

A green star-shaped sticker with the Pythagorean theorem $a^2 + b^2 = c^2$ written on it. The letter 'a' is brown, 'b' is green, and 'c' is purple.



A sticker featuring the quadratic formula
$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
 written in black ink. The formula is flanked by a Pac-Man character on the left and a ghost character on the right.

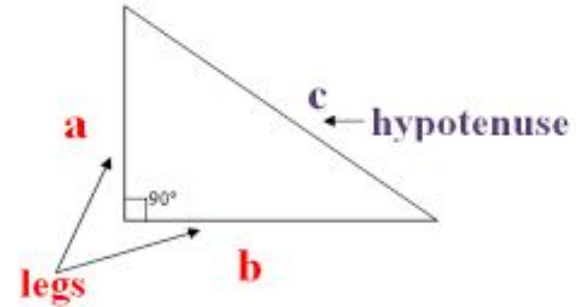
Variables

Today we shift from art to math....

You've used lots of variables in math

Letters symbolize placeholders for real values.

For instance, if $a = 8$ and $b = 15$, what is the value of c ?



$$a^2 + b^2 = c^2$$

Syntax



variable

A character or a word that represents a value that may be unknown or changing.

Syntax



JavaScript variable

Defined by using the word “var” in front of it.

The name should indicate what the variable represents. In the code must be defined before (above) where it is used.

Example

```
var GPA;    //GPA is a better name than x
```

Syntax



variable assignment

We use “=” to assign a value to a variable.

We say “gets” instead of “equals.”

The left-hand side is **always** the variable.

The right-hand side is **always** the value.

Example

GPA = 4.0; //We say “GPA gets 4.0”

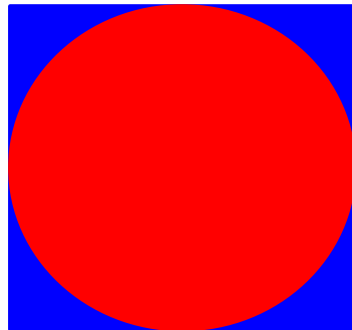
**This is not how we check whether 2 variables are equal*

Programming Example



//This code draws a blue square circumscribed about a red circle.

```
fill(30, 30, 189);  
rect(80, 80, 200, 200);  
fill(255, 0, 0);  
ellipse(180, 180, 200, 200);
```



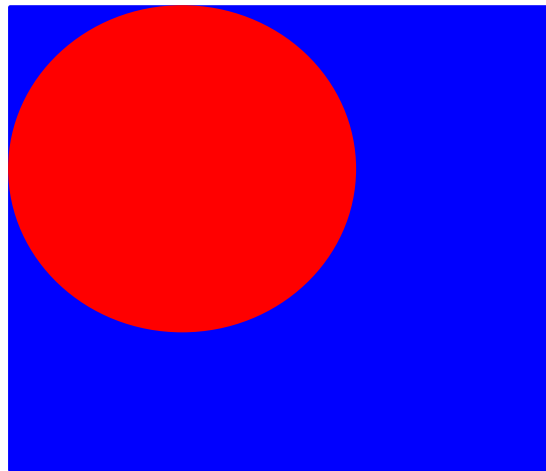
//What will happen if I change ONLY the square's height and width to 300?

Programming Example



The circle didn't keep up!!!

```
fill(30, 30, 189);  
rect(80, 80, 300, 300);  
fill(255, 0, 0);  
ellipse(180, 180, 200, 200);
```



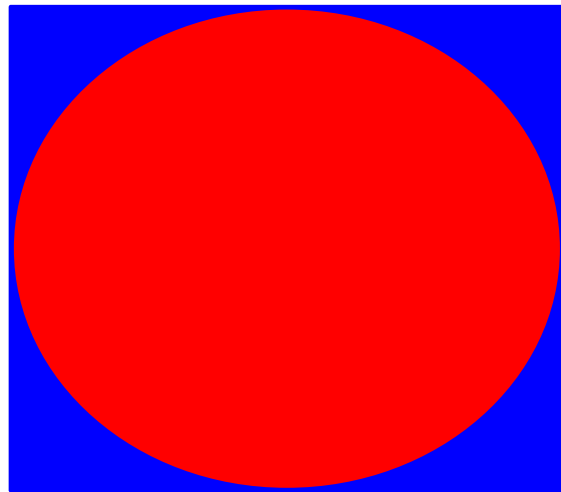
What values should I send to the ellipse parameters?

