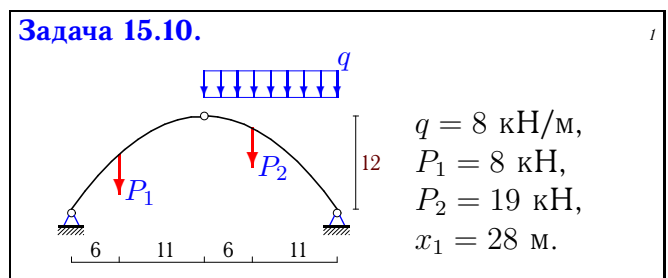
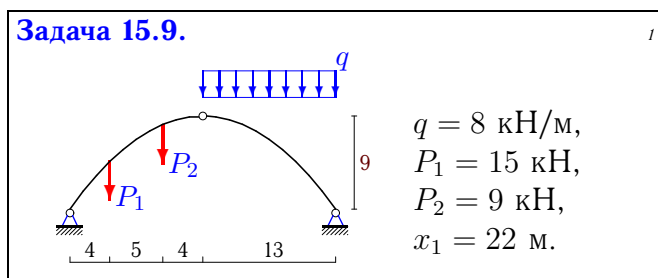
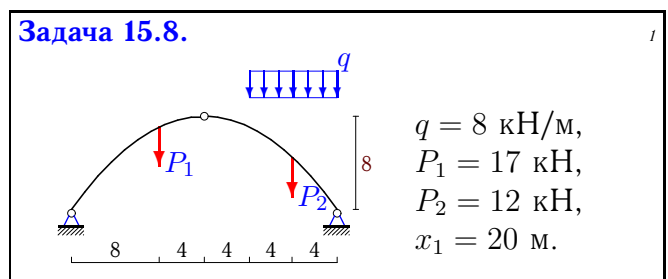
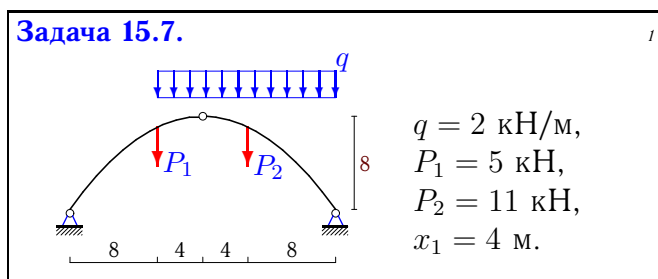
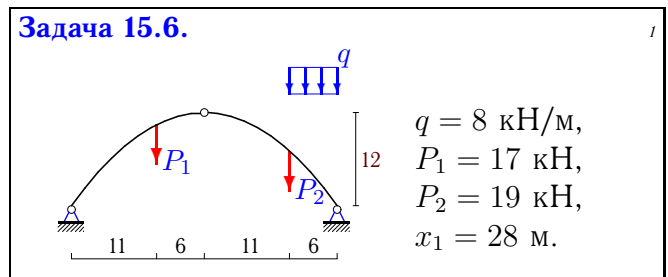
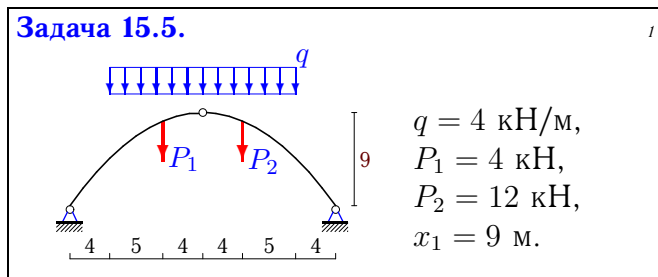
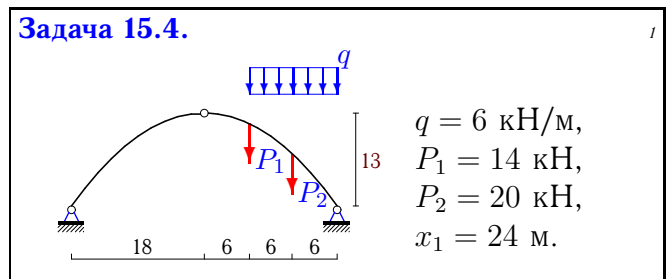
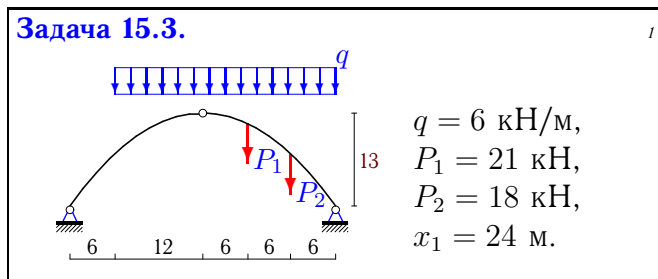
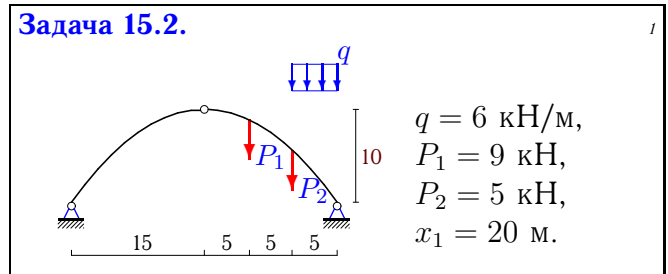
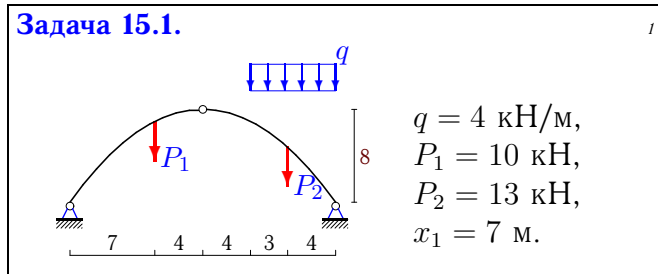
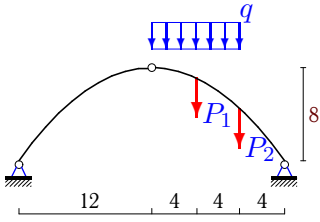


