AP Computer Science A

UNIT 1 TOPIC 4
Lab 2: Compound Assignment Operators

College Board Alignment

Unit 1 Topic 4

1.4 Compound Assignment Operators

2.B Determine the result or output based on statement execution order in a code segment without method calls (other than output).

5.A Describe the behavior of a given segment of program code.

ENDURING UNDERSTANDING

CON-1

The way variables and operators are sequenced and combined in an expression determines the computed result.

LEARNING OBJECTIVE

CON-1.B

Evaluate what is stored in a variable as a result of an expression with an assignment statement.

ESSENTIAL KNOWLEDGE

CON-1.B.4

Compound assignment operators (+=, −=, *=, /=, %=) can be used in place of the assignment operator.

CON-1.B.5

The increment operator (++) and decrement operator (−−) are used to add 1 or subtract 1 from the stored value of a variable or an array element. The new value is assigned to the variable or array element.

X EXCLUSION STATEMENT—(EK CON-1.B.5): The use of increment and decrement operators in prefix form (i.e., ++x) and inside other expressions (i.e., arr[x++]) is outside the scope of this course and the AP Exam.

Compound Operators

Compound Assignment Operators

	... same as...
Expression	**Compound Assignment Operator**
`x = x + 7;`	`x += 7;`
`x = x - 3;`	`x -= 3;`
`x = x * 10;`	`x *= 10;`
`x = x / 5;`	`x /= 5;`
`x = x % 3;`	`x %= 3;`
`x = x + 1;`	`x += 1;`
`x = x - 1;`	`x -= 1;`

Compound Assignment Operator Examples

```
int x = 10;
x += 6;    // same as x = x + 6
System.out.println(x);
```

Compound Assignment Operator Examples

```
int x = 10;
x += 6;    // same as x = x + 6
System.out.println(x);
```

PRINTS: 16

Compound Assignment Operator Examples

```
int x = 10;
x += 6;    // same as x = x + 6
System.out.println(x);
```

PRINTS: 16

```
int num = 20;
num /= 3;    // same as num = num / 3
System.out.println(num);
```

Compound Assignment Operator Examples

```
int x = 10;
x += 6;    // same as x = x + 6
System.out.println(x);
```

PRINTS: 16

```
int num = 20;
num /= 3;    // same as num = num / 3
System.out.println(num);
```

PRINTS: 6

Compound Assignment & Increment/Decrement Operators

Expression	... same as... Compound Assignment Operator
`x = x + 7;`	`x += 7;`
`x = x - 3;`	`x -= 3;`
`x = x * 10;`	`x *= 10;`
`x = x / 5;`	`x /= 5;`
`x = x % 3;`	`x %= 3;`

Expression	Compound Assignment Operator	... same as... Increment/Decrement Operator
`x = x + 1;`	`x += 1;`	`x++;`
`x = x - 1;`	`x -= 1;`	`x--;`

It's up to you whether you use these compound operators or not -- but you need to know they exist, how to use them, and how to evaluate them when you see them since they are on the AP exam. *I would recommend using them when you can!*

Incrementing/decrementing a variable **by 1** is such a common action in programming that it gets its own special operators!

Increment/Decrement Operator Examples

```
int num = 10;
num++;    // same as num = num + 1
System.out.println(num);
```

Increment/Decrement Operator Examples

```
int num = 10;
num++;    // same as num = num + 1
System.out.println(num);
```

PRINTS: 11

Increment/Decrement Operator Examples

```
int num = 10;
num++;    // same as num = num + 1
System.out.println(num);
```

PRINTS: 11

```
int y = 18;
y--;    // same as y = y - 1
System.out.println(y);
```

Increment/Decrement Operator Examples

```
int num = 10;
num++;    // same as num = num + 1
System.out.println(num);
```

PRINTS: 11

```
int y = 18;
y--;    // same as y = y - 1
System.out.println(y);
```

PRINTS: 17

What prints out?

