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Tide Producing Forces Formulas

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List of 13 Tide Producing Forces Formulas

Tide Producing Forces

1) Distance from center of Earth to center of Sun given Attractive Force Potentials

Open Calculator

fx $$r_s = \left(\frac{R_M^2 \cdot f \cdot M_{sun} \cdot P_s}{V_s} \right)^{\frac{1}{3}}$$

ex $$1.4E\hat{}8km = \left(\frac{(6371km)^2 \cdot 2 \cdot 1.989E30kg \cdot 3E14}{1.6E25} \right)^{\frac{1}{3}}$$

2) Distance of point located on surface of Earth to center of Moon

Open Calculator

fx $$r_{S/MX} = \frac{M \cdot f}{V_M}$$

ex $$257.8947km = \frac{7.35E22kg \cdot 2}{5.7E17}$$

3) Distance of point located on surface of earth to center of sun

Open Calculator

fx $$r_{S/MX} = \frac{f \cdot M_{sun}}{V_s}$$

ex $$248.625km = \frac{2 \cdot 1.989E30kg}{1.6E25}$$

4) Gravitational constant given radius of Earth and acceleration of gravity

Open Calculator

$$[G] = \frac{[g] \cdot R_M^2}{[\text{Earth-M}]}$$

$$6.7\text{E}\hat{}\text{-}11 = \frac{[g] \cdot (6371\text{km})^2}{[\text{Earth-M}]}$$

5) Gravitational Forces on particles

Open Calculator

$$F_g = [g] \cdot \left(m_1 \cdot \frac{m_2}{r^2}\right)$$

$$5.1\text{E}\hat{}\text{-}6\text{N} = [g] \cdot \left(90\text{kg} \cdot \frac{110\text{kg}}{(138040.28\text{m})^2}\right)$$

6) Greenwich Time Measured

Open Calculator

$$GMT = T_L + \left(\frac{LMT}{15}\right)$$

$$9.533333\text{h} = 9.5\text{h} + \left(\frac{0.5\text{h}}{15}\right)$$

7) Local Time given Greenwich Time Measured

Open Calculator

fx $$T_L = GMT - \left(\frac{LMT}{15}\right)$$

ex $$9.496667h = 9.53h - \left(\frac{0.5h}{15}\right)$$

8) Local Time Meridian given Greenwich Time Measured

Open Calculator

fx $$LMT = 15 \cdot (GMT - T_L)$$

ex $$0.45h = 15 \cdot (9.53h - 9.5h)$$

9) Local Time Meridian given Modified Epoch for longitude and Time Meridian Corrections

Open Calculator

fx $$LMT = (k - \kappa' + pL) \cdot \frac{15}{a}$$

ex $$0.5h = (185.2 - 9 + 11) \cdot \frac{15}{1.56m}$$

10) Modified form of epoch accounting for longitude and time meridian corrections

Open Calculator

fx $$\kappa' = k + pL - \left(a \cdot \frac{LMT}{15}\right)$$

ex $$9 = 185.2 + 11 - \left(1.56m \cdot \frac{0.5h}{15}\right)$$

11) Phase Lag given Modified Epoch that accounts for longitude and Time Meridian Corrections

Open Calculator

$$k = \kappa' - pL + \left(a \cdot \frac{LMT}{15}\right)$$

$$185.2 = 9 - 11 + \left(1.56m \cdot \frac{0.5h}{15}\right)$$

12) Poisson Probability Law for Number of Storms simulated per year

Open Calculator

$$P_{N=n} = \frac{e^{-(\lambda \cdot T)} \cdot (\lambda \cdot T)^{N} \_ \{s\}}{N_s!}$$

$$4.1E\hat{}\text{-}19 = \frac{e^{-(0.004 \cdot 60)} \cdot (0.004 \cdot 60)^{20}}{20!}$$

13) Separation of distance between centers of mass of two bodies given gravitational forces

Open Calculator

$$r = \sqrt{\frac{([g]) \cdot m_1 \cdot m_2}{F_g}}$$

$$138040.3m = \sqrt{\frac{([g]) \cdot 90kg \cdot 110kg}{5.095E\hat{}\text{-}6N}}$$

Variables Used

- **[G]** Gravitational Constant
- **a** Wave Amplitude *(Meter)*
- **f** Universal Constant
- F_g Gravitational Forces Between Particles *(Newton)*
- **GMT** Greenwich Time Measured *(Hour)*
- **k** Phase Lag
- **LMT** Local Time Meridian *(Hour)*
- **M** Mass of the Moon *(Kilogram)*
- m_1 Mass of Body A *(Kilogram)*
- m_2 Mass of Body B *(Kilogram)*
- M_{sun} Mass of the Sun *(Kilogram)*
- N_s Number of Storm Events
- $P_{N=n}$ Poisson Probability Law for the number of storms
- P_s Harmonic Polynomial Expansion Terms for Sun
- **pL** Local and Greenwich Phase Arguments
- **r** Distance between Two Masses *(Meter)*
- R_M Mean Radius of the Earth *(Kilometer)*
- r_s Distance *(Kilometer)*
- $r_{S/MX}$ Distance of Point *(Kilometer)*
- **T** Number of Years
- T_L Local Time *(Hour)*
- V_M Attractive Force Potentials for Moon

- V_s Attractive Force Potentials for Sun
- κ' Modified form of the Epoch
- λ Mean Frequency of Observed Events

Constants, Functions, Measurements used

- Constant: **[Earth-M]**, 5.9722E+24
  Earth mass
- Constant: **[g]**, 9.80665
  Gravitational acceleration on Earth
- Constant: **e**, 2.71828182845904523536028747135266249
  Napier's constant
- Function: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Length** in Kilometer (km), Meter (m)
  Length Unit Conversion
- Measurement: **Weight** in Kilogram (kg)
  Weight Unit Conversion
- Measurement: **Time** in Hour (h)
  Time Unit Conversion
- Measurement: **Force** in Newton (N)
  Force Unit Conversion

Check other formula lists

- **Attractive Force Potentials Formulas**
- **Tide Producing Forces Formulas**

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