AP CS A
Unit 1. Primitive Types. Notes

This packet covers the basics of writing short programs.

Variables and Assignment Statements.

A variable is a _____

Our rules for naming variables _____

_____

_____

Warning. Java is case-sensitive.

In Java, all variables must have a **data type**. Here are three data types (there are more)

int _____

double _____

boolean _____

Let's look at some code snippets:

double dare = 1.4; _____

boolean b = true; _____

int num = -900; _____

num = 200; _____

num = num + 3; _____

The assignment operator is the _____.

An assignment statement evaluates the expression on the right side of the assignment operator and

_____

You may assign an int to a double, but you cannot assign a _____

double num = 9.8;

int x = 42;

num = x; _____

x = num; _____

Literals are the fixed values used throughout the code. Literals have data types. For example:

double z = -1.8; _____

boolean bob = false; _____

Do the first set of exercises.

Operations with Integers.

The result of any operation involving two ints (whether variables or literals) is an int. When dividing two ints, the result is _____

int a; a = 29 / 10; What is the value of *a*?	int b; b = 23 / 4; What is the value of *b*?	double c; c = 387 / 100; What is the value of *c*?

Mixed Expressions.

If an operation involves a double, then the result is a double.

int a = 87 / 10;	What is the value of *a*?
double b = 87 / 10.0;	What is the value of *b*?
double c = 87 / 10;	What is the value of *c*?

int d = 8;
double e = 10;
int f = (5 + d)/ e;
	There is a problem and this code will not run. Why not.

double g = 10.0 * 76 / 100;	What is the value of *g*?
double h = 10.0 * (76 / 100);	What is the value of *h*?
double i = 3.21 + 24 / 9;	What is the value of *i*?

Displaying/Printing.

When we want to display/print to the screen, there are two expressions we use:

System.out.println (*an expression*); After displaying, the cursor moves to the next line

System.out.print (*an expression*); After displaying, the cursor stays on the current line

For example:

```
int n = 20;
n = n + 10 / 2;
System.out.print( "one fish " );
System.out.println( "n is " + n );
System.out.println( "two fish" );
```

Show what is displayed (pay attention to line breaks).

_____

_____

_____

"one fish", "n is", and "two fish" are examples of string literals.

Do the second set of exercises.

Scanner Objects and Simple Programs. To read in data from the keyboard, we will create an object of the Scanner class. For example:

```
import java.util.Scanner;                    This import statement is required to use the Scanner class

public class Example {
        public static void main(String[] args) {
                Scanner kb = new Scanner( System.in );          * See note 1
                System.out.println( "Enter an integer:" );
                int x = kb.nextInt();                           * See note 2
                System.out.println( "You entered " + x );
                double y= kb.nextDouble();                      * See note 3
                System.out.println( "You entered " + y );
        }
}
```

1. This statement declares a _____. The expression on the right side of the assignment operator creates a Scanner object. The name of the variable can change but keep everything else the same.

2. The expression to the right of the assignment operator calls the nextInt _____ which retrieves the first integer entered by the user. This value is then assigned to the variable.

3. Use the _____ method when you expect the user to enter a double.

We will discuss objects and classes in more detail in the next unit. For now you only need to know how to create a Scanner object and use it to read ints and doubles.

Do the third set of exercises.

Casting is the process of explicitly converting one data type to another. If you cast a double to an int, it is rounded toward zero. The casting operator has higher precedence than multiplication but lower than parentheses.

int a; a = (int) 7.8;	What is the value of *a*?
int b; b = (int) (-6 + 0.2);	What is the value of *b*?
int c; c = (int) 2.7 + 0.6;	This does not compile. Why?
int d = 39; double e = (double) d / 10;	What is the value of *e*?

Increment and Decrement Operators.

You can increase the value of an int or double by using the increment operator (++). To decrease its value, use --. For example:

```
int x = 5;
x++;
int y = 9;
y--;
System.out.println( x + ", " + y );
```

_____

In this course we will only use the increment and decrement operators in stand-alone expressions. They will never be used as part of a larger expression in this course. For example:

```
int x = 1;
int y = 3 * x++;                    We do not do this in AP CS A
System.out.println( x + ", " + y );  Surprisingly, this prints  2, 3
```

Using the increment and decrement operators in an expression (1) makes the expression harder to evaluate and (2) leads us into topics that are not part of our curriculum.

Compound Assignment Operators

Java sometimes uses "short cuts" for certain common statements

Basic Version	Alternative Version
int x = 7; x = x + 4;	int x = 7; x += 4;
int y = 14; y = y – 2;	int y = 14; y -= 2;

There is also *=, /=, and %=

Do the fourth set of exercises.

The Modulus Operator. The mod operator (a.k.a. the remainder operator) is the percent sign (%). It is used to find the remainder of a division operation. For example:

```
int x = 14 % 5;     _____
int y = 24 % 6;     _____
int z = 8 % 10;     _____
```

The modulus operator can be very useful. For example, suppose a store sells soft pretzels for 50 cents each and $5 for a dozen. Here's a program that calculates the cost.

```
import java.util.Scanner;

public class Main {
	public static void main(String[] args) {
		Scanner in = new Scanner( System.in );
		System.out.println( "How many pretzels do you want? ");
		int num = in.nextInt();

		double cost = 5 * ( _____ ) + 0.5 * (_____ );
		System.out.println( "The cost is $" + cost );
	}
}
```

Here is another sample program where the mod operator is useful. It converts minutes into hours and minutes.

```
import java.util.Scanner;

public class Main {
	public static void main(String[] args) {
		Scanner s = new Scanner( System.in );
		System.out.println( "How many minutes? ");
		int time = s.nextInt();
		int hrs = time / 60;
		int m = time % 60;
		System.out.println(time + " min = " + hrs + " hour(s) and " + m + " minute(s)" );
	}
}
```

If the user enters 73,

what is *hrs*?

what is *m*?

If the user enters 51,

what is *hrs*?

what is *m*?

Do the fifth set of exercises.