Grab out a scrap paper and pencil!

```
int a = 7;
a += 2;
a *= 2;
a /= 4;
a++;
System.out.println("a = " + a);
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;
a *= 2;
a /= 4;
a++;
System.out.println("a = " + a);
```

```
a = 7
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;
a /= 4;
a++;
System.out.println("a = " + a);
```

```
a = 7
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;
a /= 4;
a++;
System.out.println("a = " + a);
```

```
a = 7
a = 9
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;   → a = a * 2 → a = 9 * 2
a /= 4;
a++;
System.out.println("a = " + a);
```

```
a = 7
a = 9
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;   → a = a * 2 → a = 9 * 2
a /= 4;
a++;
System.out.println("a = " + a);
```

```
a = 7
a = 9
a = 18
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;   → a = a * 2 → a = 9 * 2
a /= 4;   → a = a / 4 → a = 18 / 4
a++;
System.out.println("a = " + a);
```

```
a = 7
a = 9
a = 18
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;   → a = a * 2 → a = 9 * 2
a /= 4;   → a = a / 4 → a = 18 / 4
a++;
System.out.println("a = " + a);
```

```
a = 7
a = 9
a = 18
a = 4
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;   → a = a * 2 → a = 9 * 2
a /= 4;   → a = a / 4 → a = 18 / 4
a++;      → a = a + 1 → a = 4 + 1
System.out.println("a = " + a);
```

```
a = 7
a = 9
a = 18
a = 4
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;   → a = a * 2 → a = 9 * 2
a /= 4;   → a = a / 4 → a = 18 / 4
a++;      → a = a + 1 → a = 4 + 1
System.out.println("a = " + a);
```

```
a = 7
a = 9
a = 18
a = 4
a = 5
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;   → a = a * 2 → a = 9 * 2
a /= 4;   → a = a / 4 → a = 18 / 4
a++;      → a = a + 1 → a = 4 + 1
System.out.println("a = " + a);
```

```
a = 7
a = 9
a = 18
a = 4
a = 5
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;   → a = a * 2 → a = 9 * 2
a /= 4;   → a = a / 4 → a = 18 / 4
a++;      → a = a + 1 → a = 4 + 1
System.out.println("a = " + a);
```

```
a = 7
a = 9
a = 18
a = 4
a = 5
```

What prints out?

Grab out a scrap paper and pencil!

TRACK AS YOU GO

```
int a = 7;
a += 2;   → a = a + 2 → a = 7 + 2
a *= 2;   → a = a * 2 → a = 9 * 2
a /= 4;   → a = a / 4 → a = 18 / 4
a++;      → a = a + 1 → a = 4 + 1
System.out.println("a = " + a);
```

```
a = 7
a = 9
a = 18
a = 4
a = 5
a = 5 printed!
```

What prints out?

Grab out a scrap paper and pencil!

```
int num = 15;
num -= 2;
num += 6;
num %= 4;
num++;
num /= 6;
num -= 3 + 1;  // do 3 + 1 first
num--;
System.out.println("num = " + num);
```

What prints out?

Grab out a scrap paper and pencil!

```
int num = 15;
num -= 2;
num += 6;
num %= 4;
num++;
num /= 6;
num -= 3 + 1;  // do 3 + 1 first
num--;
System.out.println("num = " + num);
```

```
num = 15
num = 13
num = 19
num = 3
num = 4
num = 0
num = -4
num = -5
num = -5 printed!
```

Summary

- **Compound assignment operators** (`+=`, `-=`, `*=`, `/=`, `%=`) can be used in place of the assignment operator.
- The **increment operator** (`++`) and **decrement operator** (`--`) are used to add 1 or subtract 1 from the stored value of a variable. The new value is assigned to the variable.
  - `x = x + 1` is the same as `x += 1` is the same as `x++` (all equivalent!)
  - `x = x - 1` is the same as `x -= 1` is the same as `x--` (all equivalent!)

Agenda

- **U1T4 Lab 2**
- **U1T1-U1T4 AP Practice Q's**
  - 15 AP style questions
  - Discuss with your partner before you submit!
- **U1T1-U1T4 AP Practice Corrections**
  - Get half points back for any missed Q's by submitting explanations of your mistakes!
  - If you got a perfect 15/15, submit the form with your name/period filled out to mark as done.