well ordered set

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A *well-ordered* set is a totally ordered set in which every nonempty subset has a least member.

An example of well-ordered set is the set of positive integers with the standard order relation $(\mathbb{Z}^+, <)$, because any nonempty subset of it has least member. However, $\mathbb{R}^+$ (the positive reals) is not a well-ordered set with the usual order, because $(0, 1) = \{x : 0 < x < 1\}$ is a nonempty subset but it doesn't contain a least number.

A **well-ordering** of a set X is the result of defining a binary relation $\leq$ on X to itself in such a way that X becomes well-ordered with respect to $\leq$.