

Java Arithmetic - First understand integer division (assumed by Java)

some examples of integer division

- . $10/2$ is 5 2&10 are stored as 32 bit (4 byte) int datatypes
- . $10/3$ is 3 so... java does 32 bit operations, resulting in 32 bit results
- . $10/4$ is 2 the answer to integer division is the whole number answer
- . $4/10$ is 0 only, the quotient in a long division problem.

now double division

- . $10.0/2$ 5.0 this is normal math type division.
- . $10.0/3$ 3.333333
- . $10/4.0$ 2.5
- . $10.0/5.0$ 2.0

Casting

To change one data type to another put the new type in parenthesis in front of the type you want to change, as follows:

```
int n = 6;
double d = (double)n;      //(double)n turns n into 6.0
                             //however this would happen anyway as 32 bits
                             // can be moved into 64 bits
```

$10/4$ evaluates to 2 because of integer division

but $(double)10/4$ evaluates to 2.5 $10/(double)4$ also evaluates to 2.5

BUT BE CAREFUL OF ORDER OF OPERATIONS

Casting comes before all operations EXCEPT () grouping

$(double)(10/4)$ evaluates to 2.0

bc $(10/4)$ is integer division \rightarrow then cast to double

```
int x,y;
```

$(double)(x/y)$ will not do the same as $(double)x/y$ or $x/(double)y$

When you cast to an int you lose precision by truncating:

```
int n = (int) 10.7 / 5;      // 10 / 5 yields 2, can be stored into an int 32 bits
```

```
int n = 10.7 / 5;      // 64 bits in either operand is 64 bit division
```

```
                             // so this is an error! cannot stuff 64 bits into 32 bits.
```

```
double m = (int)12.6 / 2;      // 12/2 is 6 but stores as 6.0
```

ASSIGNMENT PART 1: PRACTICE BY SOLVING

Assume `int x = 8; int y = 5; int a = 10; int b = 3;`

`int num = 12 / 7 ;`

`int num = 3 / 9 ;`

`double d = 1 / 2 ;`

`int num = 100 / 6.0 ;`

`int lol = x / b ;`

`double d = 100 / 40.0`

`int num = 0 / 5 ;`

`double dd = (double) -4 / 8 ;`

`double bitty = 30.0 / 12 ;`

`int f = (int)(7.0 / b) ;`

`int g = (int) 7.0 / a ;`

`int g = 7.0 / (int) 3.0 ;`

`double g = (double)(10 / 7) ;`

`int num = a / b ;`

`int btw = y / (double) b ;`