Parameters of the ellipse

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Several of the basic parameters are shown; they should be self-explanatory.

For all points on the ellipse, the combined distances from both foci have the same value. This is the reason that an ellipse can be drawn in the manner which you used this morning.

Unlike circles, which can have different sizes, but all of which have the same shape, ellipses can have different shapes as well as different sizes. Remember that a circle is just a special case of an ellipse, much as a square is a special case of a quadrilateral, as is a rectangle.

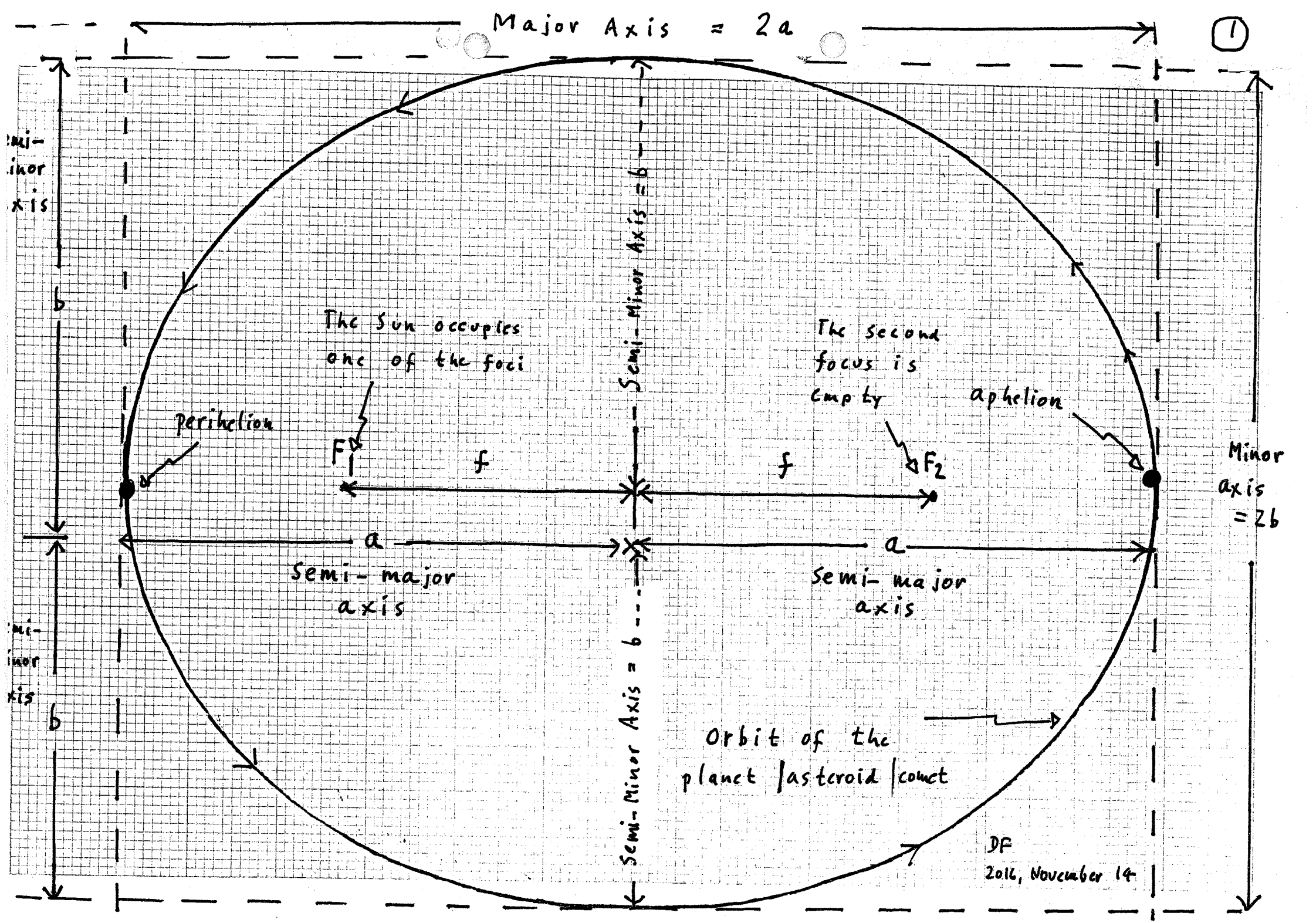
The degree of flatness of an ellipse is its "eccentricity". The eccentricity (e) is defined as

$$e = \sqrt{1 - \frac{b^2}{a^2}}$$

This is a topic which you will study in Further Mathematics, at A-level.

In this equation, a and b must have the same units.

All permanent members of the Solar System follow elliptical orbits. Planetary orbits differ quite a lot in their eccentricities, eg. Mars and the Earth; long-period cometary orbits have eccentricities which are huge. Their aphelion (farthest from the Sun distances) are substantially greater than the corresponding perihelion distances. For a circle, ($a = b$), the eccentricity, e, is zero. For a highly-flattened ellipse, ($a \gg b$), the eccentricity $\longrightarrow 1$.


Major Axis = 2a
Semi-Minor Axis = b
The Sun occupies one of the foci
The second focus is empty
aphelion
perihelion
F1
F2
f
f
a
a
Semi- major axis
Semi- major axis
Minor axis = 2b
Semi-Minor Axis = b
Orbit of the planet /asteroid /comet
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