Трехшарнирная арка

Построить эпюры M , Q , N в трехшарнирной арке параболической формы. Для заданного сечения x_1 вычислить значения $M(x_1)$, $Q(x_1)$, $N(x_1)$. Начало координат находится на левой опоре арки.

В ответах даны вертикальные реакции V_A , V_B , распор H , максимальные значения ординат эпюр балочного момента M_*^0 и момента в арке M_* и соответствующие координаты сечений $x_{M_0}^*$ и x_M^* .



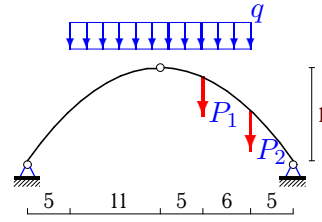
Задача 15.11.

$$q = 4 \text{ кН/м,}$$

$$P_1 = 11 \text{ кН,}$$

$$P_2 = 17 \text{ кН,}$$

$$x_1 = 8 \text{ м.}$$

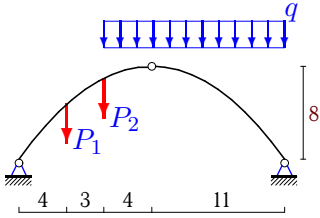
Задача 15.12.

$$q = 4 \text{ кН/м,}$$

$$P_1 = 9 \text{ кН,}$$

$$P_2 = 6 \text{ кН,}$$

$$x_1 = 11 \text{ м.}$$

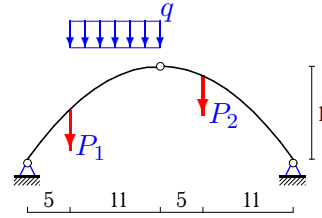
Задача 15.13.

$$q = 2 \text{ кН/м,}$$

$$P_1 = 9 \text{ кН,}$$

$$P_2 = 7 \text{ кН,}$$

$$x_1 = 4 \text{ м.}$$

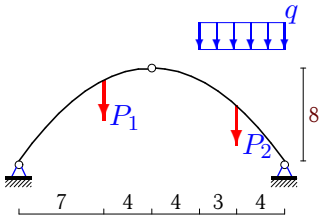
Задача 15.14.

