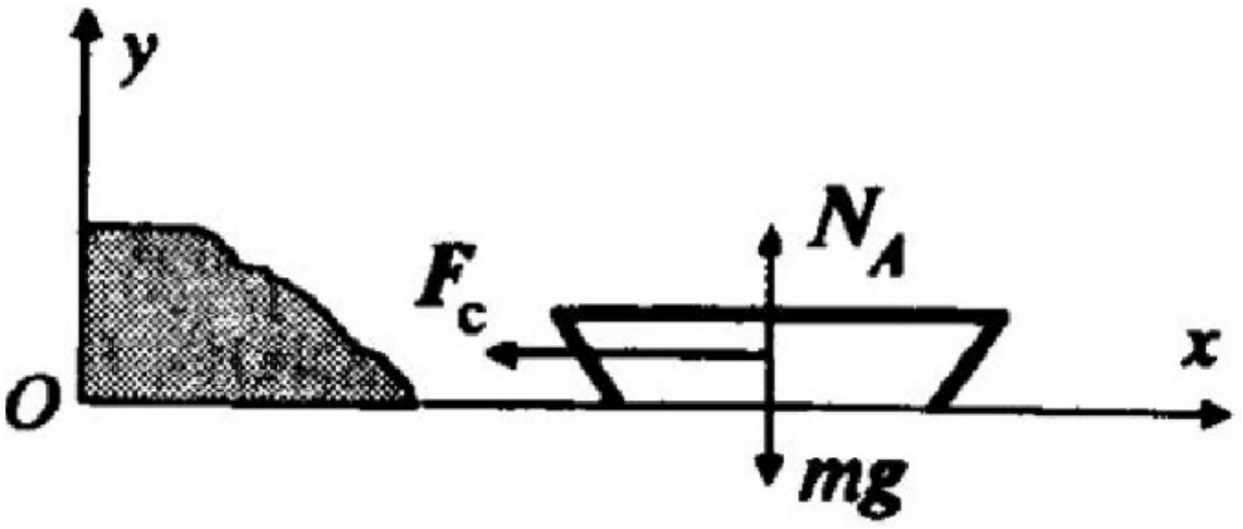
The boat has an initial velocity v_o and a mass m. Resistance force $F_c(v)$ also affects on the boat. You should:

1. Find an equation of motion of this boat.
2. Find the time when the boat speed will be reduced twice.



Lab 9, Task 1

HINTS:

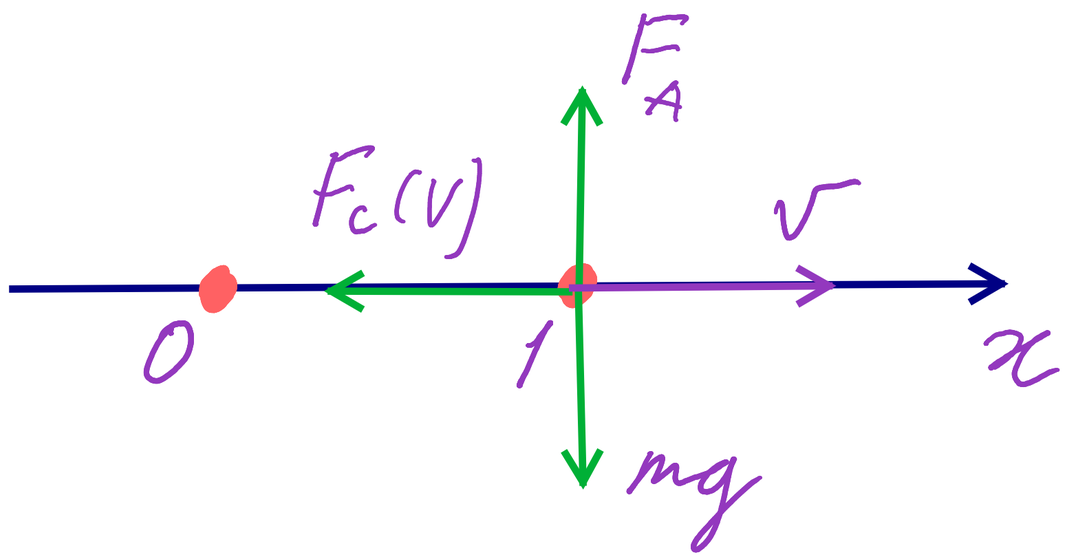
1) Depends of a research object and type of motion, you can choose an algorithm.
2) Don't forget to put a coordinate frame.
3) Each task can be divided into 2 big subtasks:
   a) Obtain equations (creative work)
   b) Integrate them (routine task). In simple cases it can be done analyticaly, otherwise - numericaly
4) Explanatory sketch and a <kinematics> scheme are different stories.
5) In some cases it's necessary to draw a scheme in different conditions.

Research Object: a boat (particle) - we represent it as a particle, because we can neglect the size of the boat.

Motion: rectlinear -> Method: 2nd Newton's Law (inertial system)

Conditions:

"0" - Initial	"1" - Final	"2"
$x_0 = 0$	$x_1 - ?$	$x_2 - ?$
$\dot{x}_0 = V_0$	$\dot{x}_1 - ?$	$\dot{x}_2 = V_0/2$
$t_0 = 0$	$t_1 - ?$	$t_2 - ?$



Force Analysis:

$\underline{m\bar{g}}$ F_A $F_c(V) = |\underline{k}\,\dot{x}|$

Solution:

1" $m\bar{a} = \bar{F}_a + m\bar{g} + \bar{F}_c$; $x: m\ddot{x} = -k\dot{x} \Rightarrow \dot{x} = e^{-\frac{k}{m}t + C_1}$

" $\dot{x}_0 = v_0$, $t_0 = 0$, $x_0 = 0$ $\Rightarrow$ $v_0 = e^{0 + C_1} \Rightarrow C_1$

$\Rightarrow$ // $0 = -\frac{m}{k} e^{0 + C_1} + C_2 \Rightarrow C_2$

$x = -\frac{m}{k} e^{-\frac{k}{m}t + C_1} + C_2$

"2" - substitute conditions to $\dot{x}(t) = \ldots$