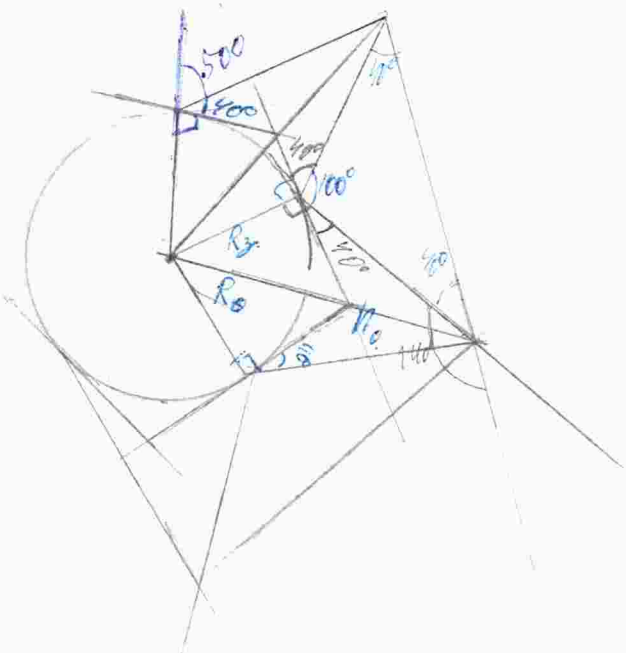
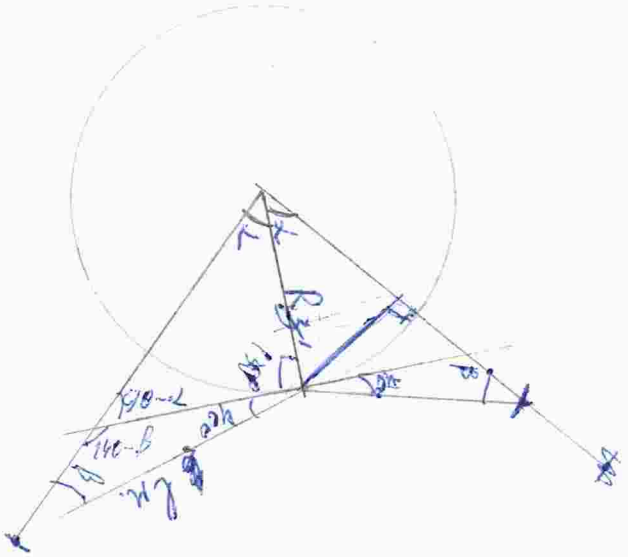
N1





$90-\alpha+140-\beta=180$

$\alpha+\beta=50°$

$\frac{\ell_м}{\sin\alpha}=\frac{R_з}{\sin\beta}$

Предп. их 5
тогда всего их 15
$\alpha=36°$

$\beta=14°$

$\ell_м=\frac{6400\cdot\sin 36}{\sin 14}$

$a^2=b^2+c^2-2bc\cdot\cos\alpha$

$(R_\oplus+h)^2=R_\oplus^2+\ell_м^2-2\ell_м R_\oplus\cdot\cos 130°$

$R^2+2Rh+h^2=R^2+\frac{R_\oplus^2\cdot\sin^2\alpha}{\sin^2\beta}-\frac{2R^2\cdot\sin\alpha\cdot\cos 130}{\sin\beta}$

$2Rh+h^2=\frac{R^2\cdot\sin^2\alpha-2R^2\cdot\sin\alpha\cdot\cos 130\cdot\sin\beta}{\sin^2\beta}=a$

$h^2+2Rh-a=0$

$D=4R^2+4a$

$h=\frac{-2R+2\sqrt{R^2+a}}{2}$

$h=\sqrt{R_\oplus^2+a}-R_\oplus$

$R=h+R_\oplus$ $\quad R=\sqrt{R_\oplus^2+a}$

$V=\sqrt{\frac{GM}{R}}$

$t=\frac{2\pi R}{V}$

$t=\frac{4\pi^2R^2}{\frac{GM}{R}}$

$t=\frac{4\pi^2R^3}{GM}$

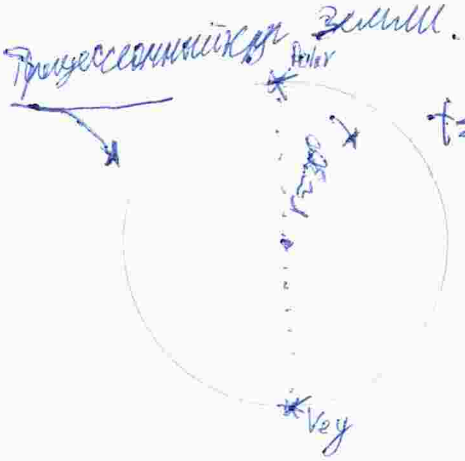
$t=\frac{4\pi^2(R_\oplus^2+a)^{1,5}}{GM_\oplus}$

ЖЖК-1

Ответ: спутников 15; $t = \frac{4\pi^2 (R_\oplus + a)^{1{,}5}}{GM}$

№2

Прецессионный круг Земли.



