Acceleration of a car

$P := 73600$ The power of the motor in Watt

$A := 2.13$ Frontarea of the car

$cw := 0.29$ A cofficient of the resistance of air

$\rho := 1.2$ The density of air at 20 degrees

$m := 1440$ The mass of the car in kg

$$k := \frac{A \cdot cw \cdot \rho}{2}$$

Describing differetialequation
Use the rule that F*v=effect.
The second derivate is the acceleration, and the first speed

$$m \cdot s'' \cdot s' = P - \frac{\rho \cdot A \cdot cw \cdot s'^3}{2}$$

The formula below you can calculate the top speed of the car

$$Vtop = \sqrt[3]{\frac{2 \cdot P}{\rho \cdot A \cdot cw}}$$

Given

$$\frac{d^2}{dt^2} s(t) = \frac{P - k \cdot \left(\frac{d}{dt} s(t)\right)^3}{m \cdot \frac{d}{dt} s(t)}$$

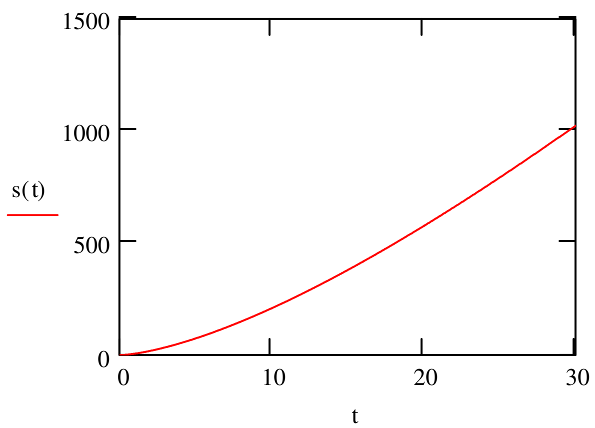
$s(0) = 0$ $s'(0) = 0.005$

$s := \mathrm{odesolve}(t, 200)$

Here I formulate the differetialequation who describes how the car accelerates. The strip is 404 m. The second derivate of s(t) is the acceleration. P is the effect you put down in the wheels. And I use the law that F*v is the effect. The dynamic pressure rise the front area on the car rise the speed is the effect. The effekt divide by the speed is the Force, and the force divide by the mass gives the acceleration of the car.

$$v(t) := \frac{d}{dt} s(t)$$

$\mathrm{root}(s(t) - 404, t, 0, 200) = 15.634$ The time to reach 404 m



$v(199) \cdot 3.6 = 210.013$ Max speed in km/h