Timers

# Lesson Notes

## What is a timer?

* A timer is another “event”
  + like the “load” event
* To use it:
  + You supply a function
  + You supply an amount of time (duration)
  + It will call your function after that amount of time expires
  + Decide: repeat until canceled, or just once
* Two purposes
  + Let your code run after some delay
  + Let your code run periodically

## Durations

The following units are commonly used in computer science for durations:

* Weeks, Days, Hours, Minutes, Seconds
  + You know these!
* **Milliseconds (ns)**
  + 1 / 1,000th of a second (thousandths of a second)
  + Inverse, 1,000 times a second, **Kilohertz (KHz)**
* **Microseconds** (**μs**)
  + 1 / 1,000,000th of a second (millionths of a second)
  + Inverse, 1,000,000 times a second, **Megahertz (MHz)**
* **Nanoseconds** **(ns)**
  + 1 / 1,000,000,000th of a second (billionths of a second)
  + Inverse, 1,000,000,000 times a second, **Gigahertz (GHz)**
  + The speed of light travels roughly 1 foot in 1 ns (“light-foot”)

## Durations in Javascript timers

Javascript uses milliseconds (thousandths of a second)

* Example: twice a second (500ms)
* Example: four times a second (250ms)
* Example: 10 times a second (100ms)
* Example: 24 frames a second (1000/24 = ~42)

## Timers that occur once (timeout timer)

* Syntax
  + var id = setTimeout(*function*, *timeInMilliseconds*);
  + clearTimeout(id);
* Can be canceled
  + Function will not be called if not already called

## Exercise

* Draw something on the canvas
* Use a timeout timer to wait 3 seconds
* After 3 seconds:
  + Erase the canvas (fillRect)
  + Draw something else

## Timers that occur repeatedly (interval timer)

* Syntax
  + var id = setInterval(*function*, *timeInMilliseconds*);
  + clearInterval(id);
* Can be canceled
  + Function will not be called any more

## Animation

* Can use interval timer for animations
* Write a function that:
  + Erases the canvas
  + Draw the scene based on the state
  + Update the state
* Make note about early games
  + Did not use time
  + Needed “turbo” button

## Exercise

* Create an animation using:
  + Canvas
  + Repeating Timers
* Display your animation
  + Everyone does a “walk-around” after a period of time
  + Ask questions

## Debugging timers

* Timers are difficult to debug
  + Use a larger interval until you get it working
  + Use a non-repeating timer until you get it working
* May need to close the browser forcefully:
  + Windows: right-click on task bar, task manager, select browser, end task
  + Mac: apple menu, force quit, select application