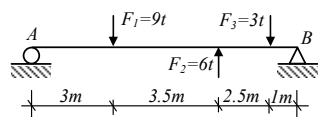


1.10 EXERCICES

Calculer les réactions des systèmes représentés ci-après.

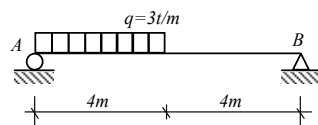
Remarque : Dans les réponses données, une réaction positive signifie qu'elle est dirigée vers le haut s'il s'agit d'une composante verticale et de gauche à droite lorsqu'il s'agit d'une composante horizontale. Pour l'effort tranchant, l'effort normal et le moment fléchissant, les conventions des signes sont celles du § 1.6.

Exercice 1.1



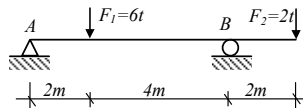
$$\text{Rép. : } V_A = 4.5 \text{ t}, V_B = 1.5 \text{ t}$$

Exercice 1.2



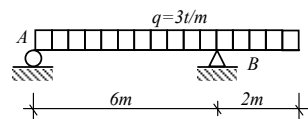
$$\text{Rép. : } V_A = 9 \text{ t}, V_B = 3 \text{ t}$$

Exercice 1.3



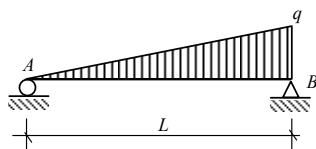
$$\text{Rép. : } V_A = 3.34 \text{ t}, V_B = 4.66 \text{ t}$$

Exercice 1.4



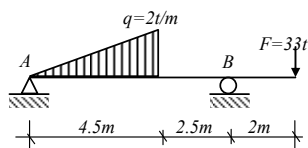
$$\text{Rép. : } V_A = 8 \text{ t}, V_B = 16 \text{ t}$$

Exercice 1.5



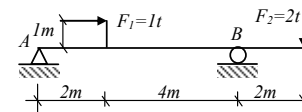
$$\text{Rép. : } V_A = qL/6, V_B = qL/3$$

Exercice 1.6



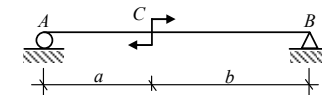
$$\text{Rép. : } V_A = 1.7 \text{ t}, V_B = 5.8 \text{ t}$$

Exercice 1.7



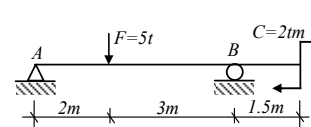
$$\text{Rép. : } V_A = -0.83 \text{ t}, V_B = 2.83 \text{ t}, H_A = -1 \text{ t}$$

Exercice 1.8



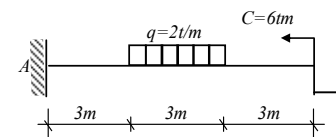
$$\text{Rép. : } V_A = -C/(a+b), V_B = C/(a+b)$$

Exercice 1.9



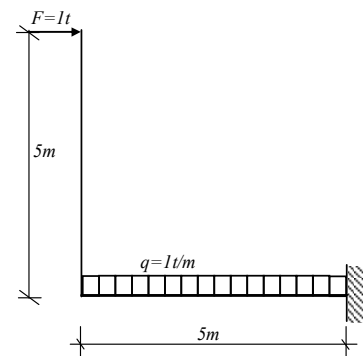
$$\text{Rép. : } V_A = 2.6 \text{ t}, V_B = 2.4 \text{ t}$$

Exercice 1.10



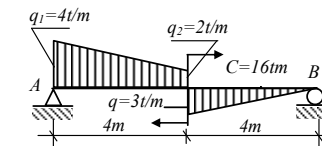
$$\text{Rép. : } C_A = -21 \text{ tm}, V_A = 6 \text{ t}$$

Exercice 1.11



$$\text{Rép. : } C_A = -7.5 \text{ tm}, V_A = 5 \text{ t}, H_A = -1 \text{ t}$$

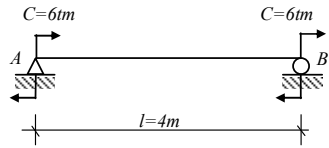
Exercice 1.12



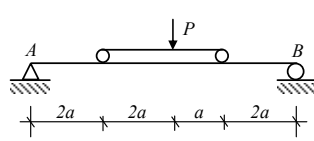
$$\text{Rép. : } V_A = 5.33 \text{ t}, V_B = 0.67 \text{ t}$$

Exercice 1.13

Exercice 1.14

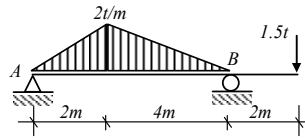


Rép. : $V_A = -3 \text{ t}$, $V_B = 3 \text{ t}$



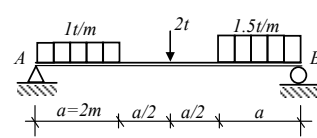
Rép. : $V_A = 3P/7$, $V_B = 4P/7$

Exercice 1.15



Rép. : $V_A = 2.83 \text{ t}$, $V_B = 4.67 \text{ t}$

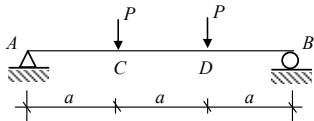
Exercice 1.16



Rép. : $V_A = 3.17 \text{ t}$, $V_B = 3.83 \text{ t}$

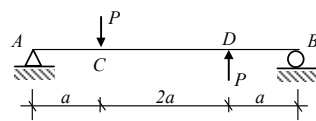
Tracer les diagrammes de M , T et N des systèmes représentés ci-après.

