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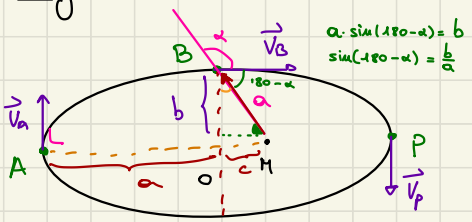

$M = 3{,}18 \cdot 10^{33}\ kg$

$m = 5{,}71 \cdot 10^{24}\ kg$

$e = 0{,}368 \qquad a = 2{,}31 \cdot 10^{12}\ m$

$V_A, V_B, V_P = ? \qquad L = ?$

(1) $E_{TOT} = -G\frac{mM}{2a}$ per la dim della lezione seguente

1a) $E_{TOT} = -G\frac{mM}{(a+c)} + \frac{1}{2}mV_A^2$

$AM = a + c$

$e = \frac{c}{a} \rightsquigarrow c = e \cdot a$

$V_A^2 = 2\frac{GM}{a}\left(\frac{1}{1+e} - \frac{1}{2}\right) = \frac{GM}{a}\left(\frac{1-e}{1+e}\right)$

$\rightsquigarrow AM = a(1+e)$

1b) $E_{TOT} = -G\frac{mM}{a} + \frac{1}{2}mV_B^2$

$BM = a$

$V_B^2 = \frac{GM}{a} \rightsquigarrow V_B \approx 4{,}66 \cdot 10^5\ \frac{m}{s}$

1c) $E_{TOT} = -G\frac{mM}{2a} + \frac{1}{2}V_P^2$

$\rightsquigarrow PM = a - c = a(1-e)$

$V_P^2 = \frac{GM}{a}\left(\frac{1+e}{1-e}\right)$

2) $\vec{L_A} = \vec{r}_{AM} \wedge \vec{p}_A$

$L_A = AM \cdot m \cdot V_A \cdot \sin 90° = a(1+e) \cdot m \cdot V_A = 3{,}72 \cdot 10^{42}\ kg\ \frac{m^2}{s}$

$\vec{L_B} = \vec{r}_{BM} \wedge \vec{p}_B = BM \cdot m \cdot V_B \cdot \sin\alpha = a \cdot m \cdot V_B \cdot \frac{b}{a} = b \cdot m \cdot V_B \approx 3{,}72 \cdot 10^{42}\ kg\ \frac{m^2}{s}$

Per trovare $\sin\alpha$, noto che $a \cdot \sin(180-\alpha) = b \Rightarrow \sin(180-\alpha) = \frac{b}{a}$

Strada 1: Uso la calcolatrice e trovo $180-\alpha$ usando $\boxed{\sin^{-1}}$

Strada 2: So che $\sin(180-\alpha) \overset{\text{Goniometria}}{=} \sin(\alpha) = \frac{b}{a}$

$\vec{L}_P = \vec{r}_{PM} \wedge \vec{p}_P$

$L_P = a(1-e) \cdot m \cdot v_P \cdot \sin 90° =$

$= a(1-e) \cdot m \cdot v_P \approx 3{,}72 \cdot 10^{42}\ kg\ \frac{m^2}{s}$