$$q = 8 \text{ кН/м,}$$

$$P_1 = 8 \text{ кН,}$$

$$P_2 = 15 \text{ кН,}$$

$$x_1 = 27 \text{ м.}$$

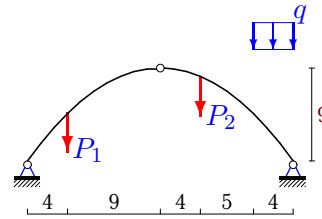
Задача 15.15.

$$q = 6 \text{ кН/м,}$$

$$P_1 = 19 \text{ кН,}$$

$$P_2 = 17 \text{ кН,}$$

$$x_1 = 15 \text{ м.}$$

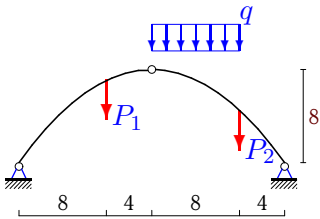
Задача 15.16.

$$q = 8 \text{ кН/м,}$$

$$P_1 = 12 \text{ кН,}$$

$$P_2 = 7 \text{ кН,}$$

$$x_1 = 22 \text{ м.}$$

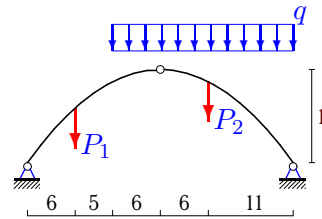
Задача 15.17.

$$q = 6 \text{ кН/м,}$$

$$P_1 = 11 \text{ кН,}$$

$$P_2 = 10 \text{ кН,}$$

$$x_1 = 16 \text{ м.}$$

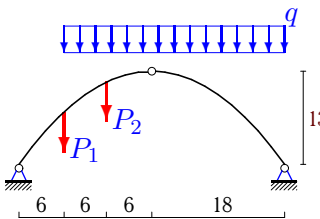
Задача 15.18.

$$q = 2 \text{ кН/м,}$$

$$P_1 = 6 \text{ кН,}$$

$$P_2 = 14 \text{ кН,}$$

$$x_1 = 6 \text{ м.}$$

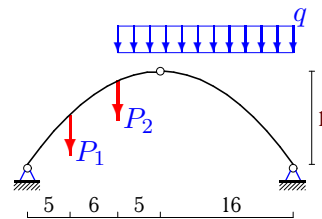
Задача 15.19.

$$q = 6 \text{ кН/м,}$$

$$P_1 = 12 \text{ кН,}$$

$$P_2 = 13 \text{ кН,}$$

$$x_1 = 24 \text{ м.}$$

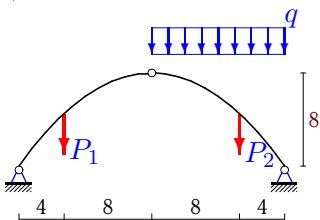
Задача 15.20.

$$q = 2 \text{ кН/м,}$$

$$P_1 = 17 \text{ кН,}$$

$$P_2 = 12 \text{ кН,}$$

$$x_1 = 5 \text{ м.}$$

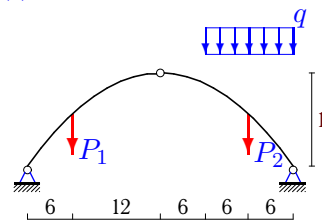
Задача 15.21.

$$q = 2 \text{ кН/м,}$$

$$P_1 = 12 \text{ кН,}$$

$$P_2 = 11 \text{ кН,}$$

$$x_1 = 4 \text{ м.}$$

Задача 15.22.

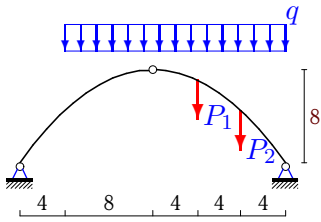
$$q = 6 \text{ кН/м,}$$

$$P_1 = 9 \text{ кН,}$$

$$P_2 = 8 \text{ кН,}$$

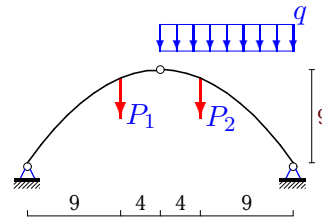
$$x_1 = 24 \text{ м.}$$

Задача 15.23.



