

PARALLELOGRAM FACTS IN E^3

Facts: The vertices of a parallelogram must be coplanar.

Opposite sides of a parallelogram must have equal length.

If a convex quadrilateral has a pair of opposite sides which are parallel and of equal length, then it must be a parallelogram.

ARROWS AND VECTORS

Definition: A line segment whose ends are designated as its initial and final points (“tail” point and “head” point) is called an arrow.

An arrow of positive length determines a unique line. Two arrows of positive length are said to be parallel if their unique lines are parallel.

Fact: Let P and Q be the tail and head of a given arrow PQ , and let P' any point; then there must be a unique arrow $P'Q'$ such that PQ and $P'Q'$ have the same length and are parallel, and hence such that the figure $PQQ'P'$ is a parallelogram. In this case, we say that the two arrows are equal. Let PQ be a given arrow of positive length. The set of all possible arrows in E^3 which are equal to PQ is called a vector or, more specifically, the vector determined by the arrow PQ . Given the arrow PQ , or any arrow equal to PQ , we say that this arrow represents this vector. Thus it is possible for the same vector to be represented by several different arrows, provided that those arrows are all equal to one another.

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