COMP 1010- Summer 2015 (A01)

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```
/*******************
* Cat Face! Draw a cat face on the screen
* author: Teo the dog
* version: try #awesome
* purpose: to show how a cat can be drawn
*******************/

size(500,500); // make a 500x500 canvas
int noseCenterX = 275;
int noseCenterY = 400;

//draw the head
ellipse(250,250,300,300);

//draw the ears
triangle(375,80,300,150,400,200);
triangle(125,80,200,150,100,200);

//draw the eyes
ellipse(175,225,60,30); // left eye
ellipse(175,225,15,30);
ellipse(325,225,60,30); // right eye
ellipse(325,225,15,30);

//whiskers!
line(noseCenterX,noseCenterY,noseCenterX-50,noseCenterY-25);
line(noseCenterX,noseCenterY,noseCenterX+50,noseCenterY-25);
line(noseCenterX,noseCenterY,noseCenterX-60,noseCenterY);
line(noseCenterX,noseCenterY,noseCenterX+60,noseCenterY);
line(noseCenterX,noseCenterY,noseCenterX-50,noseCenterY+25);
line(noseCenterX,noseCenterY,noseCenterX+50,noseCenterY+25);

// draw the nose. draw after whiskers for nice overlap effect
ellipse(noseCenterX,noseCenterY,30,30);
```

Let’s look back at the cat code: the eyes

```
//draw the eyes
ellipse(175,225,60,30); // left eye
ellipse(175,225,15,30);
ellipse(325,225,60,30); // right eye
ellipse(325,225,15,30);
```

Pupil is 15 wide
Pupil is twice high as it is wide (30 high)
eye height = pupil height (they just touch!)
eye width is twice the eye height

integer “operators” - multiplication

the “*” symbol:

<integer> * <integer>

5*5, 10*2, 2*2, 231421341*12341234

Setup the code for the pupil size

integer “operators” - division

the “/” symbol:

<integer> / <integer>

$\frac{10}{5}$ ½

10/5 , 50/10, 9/3, 12/4

We can use this to reverse the eye example

Instead, do everything with respect to the width of the eye.

Eye ratios:

Eye width is 60

Eye height is half width

Pupil height is half eye width

Pupil width is quarter eye height

Cat example – practice update with variables (at home)

We already have nose/whiskers and eye sizes done

- Head center
  - Update head ellipse
  - Update Eye locations
  - Update ear locations
  - Update nose center

Back to division….

Let’s make a line that goes X percent across the screen

```
int percent = 33;
int targetX = percent/100*500;

line(0,250,targetX,250);
```

what happened?

Reality check – calculate by hand

33/100*500 = ?

165 – try it

Why did we get a different answer?

IMPORTANT HELPER TOOL

Remember the console in processing?

You can toss data out there for a reality check

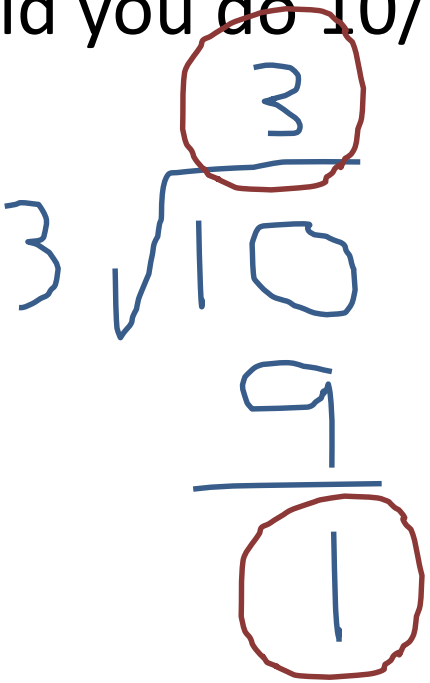
New processing command:

println(data);

Use this to debug our problem

before highschool:

How did you do 10/3 in elementary school?



The answer is 3 remainder 1

In processing with integers: 3 is the result

The remainder is discarded

division – integers never give a fraction amount. (seriously)

1/2 = ?

11/3 = ?

100/26 = ?

integer division always discards the fraction amount and gives you the whole amount.

does it always round down?

-9/10 = ?

remainder: (also called modulo, mod)

difficult but useful - highly recommend you practice this

use the “%” symbol

10%2

remainder when you do 10/2

10/2 = 5 R 0

10%2 = 0

5%2?

5/2 = 2 R 1

5%2 = 1

11%3?

11/3 = 3 R 2

11%3 = 2

Order of operations!

order of operations!

complex statements:

3+2*6/3%4

what is the answer?

order of operations!! BEDMAS

Brackets!

Exponents (and roots)!

Division and Multiplication (and remainder)

Addition and Subtraction

order of operations!

not 100% sure? just use brackets to enforce what you mean:

3+2*6/3%4 → 3 + (2*6/3)%4 = 3

Coding style and standards

Coding style is VERY important!

1. commenting!
2. indentation!
3. Use meaningful variable names

   int a; // bad. Too short. Not meaningful.

   int a2; // even worse!

3. Use named constants! (in a second)
4. More…

Variable names..

Descriptive
Self-commenting
e.g.,
float t; // tax rate
float taxRate;

Standards – be aware of them

```
int _data;
boolean isHit;
```

“readable” code

what does this mean?

```
int resultA = 100*5*26;
int resultB = 52*5*26;
int resultC = 88*5*26;
```

in this case, a summer cottage industry calculating season costs:

the first number is the cost of a service per day, the second is the number of days a week open, and the third number (26) is how many weeks the business is open a year

what are two problems with my above example?

1) hard to read
2) what if the season or week length changes?
   I need to make a bunch of changes

named constants!!

constant – a value or piece of information which we guarantee will not change while the program is running. e.g., length of a business season, or sales tax, etc.

```
int resultA = 100*5*26
int resultB = 52*5*26;
int resultC = 88*5*26;
```

```
int resultA = 100*DAYS_PER_WEEK*WEEKS_PER_YEAR;
int resultB = 52*DAYS_PER_WEEK*WEEKS_PER_YEAR;
int resultC = 88*DAYS_PER_WEEK*WEEKS_PER_YEAR;
```

```
int hydroCost = hydroDaily *DAYS_PER_WEEK*WEEKS_PER_YEAR;
int resultB = 52*5*26;
```

naming conventions

note: naming conventions are not processing rules, but accepted standards that help improve readability:

note: named constants are usually ALL_CAPS_WITH_UNDERSCORES_FOR_SPACES

regular changing variables are usually smallFirstWordAndCapitalizeEveryOtherWord.

```
int hydroCost = hydroDaily *DAYS_PER_WEEK*WEEKS_PER_YEAR;
```

named constants in Processing are done with the “final” keyword.

final type variableName;

final variables can only be set ONCE and never change:

final int WEEKS_PER_YEAR = 26;

or

final int WEEKS_PER_YEAR;
WEEKS_PER_YEAR = 26;
WEEKS_PER_YEAR = 0; // ← illegal because already set

for your assignments…

- reasonable variable names
- consistent and good indentation
- reasonable comments (err on the side of too many)

will be stressed more as we go through the course