

Useful and not so useful formulas and constants (not all are necessary for solving the problems):

Pulse signal $s(t) = \Pi(t) \times A e^{2i\pi f_0 t}$

Pulse signal $s(t) = \Pi(t) \times A e^{2i\pi (f_0 + \Delta f t / 2T) t}$

Signal to noise ratio: $SNR = \xi^2 A^2 T / \sigma$

Resolution: $R = cT/2$

Resolution: $R = 2.44 \lambda H/D$

Angular resolution: $\Theta = 1.22 \lambda/D$

Bragg's law: $n\lambda_d = 2 \lambda_w \sin\theta$

The speed of light $c = 3 \cdot 10^8 \text{ m/s}$

Gravitational acceleration at sea level $g = 9.81 \text{ m/s}^2$

Distance $s = s_0 + vt + at^2/2$

X in deciBel (dB): $X_{dB} = 10 \log_{10}(X_{lin})$

Thermal absorption of a sphere: $P_{abs} = \alpha \cdot S \cdot \pi \cdot r^2$

Thermal radiation of a sphere: $P_{em} = \epsilon \cdot \sigma \cdot 4 \cdot \pi \cdot r^2 \cdot T^4$

Solar constant: $S = 1355 \text{ W/m}^2$

Stephan Boltzmann's constant: $\sigma = 5,67 \cdot 10^{-8} \text{ W/m}^2 \text{ K}^4$

Coating material	α	ϵ
White paint	0.20	0.90
Black paint	0.95	1.05
Gold	0.25	5.00
Optical sun reflector	0.15	0.10
Solar panels	0.80	0.90

$x = (-b \pm \sqrt{b^2 - 4ac}) / 2a$