$t \approx 36000$ лет

$l = 2\pi R = 6{,}28 \cdot 30$

$l = 188{,}4^\circ$

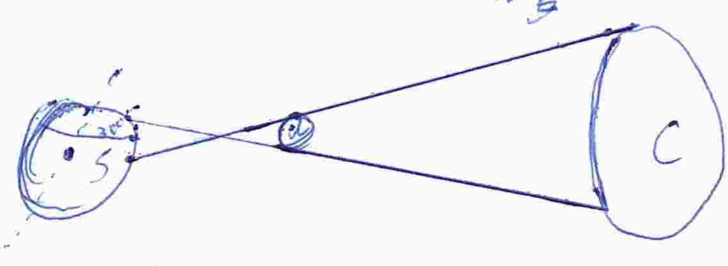
$\frac{t}{360} = 100$

$\frac{1}{100}$/год

$\frac{1}{100} \cdot l = \frac{188{,}4^\circ}{100} = 1{,}88^\circ$

Ответ: на 1,88° восточнее.

№3



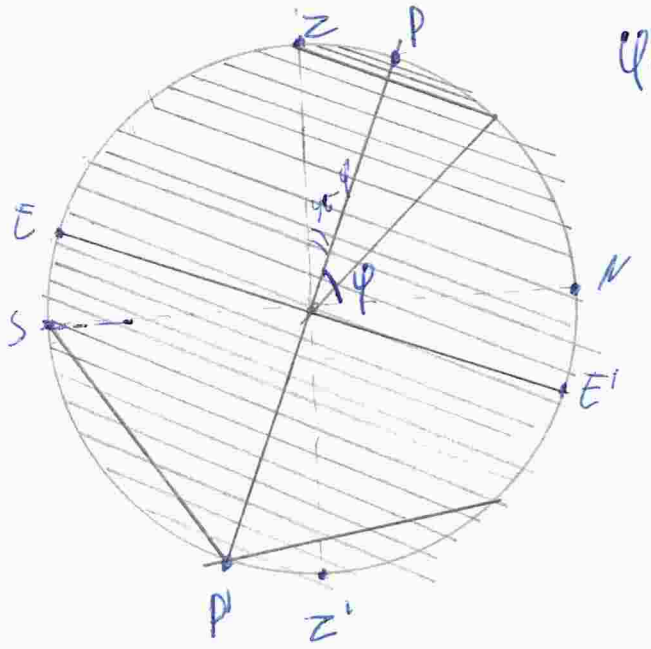
$\Phi = \frac{|\varphi_{max} - \varphi_m|}{\varphi_{max}}$

$\Phi = \frac{10^\circ}{30^\circ}$

$\Phi = \frac{1}{3}$

Ответ: макс. фаза затмения в Александрии – $\frac{1}{3}$.

N ч



$\varphi_{спб} \approx 60°$

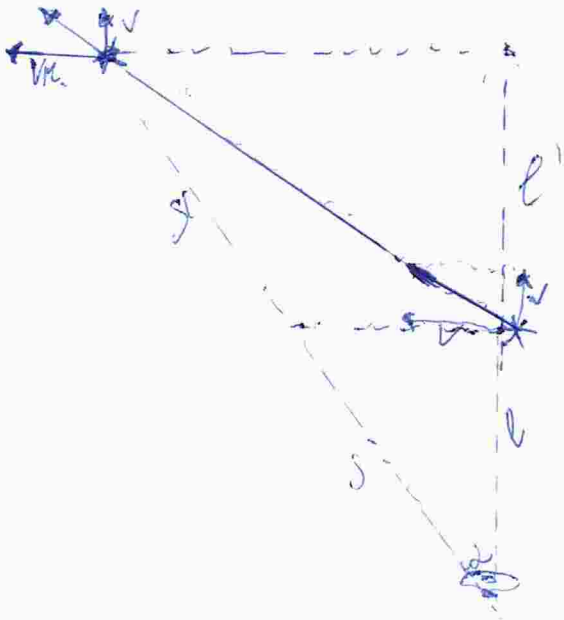
Всего восходит ~ 3663

$$\frac{2(90-\varphi)}{180} \cdot 3663 = \frac{4\pi}{180} = \frac{2 \cdot 3663}{9} = 814.$$

Ответ: $\frac{2}{9}$ всех звезд или ~ 814 зв.

~~ЖДК-1~~

№2



$$E = \frac{L}{4\pi\varepsilon R^2}$$

$$E \sim \frac{1}{R^2}$$

$$v_м = v\cos\alpha$$

$$\cos\alpha = \frac{1}{4}$$

$$\frac{l}{s} = \frac{6+l'}{S+S'} = \frac{1}{4}$$

$$\frac{l}{S} = \frac{1}{4}$$

$$S = 4l$$

$$S = 4l$$

$$S' = 2S$$

$$S' = 8l$$

$$S + S' = 12l$$

$$E_1 = \frac{L}{4\pi l^2}$$

$$E_2 = \frac{L}{4\pi\varepsilon 4l^2}$$

$$\frac{E_1}{E_2} = 10^9 4(m_2 - m_1)$$

$$\frac{E_1}{E_2} = \frac{4\pi\varepsilon \cdot 4l^2}{4\pi l^2 \cdot L} = 144$$

Ответ: $m_м \approx 12^m$.

$\frac{\times 60}{380}$

1400 км

$\frac{1400}{40000}$ 200

$\frac{4 \cdot 360}{200} = \frac{63}{5} = 12\frac{3}{5} = 12{,}6$

$56 + 12{,}6 = 68$

$\frac{180 - 70}{180} = \frac{110}{180} = \frac{11}{18}$

$\frac{11 \cdot 6000}{18}$ $\frac{110\,000}{3}$

3663 | 9
36 | 407
06
63
0

$333 \cdot 11$

$3330 + 333 = 3663$

$180 - 140 = 40^\circ$

$\frac{110}{180}$ $\frac{1}{4{,}5} = \frac{2}{9}$

УК – 1