

Grade 12 Earth and Space Science

SES4U

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October 15, 2025

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Chapter 2

Unit 2

2.1 Kepler's Law

2.1.1 Kepler's first law

Definition 2.1.1. *Planet's orbit in ellipses with the Sun at one focus*

Ellipses can be classified based on their **eccentricity**

$$e = \frac{c}{a}$$

e = Eccentricity

c = Distance from centre to a focus (in m(or Au))

a = Length of semi-major axis (in m(or Au))

2.1.2 Kepler's second law

Definition 2.1.2. *A line segment joining a planet and the sun **sweeps out equal areas in equal amount time***

2.1.3 Kepler's Third Law

Definition 2.1.3. *The square of the orbital period of a planet directly proportional to the cube of the length of the semi-major axis of its orbit*

$$p^2 = a^3$$

p = orbital period in (years)

a Length of semi-major axis (in Au)

The semi-major axis of an orbit is sometimes referred to as the **average** distance from the sun