Operators

+	addition
-	subtraction
*	multiplication
/	division
^	taking powers
<-	assignment

&	AND
|	OR
!	NOT

==	equality
!=	inequality
>	greater than
>=	greater than or equal to
<	less than
<=	less than or equal to

```
> (6 - 4) / 2
[1] 1

> 6 - (4/2)
[1] 4
```

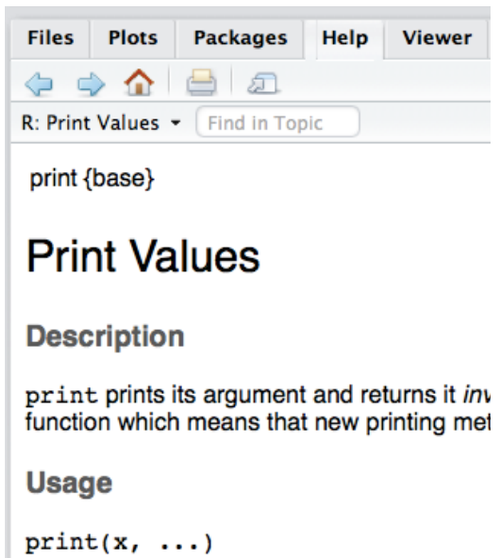
When performing multiple calculations, use parentheses to make sure R does the calculations in the desired order

(Note: without parentheses, the order is: ^ first, then * and / second (left to right), and then + and - last (left to right). No-one remembers this at first.)

Functions

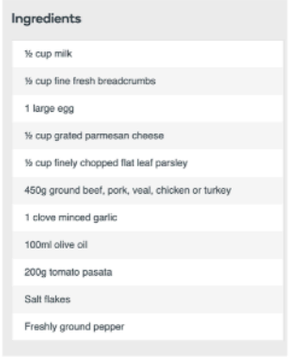
`help(functionName)`

e.g. `help(print)`



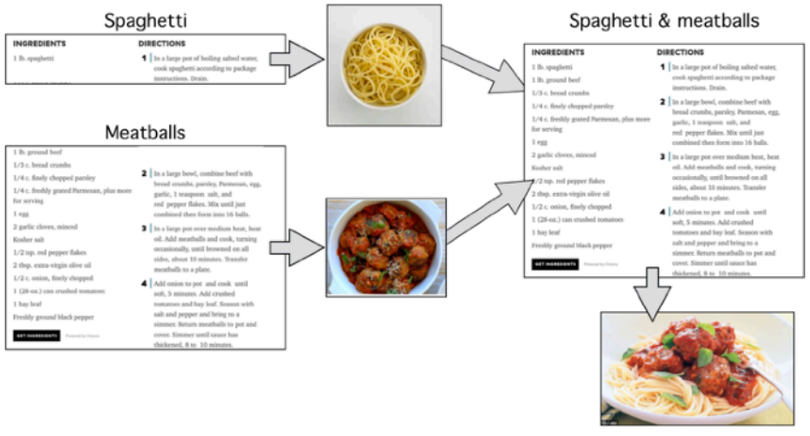
`sqrt()`	- Square root
`round()`	- Round a number
`log()`	- Logarithm
`exp()`	- Exponentiation
`abs()`	- Absolute value

functions take arguments
(order matters, unless you name them)



```
round (3.1415, 2)
round (x=3.1415, digits=2)
```

functions can take other functions
evaluated from the inside out




```
sqrt ( round(4.45) )
sqrt ( 4 )
2
```

Debugging hints

** Remember that 80% of programming is debugging. Everyone has to debug *all of the time*. Having bugs means nothing about your skill (or lack thereof). Nothing at all. Good programmers = good debuggers.

1. Double-check that you have spelled everything right and have all of the right punctuation! Especially brackets. R is *super* picky.

2. READ AND THINK ABOUT THE ERROR MESSAGE. It is often really helpful. If you don't know what it means, google it exactly.

3. If you have a long command or multiple lines, separate it into parts and make sure each part is doing what you expect, one by one

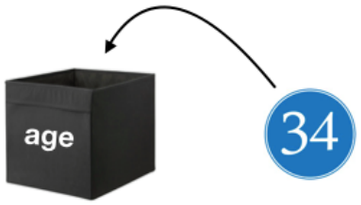
4. Experiment around and try things! It's really really hard to break R. Do strange stuff, that's how you learn.

Variables

variable classes

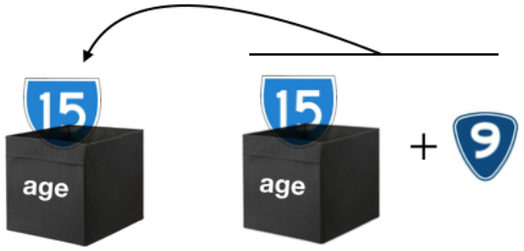
variable	example	picture
numeric	8	
logical	TRUE	
character	“a bunny”	

variable assignment




```
age <- 34
```


```
age+10
```




```
age<-age+9
```

Vectors

vectors are lists of variables
of the same class

```
name <- c( "bunny", "gladly", “flopsy" )
```

can access or assign specific variables in
a vector by location or logic

myFood

all these pick out the first item in the vector


```
myFood[1]
myFood[c(TRUE,FALSE,FALSE)]
myFood[myFood==“broccoli”]
```