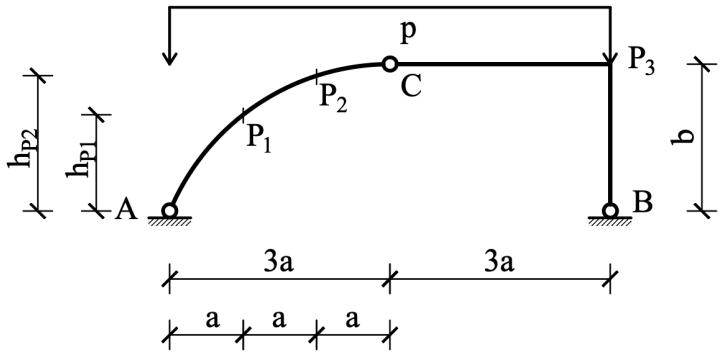
4. Determine the bending moment diagram of the structure assuming that A-C is a circular segment! (5 + 5 points)

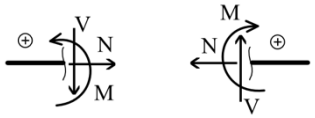


Data:

$p\ [kN/m]$	$a\ [m]$	$b\ [m]$

Results:

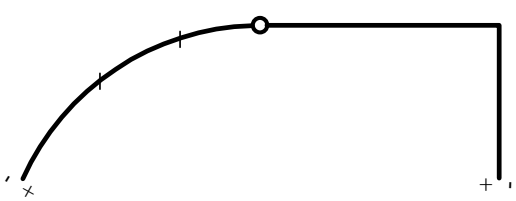
The data marked by grey colour should be given as a signed value. Positive support reactions: ↑ → ↷.



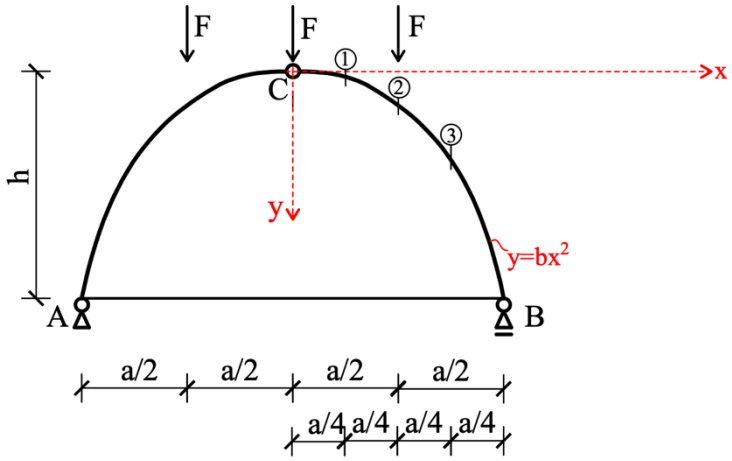
$A_x\ [kN]$	$A_y\ [kN]$	$B_x\ [kN]$	$B_y[kN]$
$R\ [m]$	$h_{P1}\ [m]$	$h_{P2}\ [m]$	
M_{P1} [kNm]	M_{P2} [kNm]	M_{P3} [kNm]	b_{C-P_3} [kNm]

Free-body diagram:

M



5. Determine the internal force diagrams of the following structure if its shape is the graph of the function $y=bx^2$ (parabola)! The heights of the points from axis x are denoted by h_1, h_2, h_3, the angles between the tangents of the parabola and axis x are denoted by $\alpha_1, \alpha_2, \alpha_3$ (see the figure below). The force in the tie rod is denoted by S. The heights are required in centimeters! (10 + 10 points)



Help:
The height of the structure h is not given, but it can be calculated from the given function.

The bending moment does not depend on the direction of axis; hence it can be calculated in the usual way.

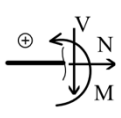
To calculate N and V, first, we should calculate the angle between the tangent of the parabola and axis x: N is parallel, and V is perpendicular to the tangent. The angle can be determined using that the slope of the tangent is the derivative of the given function.

