# Review: Build a Sporadic Group in Your Basement

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  - 2. associativity:  $a*(b*c) = (a*b)*c \forall a, b, c \in G$
  - 3. existence of identity:  $\exists e \in G \text{ s.t. } a * e = e * a = a \ \forall a \in G$
  - 4. existence of inverses:  $\forall a \in G, \exists a^{-1} \text{ s.t. } a*a^{-1} = a^{-1}*a = e$

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Examples:  $(\mathbb{Z},+)$ 

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#### Example

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- $\overline{0} = \{0 + 5\mathbb{Z}\} = \{..., -5, 0, 5, 10, 15, ...\}$   $\overline{1} = \{1 + 5\mathbb{Z}\} = \{..., -4, 1, 6, 11, 16, ...\}$   $\overline{2} = \{2 + 5\mathbb{Z}\} = \{..., -3, 2, 7, 12, 17, ...\}$
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A sporadic group is a special kind of finite simple group

▶ 18 infinite families:

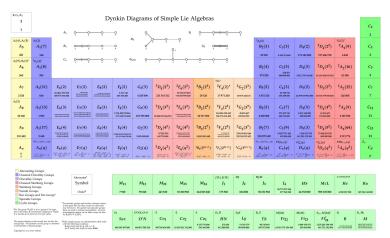
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  - 1. Mathieu Groups  $M_{11}$ ,  $M_{12}$ ,  $M_{22}$ ,  $M_{23}$ ,  $M_{24}$

#### The Periodic Table Of Finite Simple Groups



# What is the Mathieu Group $M_{24}$

#### different

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