$pLerp(t, p0, pM) := p0 \cdot (1-t) + pM \cdot t$

$sqrLerp(t, p0, pM) := p0 \cdot \left(1-\sqrt{t}\right) + pM \cdot \sqrt{t}$ basic lerp formulas

$ro(h) := \boxed{Adens0} - \frac{h}{Ha} \cdot Adens0$ density sampler

$vpoint(s) := pLerp(s, \boxed{Pv}, Pve)$

$Lendp(s) := pLerp(s, \boxed{endpPv}, endpPve)$ Light end point lerped between two light endpoints at view start and end

$scanLightPt(t, s) := pLerp(t, \boxed{vpoint}(s), Lendp(s))$ final sampling point in atmosphere.

$RayAtmLen(s) := pLerp(s, \boxed{endlPv}, endlPve)$ lerped length of atmosphere ray

$H(s) := pLerp(s, 0, Ha) \rightarrow Ha \cdot s$ interpolated point of ray atmospheric exit

distance to exit for light at t-point

$Hr(t, s) := pLerp(t, H(s), Ha) \rightarrow Ha \cdot s \cdot (-t+1) + Ha \cdot t$

$curVLen(p) := pLerp(p, 0, \boxed{LmaxV})$ Length to current view t-point on view ray

Sum density over line, defined by heights

sk is 0..1 where 0.9 means 10% of light gets scattered

Remaining power after travelling some distance at heights

remaining direct ray power, after travelling Len from Hs
to He.

$$RemPower(Hs, He, Len, Pow0) := Pow0 \cdot \boxed{ProdDensAvgP}(Hs, He, Len)$$

$$vpHitPow(pv) := \boxed{RemPower}(H(pv), Ha, RayAtmLen(pv), LPower)$$

Total Ray power that hits point on view line

hf0- height at which it is 0, hfmax - height at which it is 1.

$$foc(hf) := \frac{hf + \boxed{hf0}}{hfmax}$$

Ray power that is reflected towards eye as scattered light. focusP is percent of sk

$$remTop := \boxed{LPower} \cdot (1 + sk \cdot (prk - 1))^{endlPve \cdot roTop}$$

$$remBot := \boxed{LPower} \cdot (1 + sk \cdot (prk - 1))^{endlPv \cdot roBot}$$

$$lerpHitPow(pv) := sqrLerp(pv, \boxed{remBot}, remTop)$$

$$reflectedBack(pr) := \boxed{lerpHitPow}(pr) \cdot focusP \cdot sk \cdot ro(H(pr)) \cdot ppxi$$

power that reaches eye form view t-point thourgh atmos.

$$remToEye(TEpow, TElen, pr) := TEpow \cdot (1 + \boxed{sk} \cdot (prk - 1))^{TElen \cdot roEye}$$

$$indirectEye(pn) := \boxed{remToEye}(reflectedBack(pn), curVLen(pn), pn)$$

This seems to be the latest version of formula

$$TotalToEye := \int_0^1 reflectedBack(pp) \cdot LmaxV \, dpp \rightarrow \frac{Adens0 \cdot LPower \cdot LmaxV \cdot focusP \cdot ppxi \cdot sk \cdot \left(8 \cdot \left(\left(prk-1\right) \cdot sk+1\right)^{endlPve \cdot roTop} + 7 \cdot \left(\left(prk -\right.\right.}{30}$$

$$\frac{Adens0 \cdot LPower \cdot LmaxV \cdot focusP \cdot ppxi \cdot sk \cdot \left(8 \cdot \left(\left(prk-1\right) \cdot sk+1\right)^{endlPve \cdot roTop} + 7 \cdot \left(\left(prk-1\right) \cdot sk+1\right)^{endlPv \cdot roBot}\right)}{30}$$

**solution to to above**

$$FadedToEye := \boxed{TotalToEye} \cdot \left(1+sk \cdot \left(prk-1\right)\right)^{\frac{LmaxV}{2} \cdot roEyeAvg}$$

$$\int_0^1 indirectEye(pp) \cdot LmaxV \, dpp \rightarrow \frac{-\left(Adens0 \cdot LPower \cdot focusP \cdot ppxi \cdot sk \cdot \left(\left(\left(2 \cdot LmaxV \cdot roEye \cdot \sqrt{\pi} \cdot \ln\left(\left(prk-1\right) \cdot sk+1\right)+3 \cdot \sqrt{\pi}\right) \cdot \left(\left(prk-1\right.\right.\right.\right.\right.}{}$$

$$\frac{1}{Lmax} \cdot \int_0^{Lmax} ro\left(H\left(\frac{s}{Lmax}\right)\right) ds \rightarrow \frac{Adens0}{2}$$

$$sk := 0.3 \cdot \frac{m^3}{kg \cdot km} = \left(3 \cdot 10^{-4}\right) \frac{m^2}{kg}$$

$$\frac{kg}{m^3} \cdot km$$

how much light hits one m^2

$$powM2 := lx$$

$$rho := \frac{kg}{m^3} \qquad skunit := \frac{1}{kg}$$

$$sk := 3$$

skm is how much light is scattered by 1m*1m*1km * rho

$$mass1 := \boxed{rhoAV} \cdot \frac{kg}{m^3} \cdot dist \cdot 1000 \cdot m^3$$

$$sk^{mass1 \cdot skunit} \rightarrow 3^{1000 \cdot dist \cdot rhoAV}$$

$$2 \cdot x = b \xrightarrow{solve, x} \frac{b}{2}$$

$$vol := \boxed{rhoAvg} \cdot \left(\frac{kg}{m^3}\right) \cdot dist \cdot 1000\ m$$

$$x^{pow} = KMsk \xrightarrow{solve, x} e^{\frac{\ln(KMsk)}{pow}}$$

$$powM2 \cdot sk^{vol} \rightarrow lx \cdot 3^{\frac{1000 \cdot dist \cdot kg \cdot rhoAvg}{m^2}}$$

$$e^{\frac{\ln(0.05)}{1000}} = 0.997 \qquad x^{-1000} \rightarrow \frac{1}{x^{1000}}$$