IEEE
Computer Chapter
Southern Alberta Section

SCHULICH
School of Engineering
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# SCHULICH IGNITE 2019

# Session overview

- Practice
- Practice
- Practice
- **Yeet some balls**
- Practice
- Practice
- practice

# Arithmetic operators

| Operator | Meaning | Example |
|---|---|---|
| + | Addition | 3 + 4 |
| - | Subtraction | 7 - 5 |
| * | Multiplication | 2 * 3 |
| / | Division | 12 / 3 |
| % | Modulus | 5 % 2 |

# Updating a Variable...with itself!

- = symbol is the **assignment** operator

- The left-hand side is set to whatever the right-hand side is (and NOT vice versa)

- Note: There is also an “equality” operator that you’ll learn about next week...

# Combining variables

```
int a = 20;
int b = 30;
int c = a + b;
```

# Question

Is it okay to declare variables inside the draw function? Why or why not?

```
void draw() {  // draw() loops forever, until stopped
  background(204, 204, 204);
  int x = 10;
  x++;
  ellipse(x, 100, 50, 50);
  // Will the ellipse move in the positive x direction?
}
```

# Variable Scope & Global Variables

- **Variable scope** says how long variables last for
- Variables started **inside** {curly brackets} disappear after the brackets
- Variables outside curly brackets are **global variables**

# An Analogy to Help

Variable Scope Analogy

- What **starts** in Vegas, **stays** in Vegas
- But what gets posted on the internet goes **global**

# Updating a Variable Example

```
int height = 170;

// Next year, you grow 5 cm
height = height + 5;

println(height);
```

# Short hands for lazy programmers

- `x += 1;`
  - Means `x = x + 1;`
  - Can also be used to increase x by more than 1
    - e.g. `x += 5;` will increase x by 5
- `x -= 1;`
  - Also means `x = x - 1;`
  - Can also be used to decrease x by more than 1
    - e.g. `x -= 42;` will decrease x by 42

Ex:

```
x += y;
```

# Short hands for lazy programmers

- `x++;`
  - Also means `x = x + 1;`
  - Only used for increasing by 1
- `x--;`
  - Means `x = x - 1;`
  - Only used for decreasing by 1

# Exercise 1: Operators

1. **Declare** an *integer* variable **x** and initialize it to 6
2. **Declare** an *integer* **n** but do not initialize it. What happens if you try to print it?
3. **Set** the value of **n** to 2
4. **Increase** the value of **x** by 2
   **Print** its value
5. **Declare** and initialize an *integer* variable **w** to 4
6. **Increment** the value of **x**
7. **Set** the value of **x** to **x** minus **w**.
   **Print** its value
8. **Declare** a *double* variable **y** and initialize it to 5.2
   **Print** its value

Bonus:

**Declare** an *integer* variable **z** and initialize it to x divided by 2. **Print** its value. Is it what you expected?

# Using Variables to Change Variables

- Variables can change (and usually do!), that's why they're called variables.

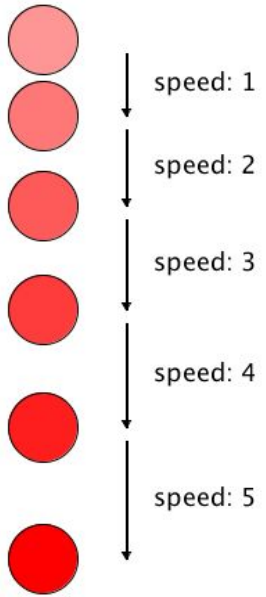
- Make a new variable named "**speed**"
- Change the X coordinate of the ball with **speed**

```
int speed = 3;
x += speed;
```

# Bonus: Adding Gravity

- In real life, the longer a ball falls, the faster it falls!
- The speed of the ball gets faster

- Make the **speed** variable change too!




```
y += speed;
speed += 1;
```

# Writing Text Across the Screen

- How would you make text move across your screen, while increasing the size?

```
textSize(size);
text(“Hello”, x, y);
x += 3;
y += 14;
size += 10;
```

# FADING COLORS

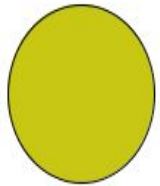
- What if you wanted to make a shape fade from one color to another?

```
// This makes the color “more green” as time goes on
fill(150, green, 150);
ellipse(100, 100, 50, 50);
green += 1.5;
```

# Bonus challenge: Bouncing ball

- We can also make a ball bounce up and down!
- For this, we will use the **sin** function (who doesn't love trig?)

```
ellipse(100, sin(n) * 200 + 200, 100, 100);
n += 0.08;
```



- Why does using *sin(n) * 200 + 200* work?

# Exercise 2: Drawing

**Set** the screen size to be 400 by 500

**Draw** a *circle* (i.e. an ellipse with equal dimensions) at the top left-hand corner of the window.

A. Write a program to make the circle move horizontally toward the right-hand side of the screen until it goes out of the window and disappears.

B. Write a program to make the circle move diagonally down to the bottom right hand side of the screen until it goes out of the window and disappears.

C. Write a program to make the circle gradually change from one colour to another colour