

## CPS 210 Lab 3

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### TIPS:

- Type all the programs from scratch each time. If you use copy and paste, it will take much longer to memorize code that is used often.
- Don't be worried about getting it on the first try; a lot of programming comes down to trial and error.
- Remember to save and recompile **every time** you make changes to your program.
- If you get any errors when you compile, go back and make sure you have proper **capitalization** and all of your **;** and matching **{ }**. If you can't find the error, **ask for help**.

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### PROBLEMS - You **MUST** use variables to solve all of these questions:

1. Write a program finds the area of a circle. The radius is 4.5 inches. Just use the value 3.1415 for PI. Display your result. The formula is:

$$area = radius \times radius \times \pi$$

2. Using the **area** variable from question 1, calculate the volume of the circle. The length is 12.75 inches. Display your result. The formula is:

$$volume = area * length$$

3. Write a program that converts a Celsius degree into Fahrenheit and displays the result. Celsius should be a double. The formula for the conversion is as follows:

$$Fahrenheit = (9 / 5) * Celsius + 32$$

- **Ex.** 43 Celsius is 109.4 Fahrenheit
- **Hint:** In Java, 9 / 5 is 1, but 9.0 / 5 is 1.8

4. Write a program that converts feet to meters. Display your result. One foot is 0.305 meter.
5. Write a program that converts pounds to kilograms. Display your result. One pound is 0.454 kilograms.
6. A person's Body-Mass-Index, BMI, is calculated using the formula below.

$$BMI = \frac{(\text{Weight in Pounds}) * 703}{(\text{Height in inches})^2}$$

Using variables for BMI, weight, and height, display the BMI of a person who is 145 pounds and 67.5 inches tall. The BMI displayed should only have 2 decimal places (HINT: which print statement should you use?).

7. Given the integer **8560**, write a program that determines if it is less than a number of your choosing. Both the integer and your number should be stored in a variable. Use a boolean variable (true/false), and display your result.
  - **Hint:** You can use boolean symbols in boolean variables.
  - Ex:** boolean b = 7 / 2 == 4;
8. Average acceleration is defined as the change of velocity divided by the time taken to make the change, as shown in the following formula:

$$a = \frac{v_1 - v_0}{t}$$

Write a program that determines the average acceleration (*a*). Choose values for the starting velocity *v*<sub>0</sub>, the ending velocity *v*<sub>1</sub>, and the time

span t. Display your result.

9. Write a program that calculates the energy (Q) needed to heat water from an initial temperature to a final temperature. Choose values for the amount of water (M) and the initial and final temperatures of the water. The formula to compute the energy is:

$$Q = M * (\text{finalTemperature} - \text{initialTemperature}) * 4184$$

10. In Java, there is a Math class that contain methods that make our lives easier as programmers. One of the methods is **Math.pow(a,b)**. This allows us to raise a number to a specific power. The letter *a* is the number we want to raise, and *b* is the power we want to raise *a* to. Math.pow(a, b); returns a double value. See the following example which is raising 2 to the 4th power:

```
double num = Math.pow(2, 4);  
System.out.println("The answer = " + num);
```

When ran, the result will be **The answer = 16**.

With this information, write a program that displays the following table. Let's say there are 5 spaces between each column. *a* and *b* should be variables; You need to reassign their values after every print statement in order to calculate pow(a,b). Remember, you can print out variables as well as do calculations inside print statements. **HINT:** Use printf.

a	b	pow(a, b)
1	2	1
2	3	8
3	4	81
4	5	1024
5	6	15625

11. My cat, Earl, is 264 ounces. Declare 264 as an integer. Write a program that determines how many pounds and remaining ounces he is. Display your results. (Please don't body shame my cat.)

- **Hint:** How many ounces are in a pound?