Programming Example



This is good... but we can do even better

```
fill(30, 30, 189);  
rect(80, 80, 300, 300);  
fill(255, 0, 0);  
ellipse(230, 230, 300, 300);
```



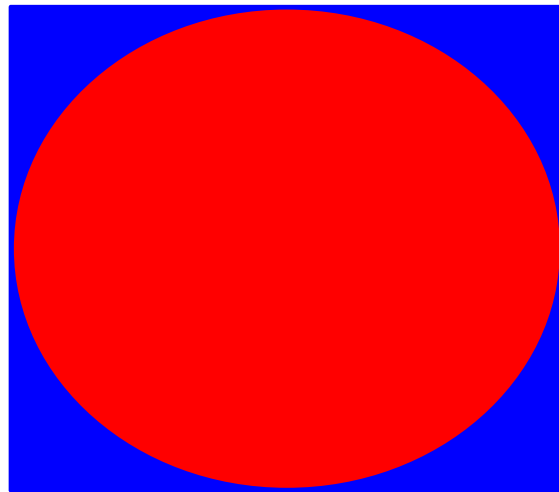
**//How can we use variables to
make sure they are ALWAYS the same??**

Programming Example



One step closer! Make width and height the same

```
var rectWidth = 300;  
var rectHeight = 300;  
fill(30, 30, 189);  
rect(80, 80, rectWidth, rectHeight);  
fill(255, 0, 0);  
ellipse(230, 230, rectWidth, rectHeight);
```



Now I must link the (x,y) coordinates

Programming Example



//It's Just MATH! Fill in the blanks :)

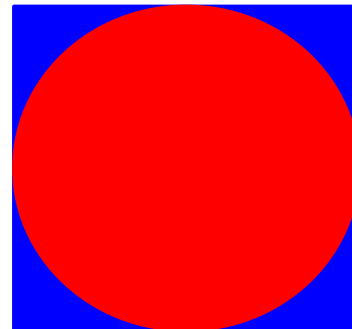
fill(30, 30, 189);

rect(80, 80, 200, 200);

fill(255, 0, 0);

ellipse(180, 180, 200, 200);

//How did I know to choose (180,180) for the ellipse's center???



180 = 80 + _____;

or 180 = rectX + _____;

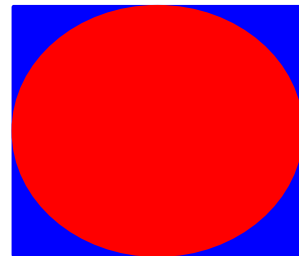
or 180 = rectX + rectWidth/____;

Programming Example



//COPY! It's perfect!

```
var rectX = 80;  
var rectY = 80;  
var rectWidth = 200;  
var rectHeight = 200;  
fill(30, 30, 189);  
rect(rectX, rectY, rectWidth, rectHeight);  
fill(255, 0, 0);  
ellipse(rectX + rectWidth/2, rectY + rectHeight/2, rectWidth, rectHeight);
```



RULE OF THUMB!

Your parameters should be variables, not numbers.

Example: Drawing a point to make a star?

NO: `point (50,60);`

YES: `point (starX, starY);`

Time to Try!



Go to my website and look at today's assignment.

Assignment #2 - Animate a Pokemon! I

BONUS!!!! SELFIE (DO THIS)

MAKE A SELFIE USING ONLY THESE VARIABLES for x and y:

var xFace = ____ ;

var yFace = ____;



ellipse(xFace, yFace, 200 ,200); //this draws the face

//The eyes and mouth and everything else should use the face variables so they move WITH the face.

Homework!

Watch: Intro to Animation

Do: Exploding Sun

