

**Answer on Question #46552 – Math – Algebra
Problem**

Consider the sets. $A = \{3x \mid x \in \mathbb{Z}\}$, $B = \{x \in \mathbb{Q} \mid -5 \leq x \leq 10\}$ and $C = \{\text{factors of 20 in } \mathbb{Z}\}$.

Represent $A \cap B$, $B \cup C$ and $C \setminus A$ by the listing method and in a single Venn diagram.

Solution

Rewrite our sets:

$$A = \{-24, -21, -18, -15, -12, -9, -6, -3, 0, 3, 6, 9, 12, 15, 18, 21, 24, \dots\}$$

$$B = \left\{ x = \frac{m}{n} \mid m \in \mathbb{Z}, n \in \mathbb{N}, -5 \leq x \leq 10 \right\}$$

$$C = \{1, 2, 4, 5\}$$

$$A \cap B = \{x \mid x \in A \text{ and } x \in B\} = \{-3, 0, 3, 6, 9\}$$

$$B \cup C = \{x \mid x \in B \text{ or } x \in C\} = B \text{ because } C \subset B$$

$$\begin{aligned} C \setminus A &= \{x \mid x \in C \text{ and } x \notin A\} = C \cup \{3x - 1, 3x - 2 \mid x \in \mathbb{Z}\} = \\ &= \{1, 2, 5\} \cup \{\dots, -14, -13, -11, -10, -8, -7, -5, -4, -2, -1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, \dots\} = \\ &= \{\dots, -14, -13, -11, -10, -8, -7, -5, -4, -2, -1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, \dots\} \end{aligned}$$

A single Venn diagram:

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