Acceleration

- **Acceleration:**

$$a = \frac{\text{change in velocity}}{\text{time}} = \frac{\Delta v}{t}$$

Standard units of acceleration : m/s^2

- **If there were no air resistance, all objects in Earth gravity would fall with the same acceleration,**

$g=9.8\ m/s^2$

(directed downward)

Galileo Galilei's experiment in Pisa (possibly, a legend)

Homework 6

Problem 1.

NASA wants to measure free fall acceleration precisely. To do that, they perform an experiment in which they measure how speed of a falling object changes with time during free fall in vacuum. The results are provided in the table. Find the acceleration during each segment.

t(s)	0	2	5	10	15
v(m/s)	0	19.62	49.05	98.10	147.15

Problem 2.

A car starts at rest at $t = 0\ s$. The car accelerates at $\mathrm{a} = 6\ {}^{m}/_{s^2}$ until it reaches a velocity of $\mathrm{v} = 42\ {}^{m}/_{s}$. **(a)** How long did it take for the car to reach this velocity? The car kept this speed for $5s$, until the driver saw a police car in the horizon. The driver slammed the brakes bringing the speed of the car down to $v = 27\,{}^{m}/_{s}$ in just $3s$. **(b)** What was the acceleration of the car during the braking process?

See problem 3 on the next page.

Problem 3.

In the following graph of v vs. t, draw the behavior of the velocity of the car in the previous problem.