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Roster Form and Set-builder Form

1. What is a set?

A **set** is a **well-defined** collection of objects: anyone can decide whether a thing belongs to it. Sets are named by capital letters and elements by small letters; $a \in A$ means "a belongs to A".

2. Roster (tabular) form

List all the elements inside curly brackets { }, separated by commas.
V = {a, e, i, o, u}

- **Order does not matter:** {1, 2, 3} = {3, 1, 2}.
- **Elements are not repeated:** the letters of SCHOOL give {S, C, H, O, L}, 5 letters.
- For a long pattern, dots may be used: {2, 4, 6, ..., 100}.



3. Set-builder form

State the **common property** of the elements instead of listing them.
A = {x : x is an even natural number, x ≤ 100}
Read as "the set of all x such that x is an even natural number and x is at most 100". The colon ":" (or "|") means "such that".

4. Which form when?

Form	Best for	Example
Roster	Small sets	{a, e, i, o, u}
Set-builder	Big or infinite sets	{x : x is a natural number}

Solved examples

Q1. Write {x : x is an integer, −3 < x < 2} in roster form.
A. The integers strictly between −3 and 2: **{−2, −1, 0, 1}**.

Q2. Write {1, 4, 9, 16, 25} in set-builder form.
A. Each element is a perfect square: **{x : x = n², n ∈ N, 1 ≤ n ≤ 5}**.

Practice questions

1. (MCQ) The roster form of the letters of MATHEMATICS has how many elements? (a) 11 (b) 8 (c) 7 (d) 9
2. (Very short) Is "the collection of good books" a set? Why?
3. (Short) Write $\{x : x \text{ is a prime number}, x < 10\}$ in roster form.
4. (Short) Write $\{3, 6, 9, 12\}$ in set-builder form.
5. (Very short) Are $\{1, 2, 3\}$ and $\{3, 2, 1\}$ equal?
6. (Short) Write $\{x : x^2 = 4, x \text{ is an integer}\}$ in roster form.

Answer key

1. (b): $\{M, A, T, H, E, I, C, S\}$.
2. No: "good" is not well-defined.
3. $\{2, 3, 5, 7\}$.
4. $\{x : x = 3n, n \in N, 1 \le n \le 4\}$.
5. Yes: order does not matter.
6. $\{-2, 2\}$.

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