Gravity-1

Orbiting Planet (1):

$$a = \frac{M\,G}{R^2} = \frac{v^2}{R}\,, \quad T = \frac{2\pi R}{v}\,.$$

Orbiting Satellite (2). Kepler's 3rd law:

$$\frac{M\,G}{4\pi^2}\,T^2 = R^3\,, \quad v^2 = \frac{M\,G}{R}\,.$$

Gravitational Acceleration (3):

$$a = \frac{G\,M}{R^2}\,, \quad R_{\rm Earth} = 6.37 \times 10^6\,{\rm m}\,.$$

Gravity-2

Escape Velocity (4).

Energy conservation:

$$\frac{1}{2}\, m\, v_f^2 = \frac{1}{2}\, m\, v_i^2 - \frac{m\, M\, G}{R}\,.$$

Two masses (5):

$$a_1 = \frac{M_2\, G}{d^2}\,, \quad \triangle t = ?\,, \quad v_f = ?\,.$$

Tidal Force (6):

$$\triangle F = \frac{m\, Mm\, G}{(r-R)^2} - \frac{m\, Mm\, G}{(r+R)^2} = ? \;\; \text{(expand)}\,.$$

Taylor expansion:

$$f(x) = f(0) + f'(0)\, x + \dots\;. \quad \text{Let} \;\; f(x) = \frac{1}{(r \pm x)^2}\,, \quad x = R\,.$$

Gravity-3

Denote the distance of one of the star from the center of the triangle by R,

$$\frac{L}{2} = R\,\cos(30^0)\,,$$

and calculate the force towards the center. Then $a = F/M$, $a = v^2/R$, and $T = 2\pi\,R/v$.