AN EPITOME OF THE FIRST THREE BOOKS OF EUCLID'S ELEMENTS OF GEOMETRY

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An Epitome of the First Three Books of Euclid's Elements of Geometry by Euclid

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ELEMENTS OF GEOMETRY.

H. M. S. BRITANNIA.

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THIS epitome of the first three books of Euclid is prepared with the design of presenting the propositions to the Cadets of H.M.S. "Britannia" in a form of reasoning easily followed, and of establishing an uniformity in the manner of writing them out.

Many "Problems" as they can manifestly be performed with instruments, and some "Theorems" which are *converse* to others previously demonstrated, are omitted in order to reduce the subject to a limit consistent with the time which can be devoted to it.

EUCLID.

DEFINITIONS.

A **Point** has no parts or magnitude, it indicates *position* only.

A **Line** has length only without breadth.

The extremities of a line are points.

A straight line ——— lies evenly between its extremities.

A **Superficies** (*surface*) has length and breadth only, *without thickness or depth.*

A **Plane Superficies** (commonly called a "Plane") is that in which any two points being taken the straight line between them lies wholly in that superficies—*as the surface of a slate.*

A **Figure** is that which is enclosed by lines or surfaces.

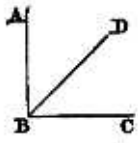
A **Plane Figure** is wholly contained in a plane—*as a circle or a square.*

A **Solid Figure** has length, breadth, and thickness.

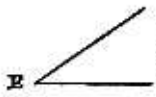
Rectilineal Figures are contained by straight lines.

Equilateral Figures have all their sides equal.

A **Plane Rectilineal Angle** is the inclination of two straight lines to one another which meet together, but are not in the same straight line.



There being more than one angle at a point as at B, where there are three angles, any one of them is expressed by placing B between the letters at the other extremities of the two straight lines which contain the angle. Thus, *the whole angle* at B is expressed by ABC or CBA, the upper one of the two remaining angles by ABD or DBA: the lower one by CBD or DBC.



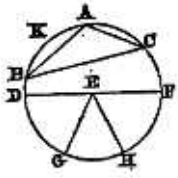
When there is only one angle at a point, it may be named by the single letter at that point, as "angle E."

When a straight line meets another straight line, making the adjacent angles equal to each other, each of the angles is called a **right angle**, and the straight lines are said to be **at right angles** or **perpendicular to** each other.

A Straight Line is perpendicular to a Plane when it makes right angles with every straight line meeting it in that plane.

An **Obtuse Angle** is greater than a right angle.

An **Acute Angle** is less than a right angle.



A **Circle** is a plane figure contained by one line, which is called the circumference, and is such that all the **radii** ED, EG, EH, or straight lines drawn from a certain point E (called the **centre**) to the circumference, are equal to one another.

A **Diameter** of a circle is a straight line, as DF, passing through the centre, and terminated both ways by the circumference.

A **Semicircle** (*half circle*) is the figure contained by a diameter and the part of the circumference it cuts off, as the figure DAFED.

Equal Circles are those whose diameters are equal or whose radii are equal.

Any straight line in a circle which is terminated both ways by the circumference, as the straight line BC, is called a **Chord**.

A part of the circumference of a circle, as CF, is called an **Arc**.

A **Segment** of a circle is the figure contained by a chord and the arc it cuts off, as the figure BKCB.

An **Angle in a Segment** is the angle contained between two straight lines drawn from any point in the arc of the segment to the extremities of the chord, as the angle BAC.

An angle is said to *stand upon* the arc intercepted between the straight lines which contain the angle, as the angle BAC *stands upon* the arc BGFC.

A **Sector** of a circle is the figure contained by two radii and the arc between them, as the figure EGHE.

Similar Segments of circles are those in which the angles are equal,

(as when angle A equals angle B.)