

# Writing -680 as a “Product of Threes”: The power of $\tau$ -factorization

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**Abstract:** What if...we take an ordinary integral domain  $D$ , but endow it with an extraordinary (or just plain weird) rule for making products? Let  $\tau$  be a subset of  $D \times D$  (for example, let  $\tau_7 = \{(a, b) | a, b \in \mathbb{Z}, a - b = 7n \text{ for some } n \in \mathbb{Z}\} \subset \mathbb{Z} \times \mathbb{Z}$ ). A  $\tau$ -product is  $\lambda a_1 \cdots a_n$ , where  $(a_i, a_j) \in \tau$  and  $\lambda$  is a unit (that is,  $-680 = 10 \cdot 17 \cdot -4$  is a  $\tau_7$ -product). If we require all “good” products to be  $\tau$ -products (and we will!), definitions of such basic concepts as *prime* and *division* must also change. Will anything stay the same? Find out Wednesday, February 1!

The talk will be accessible to anyone with a healthy appreciation for numbers, but most enlightening to those somewhat familiar with abstract algebra.