Iarnă

3) $\delta_\odot \in [-23^\circ 27', +23^\circ 27']$

$\varphi = 46^\circ 45' 47''$

a) A_{max}, A_{min} pt răsărit și apus de soare pe an [illegible]

b) durata zilei maxime și minime

a) $\cos A = -\frac{\sin \delta}{\cos \varphi}$

I $\delta = -23^\circ 27'$

$$\cos A = \frac{-\sin(-23^\circ 27')}{\cos(46^\circ 45' 47'')}$$

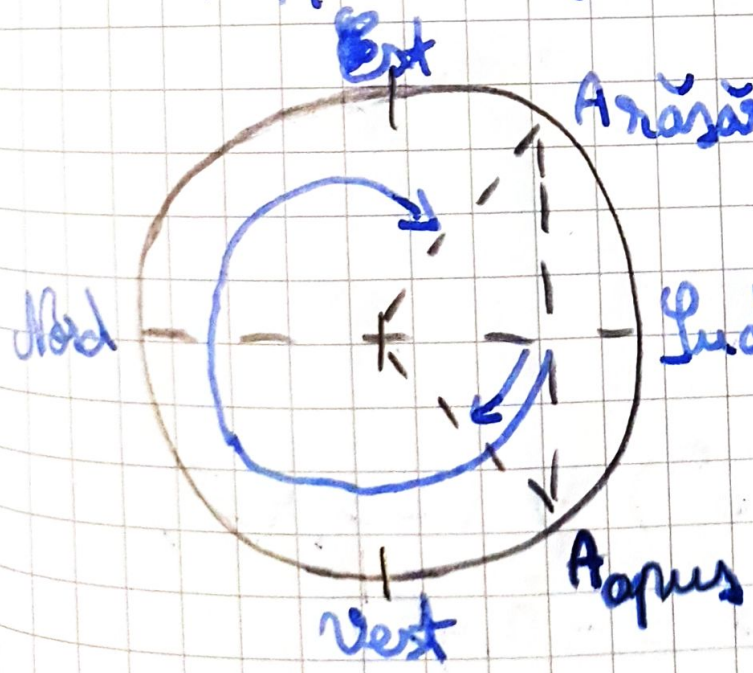
$23^\circ 27' = 23^\circ + \left(\frac{27}{60}\right)^\circ = 23,45^\circ$

$46^\circ 45' 47'' = 46^\circ + \left(\frac{45}{60}\right)^\circ + \left(\frac{47}{3600}\right)^\circ =$

$= 46,76^\circ$

$$\cos A = \frac{\sin(23,45^\circ)}{\cos(46,76^\circ)} = \frac{0,39}{0,72} = 0,58$$

$\Rightarrow A = 54,5^\circ = 54^\circ 30' \Rightarrow A_{apus} = 54^\circ 30'$



$A_{răsărit} = 360^\circ - 54^\circ 30' = 305^\circ 30'$

a) $\underline{\underline{\Pi}}$ $\delta = 23,45°$

$$\cos A = = \frac{\sin(23,45°)}{\cos(46,76°)} =$$

$$= \frac{-0,39}{0,72} = -0,58$$

$$\Rightarrow A = 124,91° = 124° 54,6' = 124° 54' 36''$$

$$\Rightarrow A_{opus} = 124° 54' 36''$$

$$A_{rozšířit} = 360° - 124° 54' 36'' =$$

$$= 359° 60' - 124° 54' 36'' =$$

$$= 235° 5' 24''$$

b) $\cos H = -\operatorname{tg}\varphi \cdot \operatorname{tg}\beta$

$\cos H = -\operatorname{tg}(46{,}76°) \cdot \operatorname{tg}(-23{,}45°)$

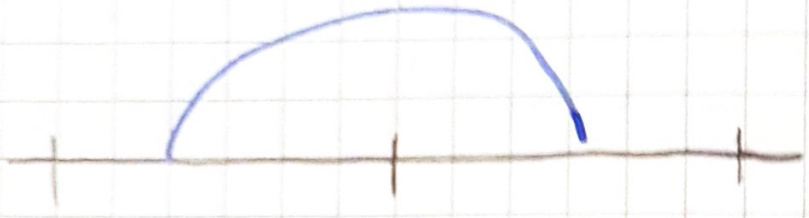
$= -1{,}06 \cdot (-0{,}43) = 0{,}45$

$H = \arccos(0,45) = 63,03^\circ = 63^\circ\ 1,8' =$

$= 63^\circ\ 1'\ 48''$

$H_1 = 63,03 / 15 = 4,2\ h$ punct de apus

$24^h - 4,2^h = 19,8\ h$ punct de răsărit



$\cos H = -\operatorname{tg}\varphi \operatorname{tg}\delta$

$\cos H = -\operatorname{tg}(46,76^\circ) \operatorname{tg}(23,45^\circ)$

$= -1,06 \cdot 0,43 = -0,45$

$H = \arccos(-0,45) = 116,31^\circ =$

$= 116^\circ\ 18,6' = 116^\circ\ 18'\ 36''$

$H_2 = 116,31 / 15 = 7,75\ h$

$24\ h - 7,75 h = 16,25 h$

$$\Delta\theta_1 = 2H_1 = 2 \cdot 4{,}2 = 8{,}4R$$

$$\Delta\theta_2 = 2H_2 = 2 \cdot 7{,}75 = 15{,}5R$$