Something new: Casting & Ranges of primitives

Mr. Neat

Java

Ranges of primitives: ints

- the maximum value that an int variable can take on is the same for all Java programs
- it is stored in a constant: Integer.MAX_VALUE (for min, Integer.MIN_VALUE)
- four bytes long
- the Max value is:2147483647 = $(2^{31}-1)$
- the Min value is: - 2^{31}

Ranges of primitives: doubles

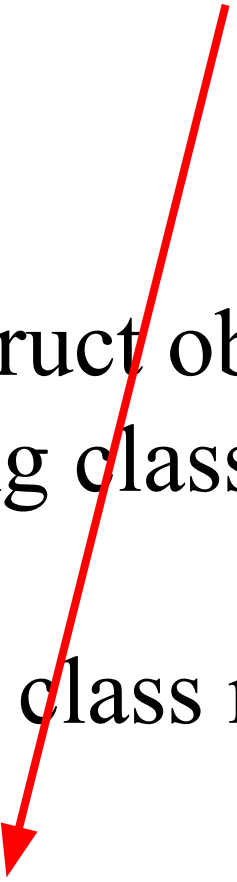
Simple Definition:

- two whole numbers with a decimal between them
- can be +, -, 0
- used for measuring

Advanced Definition:

- Value ranges
  - furthest from zero $1.7e^{308}$
  - closest to zero $1.7e^{-308}$

New Idea: static methods!

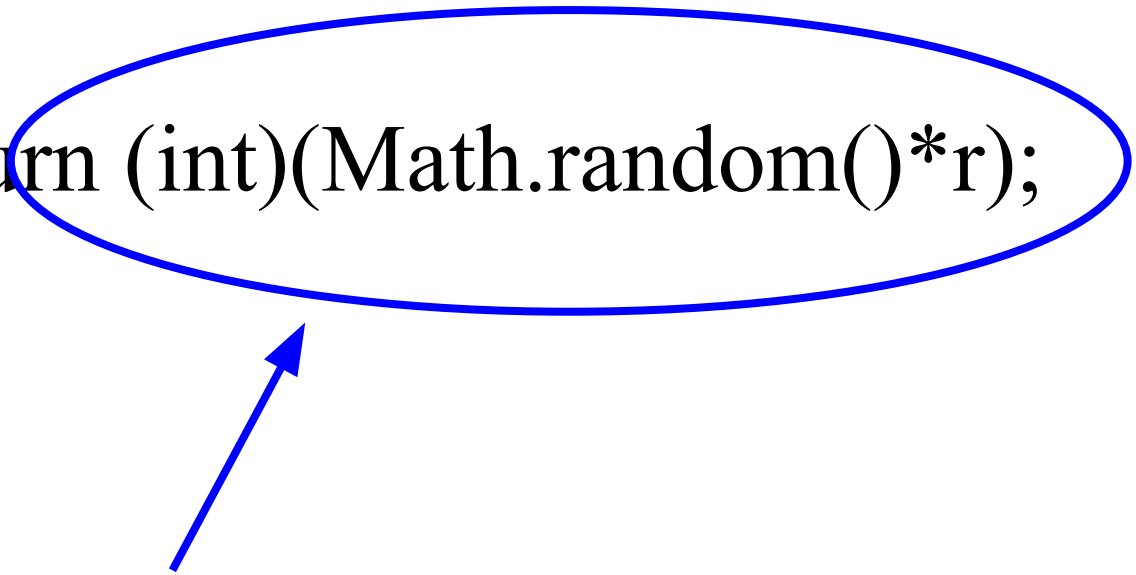


- no need to construct object of class
- call method using class name as the object
- no object of that class needs to exist

```
System.out.print(Canvas.rand(100));
```

Look at the Canvas rand method definition...

```
public static int rand(int r)
{
    return (int)(Math.random()*r);
}
```



Let's analyze this

Look at the Canvas rand method definition...

```
(int)(Math.random()*r);
```

- Math is a static class
- call all Math methods with class name
- random() is one Math method
- random returns a double from 0 to 1
- including 0 but not including 1

Other Math Methods...

- Math.abs()
- Math.power(a,b)
- Math.sqrt(s)
- Math.min(c, d);
- Math.max(e, f);

Look at the Canvas rand method definition...

```
(int)(Math.random()*r);
```

- r is an integer multiplier
- Math.random() is like taking a percent of r

Look at the Canvas rand method definition...

```
(int)(Math.random()*r);
```

- this produces a double
- the value is some % of r
- for example, 17.5

Look at the Canvas rand method definition...

```
(int)(Math.random()*r);
```

- this command "casts" the double to an integer
- casting a double to an integer has the effect of chopping off the decimal
- for example, (int)(17.5) = 17
- So the above expression generates random integers from (and including) 0 up to (and including) r - 1

Another Example...

```
int john;
double sam;
EasyReader sue = new EasyReader();
sam = sue.readDouble();
john = (int)sam;
```

casting

(truncates towards zero)

If sam = 5.9, john = 5!

Lab

1) Review your Frogger Final program and eliminate all calls to Canvas.rand(). Replace with direct calls to Math.random().
2) Comment out the old call to make it easier to fix if you get errors.
3) Run the code and verify you didn't break it
4) In the future, use the direct call if you would like. I don't care