Data analysis – reserve: solution

Picture scale:
For exampe from stars C D > distance on picture = 63±1 mm
From paralactic triangle or from map measurements distance C-D = 2.5º = 150'
Scale 150'/63 = 2.38'/mm ≈ 0.04 º/mm

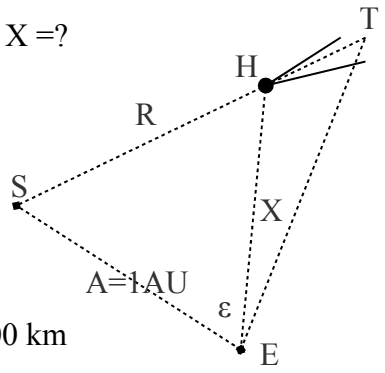
Comet's Head size = 7 mm = 0.28º
Comet's tail size (end of tail should be marked by student) 50 mm = 2º (angle HET)

Coordinatess of comet $\alpha_1 \approx$ 21h52' $\delta_1 \approx$ 37.5º ; $\alpha_2 \approx$ 22h03' $\delta_1 \approx$ 38.8º

Angular speed ≈ 2.5º/24h = 6.25'/h

Elongation ε
$\cos(\varepsilon) = \cos(\delta_1)\cdot\cos(\delta_\square) + \sin(\delta_1)\cdot\sin(\delta_\square)\cdot\cos(\alpha_1-\alpha_\square) = 0.73076$ >>> ε ≈43º3'

Distance from Earth:
Triangle Sun – Earth – Head of Comet (SEH)
Let's assume distance S-E A = 1 AU; S-H R = 1.024 AU; E-H X =?



$(R)^2 = X^2 + 1 - 2\cdot X\cdot\cos(\varepsilon)$ > X ≈ 0.9 AU

sin(ε)/R = sin(EHS) / 1 >>> Angle EHS = 41.5º

Linear size of head;
Assume that the head has a spherical shape
Head radius r_h / x=tan(0.28º/2) >>> r_h = 0.0022 AU ≈ 330 000 km

Linear size of tail (H-T)
From triangle Earth- Comet Head- comet tail's end (EHT)

Angle EHT = 180º-EHS = 138.5
Angel HET = 2º
Angle HTE = 39.5º

X/sin(39.5) = H-T/ sin(2º) >>> H-T ≈ 0.05 AU