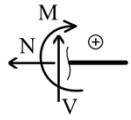
Data:

$F\ [kN]$	$a\ [m]$	b

Results:

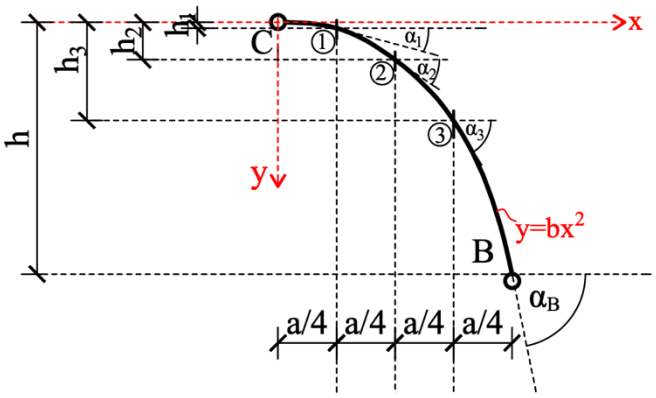
The data marked by grey colour should be given as a signed value. Positive support reactions: ↑ → ↷.

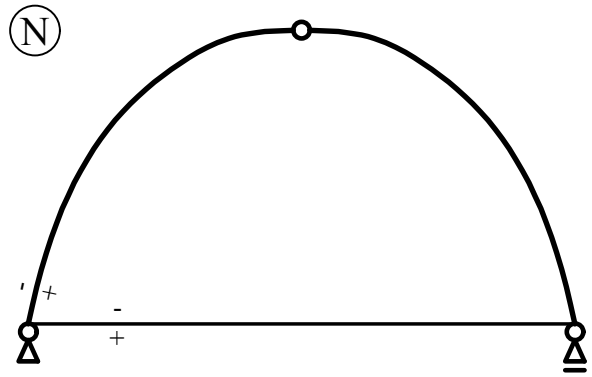


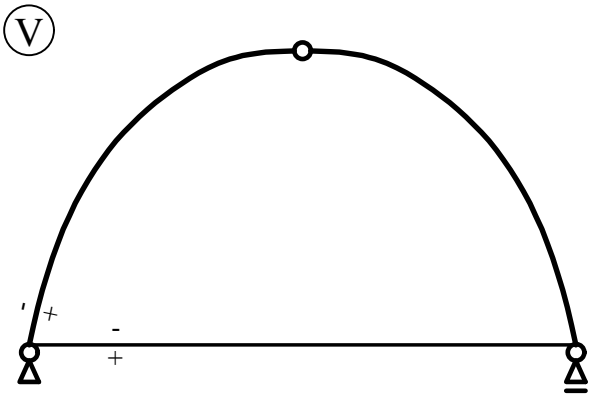


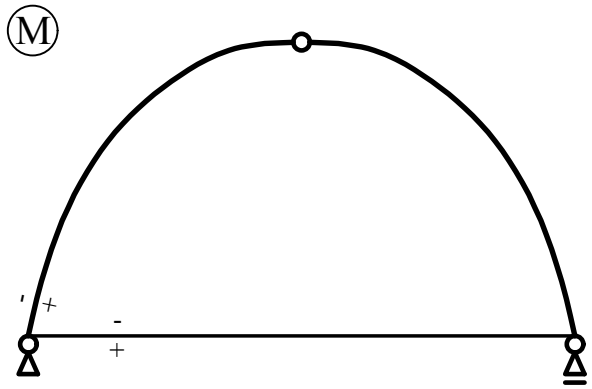
$h_1[cm]$	$h_2\ [cm]$	$h_3\ [cm]$	$h\ [cm]$	$S\ [kN]$
α_1 [°]	α_2 [°]	α_3 [°]	α_B [°]	
M_1 [kNm]	M_2 [kNm]	M_3 [kNm]		
$V_C^j\ [kN]$	$V_2^b\ [kN]$	$V_2^j\ [kN]$	$V_B\ [kN]$	
$N_C^j\ [kN]$	$N_2^b\ [kN]$	$N_2^j\ [kN]$	$N_B\ [kN]$	

Superscript 'b' and 'j' refer to the left and right sides of a point, respectively.




N
+
-
+


V
+
-
+


M
+
-
+