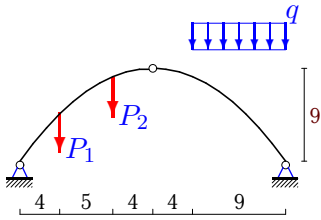
$q = 6 \text{ кН/м},$
 $P_1 = 7 \text{ кН},$
 $P_2 = 6 \text{ кН},$
 $x_1 = 16 \text{ м}.$

Задача 15.24.



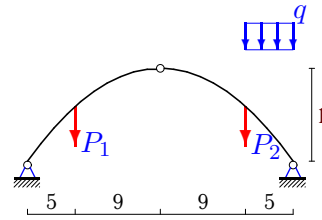
$q = 8 \text{ кН/м},$
 $P_1 = 20 \text{ кН},$
 $P_2 = 5 \text{ кН},$
 $x_1 = 22 \text{ м}.$

Задача 15.25.



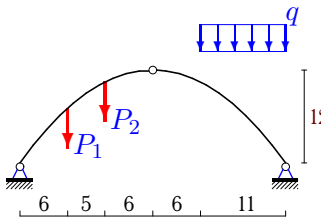
$q = 2 \text{ кН/м},$
 $P_1 = 9 \text{ кН},$
 $P_2 = 15 \text{ кН},$
 $x_1 = 4 \text{ м}.$

Задача 15.26.



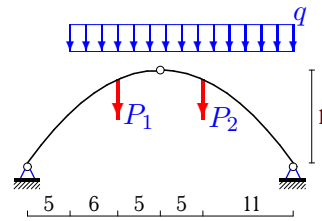
$q = 2 \text{ кН/м},$
 $P_1 = 13 \text{ кН},$
 $P_2 = 6 \text{ кН},$
 $x_1 = 5 \text{ м}.$

Задача 15.27.



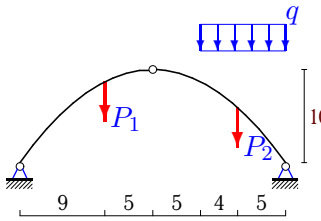
$q = 8 \text{ кН/м},$
 $P_1 = 13 \text{ кН},$
 $P_2 = 20 \text{ кН},$
 $x_1 = 28 \text{ м}.$

Задача 15.28.



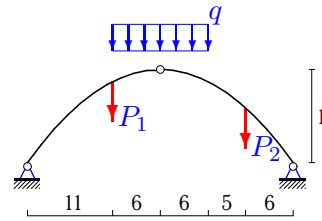
$q = 4 \text{ кН/м},$
 $P_1 = 10 \text{ кН},$
 $P_2 = 22 \text{ кН},$
 $x_1 = 11 \text{ м}.$

Задача 15.29.



$q = 4 \text{ кН/м},$
 $P_1 = 14 \text{ кН},$
 $P_2 = 6 \text{ кН},$
 $x_1 = 9 \text{ м}.$

Задача 15.30.



$q = 4 \text{ кН/м},$
 $P_1 = 11 \text{ кН},$
 $P_2 = 22 \text{ кН},$
 $x_1 = 11 \text{ м}.$

