Parallel Straight Lines :—

When a straight line cuts two other straight lines, if—

(i) A pair of alternate angles are equal; or

(ii) A pair of corresponding angles are equal; or

(iii) A pair of interior angles on the same side of the cutting-line are together equal to two right angles—

then the two straight lines are parallel; and the converse.

Straight lines which are parallel to the same straight line are parallel to one another.

If there are three or more parallel straight lines, and the intercepts made by them on any straight line that cuts them are equal, then the corresponding intercepts on any other straight line that cuts them are also equal.

Triangles and other Rectilinear Figures :—

The sum of the angles of a triangle is equal to two right angles.

If the sides of a convex polygon are produced in order, the sum of the angles so formed is equal to four right angles.

If two triangles have two sides of the one equal to two sides of the other, each to each, and also the angles contained by those sides equal, the triangles are congruent.

If two triangles have two angles of the one equal to two angles of the other, each to each, and also one side of the one equal to the corresponding side of the other, the triangles are congruent.

If two sides of a triangle are equal, the angles opposite to these are equal; and the converse.

If two triangles have the three sides of the one equal to the three sides of the other, each to each, the triangles are congruent.

If two sides of a triangle are unequal, the greater side has the greater angle opposite to it; and the converse.

Of all the straight lines that can be drawn to a given straight line from a given point outside it, the perpendicular is the shortest.

The opposite angles of a parallelogram are equal; and the converse.

The opposite sides of a parallelogram are equal and each diagonal bisects the parallelogram; and the converse of the first part.

The diagonals of a parallelogram bisect one another; and the converse.

If a pair of opposite sides of a quadrilateral are equal and parallel, it is a parallelogram.

The straight line drawn through the middle point of one side of a triangle parallel to another side bisects the third side.

The straight line joining the middle points of two sides of a triangle is parallel to the third side and equal to one-half of it.

Areas :—

The area of a rectangle is measured by the product of the measures of its sides.

The area of a parallelogram is equal to the area of a rectangle on the same base and between the same parallels, and is therefore measured by the product of the measures of its base and its altitude.

Parallelograms on the same or equal bases and of the same altitude are equal in area.

The area of a triangle is equal to one-half of the area of a rectangle on the same base and between the same parallels, and is therefore measured by one-half of the product of the measures of its base and its altitude.

Triangles on the same or equal bases and of the same altitude are equal in area.

Equal triangles on the same or equal bases are of the same altitude.

The square of the hypotenuse of a right-angled triangle is equal to the sum of the squares on the other two sides; and the converse.

Geometrical proofs of the following algebraic identities :—

$$k (a + b + c) = ka + kb + kc$$
$$(a + b)^2 = a^2 + 2ab + b^2$$
$$(a - b)^2 = a^2 - 2ab + b^2$$
$$a^2 - b^2 = (a + b)(a - b)$$

The square on a side of a triangle is greater than or less than the sum of the squares on the other two sides, according as the angle contained by those sides is obtuse or acute. The difference is twice the rectangle contained by one of the two sides and the projection on it of the other.

Loci :—

The locus of points equidistant from two fixed points is the perpendicular bisector of the line joining the two fixed points.