1.4 Expressions and Assignment Statements

Expression

A combination of constants, variables, operators that evaluate to a value

Examples

- `11 * 3 + 5 - 8 / 4`
- `100`
- ```
  int x = 10;
  x * 10
  ```
  ```

Relational Operators

Operator	Meaning	Example
==	equal to	x == 100
!=	not equal to	age != 21
>	greater than	average > 30
<	less than	grade < 65
>=	greater than or equal	age >= 18
<=	less than or equal	height <= 6

Assignment vs Equals

Assignment

```
x = 0
```

Equality

```
x == 0
```

Arithmetic Operators

Operator	Meaning	Example
+	addition	3 + x
-	subtraction	p - q
*	multiplication	6 * i
/	division	10 / 4
%	mod (remainder)	11 % 3

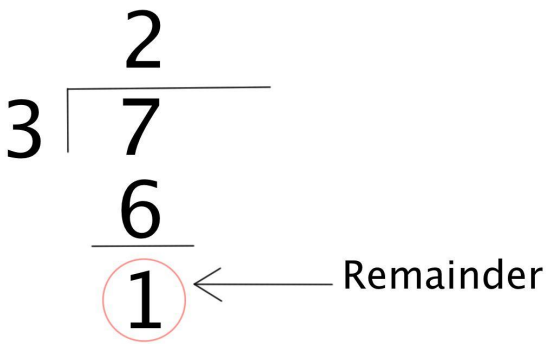
Modulus

Modulus gives the remainder to an equivalent division problem.

7 % 3 == 1

4 % 2 == 0

3 % 5 == 3



Order of Operations

Java evaluates expressions according to standard mathematical rules of precedence.

PEMDAS
- **P**arentheses
- **E**xponent (ignore this for now)
- **M**ultiply / **D**ivide / Modulus
- **A**ddition / **S**ubtraction

Note that Java evaluates expressions from left to right and from top to bottom.

Integer Division

Dividing two `int` values always results in a single `int`

(always truncated: rounded down)

```
10 / 2 = 5
15 / 2 = 7
19 / 10 = 1
```

Dividing with a double results in a double

```
15 / 2.0 = 7.5
```

Double Division

```
int x = 9;

int y = 2;

double z = 1.0 * x / y;
```

The String Concatenation Operator (+)

- Same symbol as addition
- Used to combine strings and other data types into strings

Examples

"hello " + " friend" == "hello friend"

"your score: " + 100 == “your score: 100"

88.6 + " degrees" == "88.6 degrees"

String Concatenation

Once Java starts working with Strings, it continues to look at thing as strings and interpret “+” operator as string concatenation operator.

Examples

- "Lucky number: " + 4 + 2 == "Lucky number: 42"
- 4 + 2 + " is lucky" == "6 is lucky"

Practicing variable assignment

- Open the repl.it project called ToCelsius
- Inside main(), define and initialize the temperature in Fahrenheit as a variable f
- Your program should then convert this to a temperature in degrees Celsius
- You should then print “f degrees Fahrenheit is c degrees Celsius” for the values of f and c
    - Remember that to convert Fahrenheit to Celsius, you need to subtract 32 and then multiply by 5/9

*use comments!!

More practice

- Open the repl.it project addFrac
- Inside main() define and initialize four integers: the numerator and denominator of the first fraction, and the numerator and denominator of the second fraction
- Your program should then print these fractions, e.g.
  - “The first fraction is 5/9”
  - “The second fraction is 2/3”
- Your program should then compute the sum of these fractions. The sum does not need to be in reduced form
  - Recall that a/b + c/d = (a*d)/(b*d) + (c*b)/(d*b) = (ad + bc)/(db)
- Your program should then print this sum:
  - “The sum of the fractions is 33/27”