Exercice 1.17



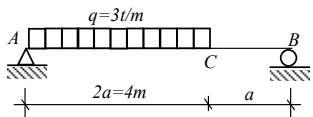
Rép. : $T_A = T_{C(g)} = -T_{D(d)} = -T_B = P$
 $T_{C(d)} = T_{D(g)} = 0$, $M_C = M_D = Pa$

Exercice 1.18



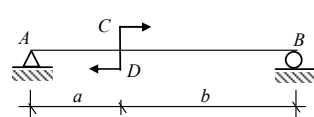
Rép. : $M_C = -M_D = Pa/2$
 $T_A = T_{C(g)} = T_{D(d)} = T_B = -T_{C(d)} = -T_{D(g)} = P/2$

Exercice 1.19



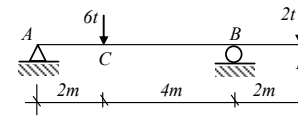
Rép. : $T_A = 8 \text{ t}$, $T_C = T_B = -4 \text{ t}$
 $M_C = 8 \text{ tm}$

Exercice 1.20



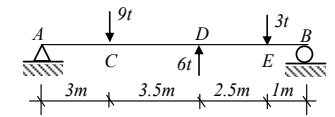
Rép. : $T_A = T_B = T_D = -C/(a+b)$
 $M_{D(g)} = -Ca/(a+b)$, $M_{D(d)} = Cb/(a+b)$

Exercice 1.21



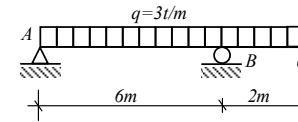
Rép. : $T_A + T_{C(g)} = 3.33 \text{ t}$
 $T_{C(d)} = T_{B(g)} = -2.67 \text{ t}$, $T_{B(d)} = T_D = 2 \text{ t}$
 $M_C = 6.67 \text{ tm}$, $M_B = 4 \text{ tm}$

Exercice 1.22



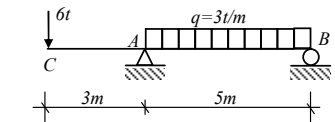
Rép. : $T_A = T_{C(g)} = -T_{C(d)} = -T_{D(g)} = 4.5 \text{ t}$
 $T_{D(d)} = T_{E(g)} = -T_{E(d)} = -T_B = 1.5 \text{ t}$
 $M_C = 13.5 \text{ tm}$, $M_D = -2.25 \text{ tm}$, $M_E = 1.5 \text{ tm}$

Exercice 1.23



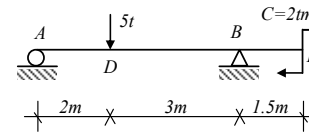
Rép. : $T_A = 8 \text{ t}$
 $T_{B(g)} = -10 \text{ t}$, $T_{B(d)} = 6 \text{ t}$
 $M_{max} = 10.67 \text{ tm}$, $M_B = -6 \text{ tm}$

Exercice 1.24



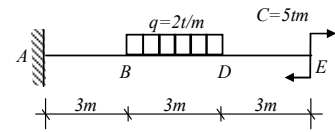
Rép. : $T_C = T_{A(g)} = -6 \text{ t}$, $T_{A(d)} = 11.1 \text{ t}$
 $T_B = -3.9 \text{ t}$
 $M_A = -18 \text{ tm}$, $M_{max} = 2.5 \text{ tm}$

Exercice 1.25



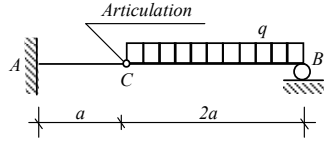
Rép. : $T_A = T_{D(g)} = 2.6 \text{ t}$
 $T_{D(d)} = T_{B(g)} = 2.4 \text{ t}$, $T_{B(d)} = T_E = 0$
 $M_D = 5.2 \text{ tm}$, $M_B = M_E = -2 \text{ tm}$

Exercice 1.26



Rép. : $T_A = T_B = 6 \text{ t}$
 $T_D = T_C = 0$
 $M_A = -31 \text{ tm}$, $M_B = -14 \text{ tm}$, $M_D = M_E = -5 \text{ tm}$

