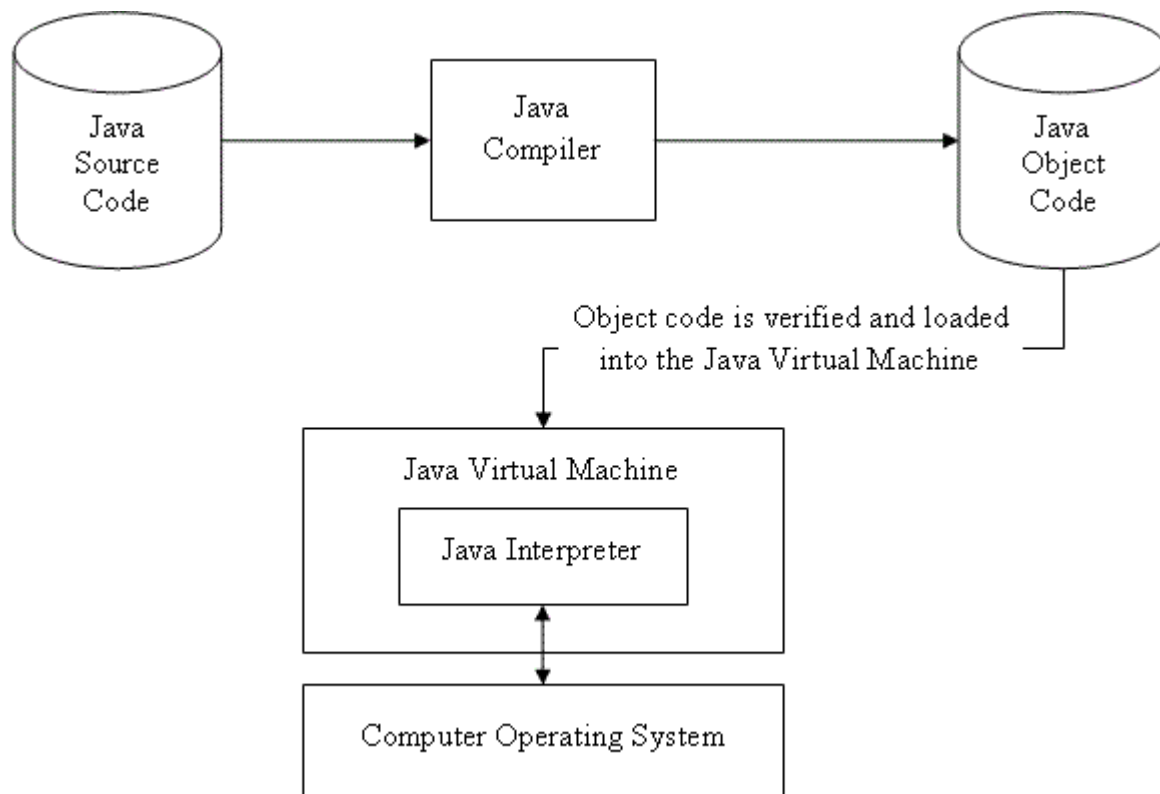
At first, coding will seem to be the most difficult part of programming. You are learning a new language whose _____ and _____ are unfamiliar. DO NOT GIVE UP!! Please be reassured that coding will become easier as you learn more about the programming process.

Computer programs can be written in several different programming languages. In this class you will learn _____ to illustrate the more general concepts of programming and computer science. Java is called an _____ _____ programming language. Other languages include: Objective-C (iPhone), C++, Pascal, Fortran, C#.

Java was written by James Gosling at Sun Microsystems (now Oracle) in 1975.

"Write once, run anywhere" is a slogan created by Sun Microsystems to illustrate the _____ benefits of the Java language. Ideally, this means Java can be developed on any device, compiled into a standard _____ and be expected to run on any device equipped with a _____ _____ _____ (JVM). The installation of a JVM or Java interpreter on chips, devices or software packages has become an industry standard practice.

This is intended to save software developers the effort of writing a different version of their software for each _____ or _____ _____ they intend to deploy on.

```
┌──────────┐        ┌──────────────┐        ┌──────────┐
│   Java   │        │     Java     │        │   Java   │
│  Source  │───────▶│   Compiler   │───────▶│  Object  │
│   Code   │        │              │        │   Code   │
└──────────┘        └──────────────┘        └──────────┘
```

Object code is verified and loaded
into the Java Virtual Machine

```
┌─────────────────────────────────┐
│   Java Virtual Machine           │
│   ┌───────────────────────────┐  │
│   │    Java Interpreter        │  │
│   └───────────────────────────┘  │
└─────────────────────────────────┘
              ▲
              ▼
┌─────────────────────────────────┐
│   Computer Operating System      │
└─────────────────────────────────┘
```

Programming languages are made up of English words which have meaning to the computer. There are
_____ when writing the words into a program. The rules (_____ _____) let the
compiler change the words into instructions (_____ _____ or
_____) the computer can understand.

When you compile a program, the compiler first checks to see whether your program is
_____ correct. If you have violated the syntactic rules, the compiler displays an error
message. These errors are called _____ _____. These errors can be frustrating,
but your biggest source of frustration will occur when your program compiles but fails to operate correctly. This
type of mistake is called a _____ and the process of finding and fixing such mistakes is called
_____. All programmers make logic errors. You will make logic errors and it is your
job as a programmer to find and fix the bugs!

