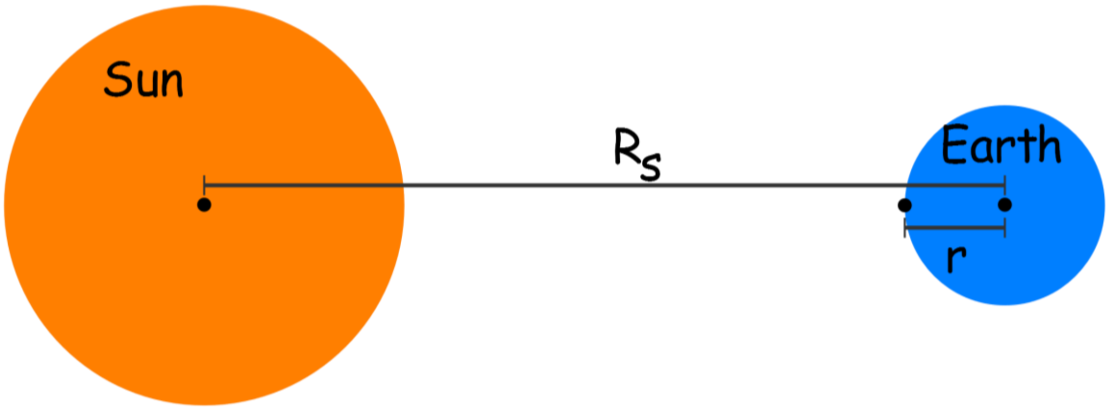

According to Newton's law of gravity, the acceleration of the Earth centre due to the gravitational force of the Sun is $a_{\text{CM}} = \frac{GM_s}{R_s^2}$, where M_s and R_s are the mass of the Sun and the distance between the Sun and the planet respectively, G is simply a constant. Acceleration can also refer to as force/mass. However, the acceleration exerted by the Sun on water masses located on the Earth surface ($r = 6400$km) should be $a_{\text{surface}} = \frac{GM_s}{(R_s - r)^2}$

The tidal acceleration is the acceleration difference between the surface and the centre, or part of the a_{surface} is used for maintaining Sun-earth rotation:

$$a_{\text{tidal, sun}} = a_{\text{surface}} - a_{\text{CM}} = \frac{GM_s}{R_s^2}\left\{\left(1 - \frac{r}{R_s}\right)^{-2} - 1\right\} \approx \frac{GM_s}{R_s^2}\left\{\left(1 + 2\frac{r}{R_s}\right) - 1\right\} = Gr\frac{M_s}{R_s^3}$$

Here, the binomial approximation was used to substract two very close numbers in the curly bracket. Basically, a_{surface} is the sum of a_{CM}, which make the Earth moves around the Sun and $a_{\text{tidal, sun}}$, which is due to the geographical difference of the gravity. Notice the cubic exponent of R_s. Similarly, if the sun is replaced by the moon, we can have a similar equation $a_{tidal,\text{ moon}} = Gr\frac{M_m}{R_m^3}$ with M_m the mass of the moon and R_m the distance between the Earth and the moon. The moon-earth common mass centre (see note) is <<6400 km from surface, so the difference can be ignored.

If we compare the magnitudes between two tidal accelerations, and substitute the numbers

$$\frac{a_{\text{tidal, moon}}}{a_{\text{tidal, sun}}} = \frac{M_m}{M_s}\left(\frac{R_s}{R_m}\right)^3 = \frac{1}{27 \times 10^6} \times (400)^3 \approx 2.37$$

The tidal acceleration (force) by the moon is roughly twice larger than the one by the Sun.

Reference:

https://en.wikipedia.org/wiki/Tidal_force

https://en.wikipedia.org/wiki/Binomial_approximation