Трехшарнирная арка

| № | V_A | V_B | H | M_*^0 | $x_{M_0}^*$ | M_* | x_M^* | $M(x_1)$ | $Q(x_1)$ | $N(x_1)$ |
|----|--------|---------|--------|----------|-------------|---------|---------|----------|----------|----------|
| 1 | 13.636 | 37.364 | 13.750 | 126.158 | 15.767 | 51.853 | 17.967 | -0.000 | -3.214 | -13.855 |
| 2 | 6.333 | 37.667 | 9.500 | 126.667 | 20.000 | 60.556 | 25.000 | 42.222 | 1.421 | -9.764 |
| 3 | 85.000 | 134.000 | 84.462 | 1111.920 | 20.400 | 100.980 | 5.400 | 92.000 | -3.003 | -95.188 |
| 4 | 20.000 | 86.000 | 27.692 | 482.880 | 25.200 | 209.320 | 29.400 | 160.000 | 17.419 | -22.348 |
| 5 | 42.769 | 45.231 | 42.000 | 378.898 | 13.867 | 26.453 | 3.467 | -7.290 | 0.806 | -45.996 |
| 6 | 19.088 | 64.912 | 18.542 | 244.983 | 27.767 | 115.778 | 28.333 | 116.128 | 0.019 | -25.096 |
| 7 | 17.667 | 30.333 | 22.000 | 181.440 | 14.400 | 27.840 | 4.800 | -27.111 | -1.412 | -28.180 |
| 8 | 24.000 | 69.000 | 27.500 | 251.040 | 16.800 | 89.778 | 20.000 | 89.778 | -9.384 | -45.135 |
| 9 | 44.577 | 83.423 | 45.389 | 434.960 | 15.600 | 66.875 | 19.500 | 56.982 | -5.713 | -68.351 |
| 10 | 46.735 | 116.265 | 58.875 | 800.010 | 22.100 | 176.584 | 23.233 | 142.889 | -10.693 | -89.510 |
| 11 | 17.167 | 42.833 | 25.750 | 242.667 | 16.000 | 60.676 | 17.600 | -45.778 | 5.229 | -30.503 |
| 12 | 48.031 | 54.969 | 47.864 | 528.524 | 17.067 | 38.427 | 4.267 | -18.740 | 3.183 | -53.463 |
| 13 | 22.364 | 23.636 | 17.375 | 139.662 | 10.267 | 8.788 | 6.967 | 6.744 | -1.995 | -21.829 |
| 14 | 71.031 | 39.969 | 51.318 | 603.440 | 12.800 | 106.116 | 25.067 | -97.842 | 6.208 | -64.750 |
| 15 | 22.727 | 55.273 | 21.750 | 190.003 | 15.767 | 69.357 | 17.967 | 37.917 | 13.464 | -17.484 |
| 16 | 15.038 | 35.962 | 9.722 | 99.350 | 16.900 | 36.209 | 22.967 | 34.284 | 3.868 | -9.760 |
| 17 | 25.000 | 44.000 | 32.000 | 272.320 | 14.400 | 43.840 | 4.800 | 36.444 | 3.858 | -33.303 |
| 18 | 25.029 | 40.971 | 26.958 | 335.840 | 20.400 | 45.188 | 23.233 | -37.879 | -4.132 | -32.738 |
| 19 | 93.667 | 111.333 | 79.385 | 1032.920 | 17.400 | 34.333 | 3.000 | -13.333 | -1.001 | -88.589 |
| 20 | 36.000 | 35.000 | 27.636 | 306.240 | 14.400 | 18.720 | 11.200 | 19.688 | -5.178 | -33.135 |
| 21 | 17.833 | 29.167 | 14.750 | 126.493 | 14.800 | 35.111 | 20.000 | 5.778 | -5.439 | -14.900 |
| 22 | 20.833 | 68.167 | 20.538 | 349.580 | 25.800 | 154.800 | 28.800 | 100.667 | 19.572 | -13.372 |
| 23 | 53.333 | 79.667 | 56.000 | 450.347 | 12.800 | 36.480 | 3.600 | 23.111 | -0.711 | -61.598 |
| 24 | 40.808 | 88.192 | 50.056 | 477.560 | 15.600 | 76.120 | 5.200 | 54.189 | -5.927 | -75.020 |
| 25 | 20.538 | 21.462 | 14.000 | 139.500 | 9.100 | 24.840 | 9.100 | 16.544 | -1.358 | -18.091 |
| 26 | 12.643 | 16.357 | 6.000 | 63.167 | 5.133 | 27.233 | 5.133 | 28.010 | -4.321 | -4.178 |
| 27 | 38.471 | 82.529 | 32.583 | 425.640 | 23.800 | 126.000 | 27.200 | 123.882 | -3.518 | -47.345 |
| 28 | 59.688 | 80.313 | 60.273 | 666.980 | 17.600 | 51.787 | 4.267 | -13.691 | -0.194 | -65.518 |
| 29 | 16.357 | 39.643 | 15.900 | 171.480 | 19.600 | 54.774 | 22.867 | 8.495 | -5.126 | -15.234 |
| 30 | 35.324 | 45.676 | 38.542 | 462.500 | 17.000 | 56.803 | 6.233 | -16.329 | 4.582 | -45.344 |