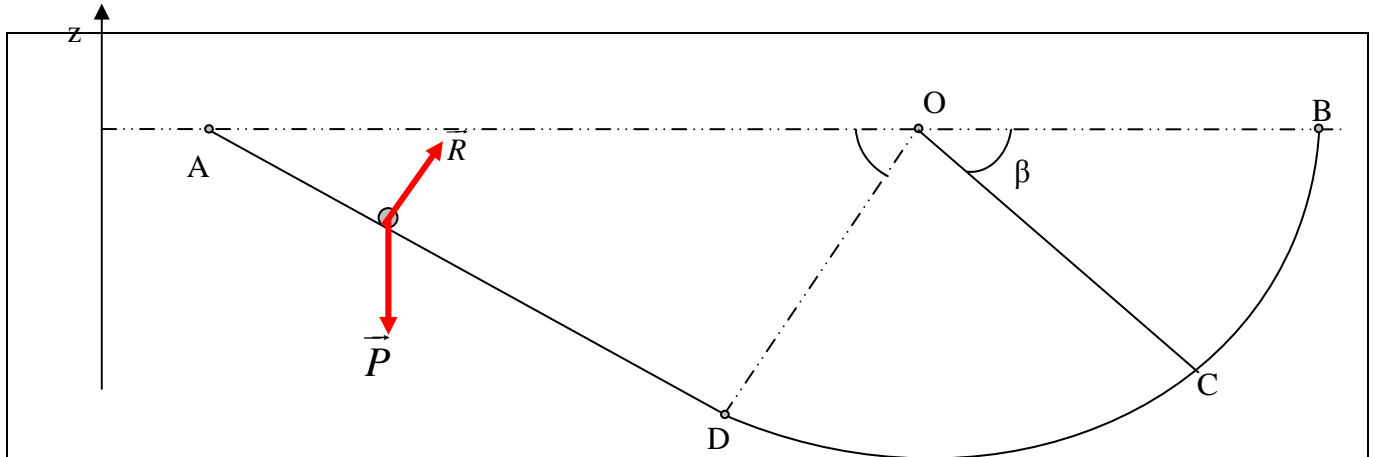


## حل التمرين 12

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1. نطبق مبرهنة الطاقة الحركية بين A و C :

$$E_{C} - E_{A} = \sum W_{A \rightarrow C}(\vec{F}) \Rightarrow \frac{1}{2}mv_{C}^2 - \frac{1}{2}mv_{A}^2 = W_{A \rightarrow C}(\vec{P}) + W_{A \rightarrow C}(\vec{R})$$

$$v_{A} = 0 ; v_{C} = 0 \Rightarrow W_{A \rightarrow C}(\vec{P}) + W_{A \rightarrow C}(\vec{R}) = 0$$

الحركة تتم بدون احتكاك، إذن:  $W_{A \rightarrow C}(\vec{R}) = 0$ . نستنتج :

$$W_{A \rightarrow C}(\vec{P}) = 0 \Rightarrow mg(z_{A} - z_{C}) = 0 \Rightarrow z_{A} = z_{C}$$

النقطة C لها نفس أنسوب النقطة A، إذن C تطابق B. المتحرك يصل إلى النقطة B.

2.

$$\frac{1}{2}mv_{A}^2 - \frac{1}{2}mv_{C}^2 = W_{A \rightarrow C}(\vec{P}) + W_{A \rightarrow C}(\vec{R}) \quad .2.1$$

$$W_{A \rightarrow C}(\vec{P}) + W_{A \rightarrow C}(\vec{R}) = 0 \Rightarrow W_{A \rightarrow C}(\vec{R}) = -W_{A \rightarrow C}(\vec{P})$$

$$W_{A \rightarrow C}(\vec{R}) = W_{A \rightarrow C}(\vec{R}_n) + W_{A \rightarrow C}(\vec{f})$$

$$W_{A \rightarrow C}(\vec{R}_n) = 0 \Rightarrow W_{A \rightarrow C}(\vec{f}) = -W_{A \rightarrow C}(\vec{P})$$

$$\Rightarrow W_{A \rightarrow C}(\vec{f}) = -mg(r \sin \alpha + r(1 - \cos(\frac{108 - (\alpha + \beta)}{2})))$$

$$\Rightarrow W_{A \rightarrow C}(\vec{f}) = -mgr \sin \alpha$$

$$W_{A \rightarrow C}(\vec{f}) = -0,1 \times 10 \times 5.10^{-2} \times \sin 60 = -4,3.10^{-2} J \quad \text{تطبيق عددي}$$

$$W_{A \rightarrow C}(\vec{f}) = -f(AD + DC) = -f(r \cdot \text{tg} \alpha + r \cdot (\pi - (\alpha + \beta))) \quad .2.2$$

$$\Rightarrow f = -\frac{W_{A \rightarrow C}(\vec{f})}{r(\text{tg} \alpha + (\pi - (\alpha + \beta)))}$$

$$f = -\frac{-4,3.10^{-2}}{5.10^{-2}(\text{tg} 60 + (\pi - (\frac{\pi}{3} + \frac{\pi}{6})))} \Rightarrow f = 0,26 N \quad \text{تطبيق عددي}$$

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