Some of the English words (called _____) have special meaning in Java, these are called
_____ words. Some examples are `public`, `static`, and `class`. Below are the Java
reserved words:

4 of 8
```

```
abstract      else                                    interface     super
assert        enum                                    long          switch
boolean       extends                                 native        synchronized
break         false                                   new           this
byte          final                                   null          throw
case          finally                                 package       throws
catch         float                                   private       transient
char          for                                     protected     true
class         goto                                     public        try
const         if                                      return        void
continue      implements                              short         volatile
default       import                                  static        while
do            instanceof                              strictfp
double        int
```

Other identifiers are made up by other programmers or yourself and can represent _____,
_____ or _____. Identifiers can be made up of letter, digits, underscore and
dollar sign characters, are case sensitive and cannot begin with a digit.

Which of the following identifiers are legal in Java?

ILoveAPCS	2_names	$myNum
iloveapcs!	my$num	MY$NUM
I_love_apcs	Account_2	account^num

Every Java program is made up of _____. Classes are usually small and are created for a specific
function. Classes are like blueprints, they define what something is going to look like (called _____
_____) and how it will behave (called _____).

Imagine a blueprint for a house. You know what the house will look like and how it will function by looking at
the blueprint, but the house doesn't exist yet. You cannot live in a blueprint. You have to create the house
(_____) from the blueprint (_____). This creation is called _____.
The house object is _____ from the house blueprint (class). In other words, the house is
an _____ of the house blueprint. Many houses can be built (instantiated) from one
blueprint.

Class Creation

Each class is written in a separate class file with a file extension _____. The convention is to start class names with a _____ letter. Class names and the `.java` file name are identical. Each class is defined with a class heading using this syntax (rules for declaring a class):

Classes contain information specific to the class, called _____ _____. Instance variables must be defined with a _____ and variable _____. Types can be one of Java's primitive types (`int` _____, `boolean` _____ or `double` _____) or an object type (class name). The convention is to start variable names with a _____ letter.

Classes also contain behavior called _____. Each method has a set of instructions that perform a function. The set of instructions is the _____ for the method. Each _____ in the method is a specific instruction. Statements end with a _____. Method declarations follow this syntax:

Each program you write will contain a class with a method named _____. The JVM will look for this method when you run your program. This method will also create _____ from the other classes in your program, but will not become an object itself.

Write a class named `MyMessage` **that will print the message** `I love computer science!`:

Java API

The Java API contains all of the class information for the many classes that come with Java. You will need to become familiar with the Java API.

Open the Java API up (https://docs.oracle.com/javase/7/docs/api/) and look at the instance variables and methods for the following classes that you will be required to know for the AP Exam and answer the questions in the space provided.

`Integer`   What are the `MAX_VALUE` and `MIN_VALUE` for this object?

`Double`   Look under the "Method Summary" section. What does the method `longBitsToDouble()` do?

`String`   Look under the "Method Summary" section. What does the method `length()` d**o?**

`Math`   Look under the "Method Summary" section. What does the method
            `max(double a, double b)` do?

`ArrayList` Look under the "Method Detail" section. What does the method `isEmpty()` return?

`System`   Look under the "Field Detail" section. What does it say under the field `in`?

Comments

Comments are a very important part of your program. They are written for _____ _____
not the _____. The compiler ignores comments. The three types of comments in Java are:

1.
```
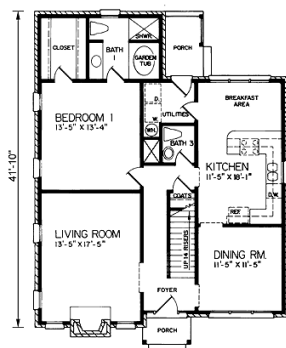/*
* File: MyMessage.java
* This program prints out a simple message to the console
*/
```

2.
```
// Use this type for short, one-line comments.
```

3.
```
/**
* File: CallOfDuty.java
* @author Mrs. Allen
* This program simulates war time fighting.
*/
```

A few words on JCreator

JCreator is an IDE (_____ _____ _____)
which allows programmers to _____, _____ and _____ Java programs.

- **write** – Using the Java commands and syntax, create class files and save with the .java file extension.
- **compile** – Invoke the Java compiler to read the class files and if there are no syntax errors, convert the Java language into bytecode or machine code (.class file) which can be read only by computers.
- **execute** – Invoke the JVM (Java Virtual Machine) to read the .class bytecode file and carry out the instructions of the program.

You can set up your file structure in many different ways. To help organize your programs, you will need to create an \APCS folder in your student director. Each chapter will have a .zip file to download from Moodle, containing the chapter lab manual and any lab files. Keep each chapter separate by using the folders created during the unzip. They will be named \Chapter 1, \Chapter 2, etc.

The first time you start JCreator, you will need to do the following:
1. Start *JCreator.*
2. Make sure there is no workspace open (choose File/Close Workspace if one is open). From the Configure menu, choose Options... In the dialog box that pops up expand the Editor node and click on Java.
3. Set the tab size to 2 and select the Insert spaces option.
4. Create an \APCS folder in your student directory – each chapter will have a separate folder containing the chapter lab manual and lab files.
5. Click on the Directories node and enter the path of the \APCS in your student directory in the Default Project Directory line.
6. Click on the Code Insertion node and check the Start open brace on new line box.
7. Then click OK.