Euclidean Geometry

(1) Simon Newcomb, "Elements of geometry" (3rd edition, revised) (Henry Holt & Co, N.Y., N.Y., USA, 1884).

Pf iii–iv: Euclid's work on angles: does not recognize angles 180° or more (but Newcomb's variant presentation does) and does not define the sum of 2 or more angles (but Newcomb's variant presentation does).


Postulate is something which we suppose capable of being done without showing how.

Postulate: let a postulate be something which we suppose capable of being done without showing how.

I thought this was Euclid's (unproved) 5th postulate but see (5) sheet (3).

Row 455.89

(R) F. Durell, "Plane geometry" (Charles E. Merrill Co, N.Y., USA, c 1904—1905).

P 61: Prop 28. XXIV. Thm. "If 2 parallel lines are cut by a transversal, the sum of the interior angles on the same side of the transversal is equal to 2 right angles (E 180°)."

A

--- B

C

--- D

E

He means $B^\alpha + F^\alpha = 180°.

(Also converse on p 61).

P 41: Prop 32. Thm. "The sum of the angles of a triangle is equal to 2 right angles (E 180°)."

I thought this was Euclid's (unproved) 5th postulate.

I thought geometric figures admitted as possible. More narrow.
Euclidean geometry.

p. 27: "69. All straight angles are equal" vs allegedly a property of angles inferred immediately, probably it is related to Euclid's (improved) 5th postulate.

Dowell does not discuss sums of angles and constructions to find them: see (1). However, he notes (in his text) that 2 right angles is a straight angle, proved from the axioms and postulates.

p. 47: "77. The sum of all the angles about a point on the same side of a straight line passing through the point equals 2 right angles." Allegedly this is used in the proof of proposition XXXII on p. 4. See p. 4.

QF 453, L5


p. 45: He gives a construction to add 2 angles, same as later used by Newcomb.

p. 19: Proposition I: Theorem. "Les angles droits sont tous égaux entre eux." If 2 given: there may be a catch: a supplementary angle.

p. 20: Proposition XIX: 1er loi. "La somme des trois angles d'un triangle ne peut [pas] être plus grande que deux angles droits.

p. 20-23: Proposition XX: Theorem. "Dans tout triangle, la somme des trois angles est égale à deux angles droits.'


Extra (5): Durell says that Greeks used $\Delta \overline{AB}$ in regular polygons to show $\angle A \equiv \angle B$. For example, $\Delta A\overline{B}$ for $\angle A$.

Extra (6): Durell mentions that Thales proved that the sum of the angles of a triangle is equal to 2 right angles.
Euclidean geometry.


P. 143 (§ 182): "But Aristotle ... maintains that a postulate is demonstrable ... ."

P. 144: Proclus announces postulate 4 of Euclid (all right angles are equal to each other) and gives a proof which may have a catch (§§ 188-189).


Euclidean geometry.

Extra: (1) Proof of Proposition 19: Shortest set of terms:

Thm I: If 2 straight lines intersect, the opposite angles will be equal.

Thm II: If a transversal crossing 2 straight lines makes the alternate angles equal, the 2 straight lines are parallel.

For Thm I, the terms tacitly that all straight angles are equal.

Thm III: If a transversal crosses 2 straight lines, the 4 alternate and corresponding angles are equal to each other and the 4 other angles are equal to the common supplement of each of 1st 4 angles. (Note well expressed?).

Thm III uses Axiom 11 of Section 45, P21 (through a given point 1 only) 1 straight line can be drawn // to given str. line.)

Extra: (2) Proof of Proposition 20: Thm assumes tacitly (all straight angles are equal, a property inferred immediately see p. 27, property 69) which leads to all right angles are equal (see p. 27, property 2).

He uses: Proposition 20. Thm: If a straight line is cut by a transversal, the alternate interior angles are equal.

A - B - C

He means: \( \angle A \cong \angle C \).

E - F - G

He proves \( \triangle \text{EAF} \cong \triangle \text{EFG} \). Hence result.

He uses: one of a || lines is // to the other // line as below.

He uses alternate interior angles are equal, i.e. p58 (Prop. 20).

Prop. 20: Thm uses Proposition 18: Thm (see above), which uses that through a given point exactly one straight line can be drawn parallel to another given straight line where parallel lines are straight lines in the same plane, which do not meet however far they are produced on p. 21 in article #4. 3