$$\mathbb{T}h_{\triangle}\,\mathrm{l}^{1} = \frac{{}_{2}\mathbb{T}h \xrightarrow{q} \mathrm{l}}{\overbrace{\underbrace{\mathbb{h}\times\mathbb{h}'}\,\underbrace{\mathbb{h}\times\mathbb{h}''}}\,q = \mathbb{h}\ltimes\overbrace{\underbrace{\mathbb{h}'\mathbb{h}''}}\,q}$$

$$\mathbb{T}h_{\underset{\sim}{\triangle}}\,\mathrm{l}^{1} = \frac{\mathbb{T}h \xrightarrow{4} \mathrm{l}}{1\,4 = 0}$$

$$\mathbb{T}h_{\triangle}\,\mathrm{l}^{2} \xleftarrow{d_1} \mathbb{T}h_{\triangle}\,\mathrm{l}^{1}$$

$$\mathbb{T}h_{\underset{\sim}{\triangle}}\,\mathrm{l}^{2} \xleftarrow{\underset{\sim}{d}_1} \mathbb{T}h_{\underset{\sim}{\triangle}}\,\mathrm{l}^{1}$$

$$\overbrace{{}_{0}\mathbb{h}\,{}_{1}\mathbb{h}\,{}_{2}\mathbb{h}}\,\underbrace{d q} = \overbrace{{}_{0}\mathbb{h}\,{}_{1}\mathbb{h}}\,\underset{\approx}{d}\,4 = {}_{0}\mathbb{h}\ltimes\overbrace{{}_{1}\mathbb{h}\,4} - \overbrace{{}_{0}\mathbb{h}\times{}_{1}\mathbb{h}}\,4 + {}_{0}\mathbb{h}\,4$$