Exercice 1.27

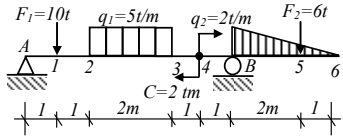


$$\text{Rép. : } T_A = T_C = -T_B = qa$$

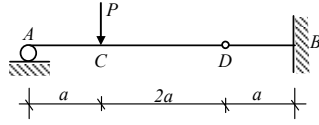
$$M_A = -qa^2$$

$$M_{\max} = qa^2/2$$

Exercice 1.29



Exercice 1.28



$$\text{Rép. : } T_A = T_{C(g)} = 2P/3$$

$$T_{C(d)} = T_D = T_B = -P/3$$

$$M_C = 2Pa/3, M_D = 0, M_B = -Pa/3$$

$$\text{Rép. : } V_A = 10.5 \text{ t}, V_B = 18.5 \text{ t}$$

$$T_A = T_{1(g)} = 10.5 \text{ t}, T_{1(d)} = T_2 = 0.5 \text{ t}$$

$$T_3 = T_4 = T_{B(g)} = -9.5 \text{ t}, T_{B(d)} = 9 \text{ t}$$

$$T_{5(g)} = 6.33 \text{ t}, T_{5(d)} = 0.33 \text{ t}, T_6 = 0$$

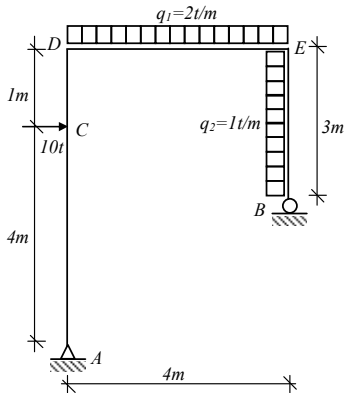
$$M_1 = 10.5 \text{ tm}, M_2 = 11 \text{ tm},$$

$$M_3 = 2 \text{ tm}, M_{4(g)} = -7.5 \text{ tm},$$

$$M_{4(d)} = -5.5 \text{ tm}, M_B = -15 \text{ tm},$$

$$M_5 = -0.11 \text{ tm}$$

Exercice 1.30



$$\text{Rép. : } V_A = -8.625 \text{ t}, V_B = 16.625 \text{ t}$$

$$H_A = -13 \text{ t}, N_{AD} = 8.625 \text{ t}, N_{DE} = 3 \text{ t},$$

$$N_{EB} = -16.625 \text{ t},$$

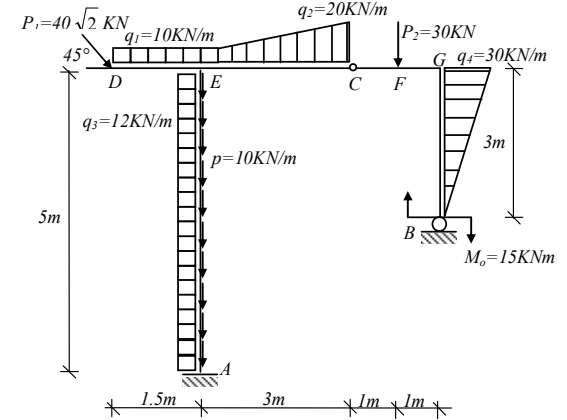
$$T_{AC} = T_{CA} = 13 \text{ t}, T_{CD} = T_{DC} = 3 \text{ t}$$

$$T_{DE} = -8.625 \text{ t}, T_{ED} = -16.625 \text{ t}$$

$$T_{EB} = -3 \text{ t}, T_{BE} = 0, M_{CD} = M_{CA} = -52 \text{ tm},$$

$$M_{DE} = -M_{DC} = 55 \text{ tm}, M_{ED} = M_{EB} = 4.5 \text{ tm}$$

Exercice 1.31



$$\text{Rép. : } H_A = -55 \text{ KN}, V_A = 135 \text{ KN}, V_B = 45 \text{ KN}, N_{AE} = -135 \text{ KN}, N_{EA} = -85 \text{ KN},$$

$$N_{DE} = N_{ED} = -40 \text{ KN}, N_{EG} = N_{GE} = N_{GB} = N_{BG} = -45 \text{ KN}, M_{AE} = 83.75 \text{ KNm},$$

$$M_{EA} = -41.25 \text{ KNm}, M_{ED} = -71.25 \text{ KNm}, M_{EC} = -30 \text{ KNm}, M_{FC} = M_{FG} = -15 \text{ KNm},$$

$$M_{GF} = M_{GB} = -60 \text{ KNm}, M_{BG} = -15 \text{ KNm}, T_{AE} = 55 \text{ KN}, T_{EA} = -5 \text{ KN},$$

$$T_{DE} = -40 \text{ KN}, T_{ED} = -55 \text{ KN}, T_{EC} = 30 \text{ KN}, T_{CE} = T_{CF} = T_{FC} = -15 \text{ KN},$$

$$T_{FG} = T_{GF} = -45 \text{ KN}, T_{GB} = 45 \text{ KN}, T_{BG} = 0.$$