Subsets and elements

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Element or Subset or Both or Neither?

In each row, you must decide if Thing 1 is (element / subset / neither / both) of Thing 2.
Circle the letter in the correct column.
Hint: If confused, write down the cardinality of Thing 2 (if defined). That sometimes helps.

Thing 1	$\in$	$\subseteq$	neither	both	Thing 2
0	T	H	E	R	$\{1,2,3\}$
1	S	O	A	S	$\{1,2,3\}$
2	R	L	P	I	$\{1,2,3\}$
$\{1\}$	S	E	V	H	$\{1,2,3\}$
$\{1,2,3\}$	L	V	M	S	$\{1,2,3\}$
$\emptyset$	U	I	O	N	$\{1,2,3\}$
$\{\}$	B	N	W	C	$\{1,2,3\}$
$\{\emptyset\}$	O	I	U	Y	$\{1,2,3\}$
$\mathbb{Z}$	W	E	S	A	$\mathbb{Q}$
$\mathbb{N}$	S	R	H	A	$\{\mathbb{Z}\}$
$\mathbb{Z}$	L	T	D	F	$\mathbb{R}$
$\mathbb{R}$	S	O	E	G	$\mathbb{Z}$
1	H	U	L	P	1
$\{1\}$	B	M	S	U	$\{1,\{1\}\}$
$\{\{1\}\}$	Q	R	V	G	$\{1,\{1\}\}$
$\{\{\{1\}\}\}$	U	A	S	D	$\{1,\{1\}\}$
$\{1,2,3\}$	R	V	I	K	$\{\{1\},\{1,2\},\{1,2,3\}\}$
$\{\{1,2,3\}\}$	L	E	F	T	$\{\{1\},\{1,2\},\{1,2,3\}\}$
1	C	E	B	D	$\{\{1\},\{1,2\},\{1,2,3\}\}$
1	M	O	R	E	$\{\{1\},\{1,2\},1,2,3\}$
$\{1\}$	T	F	I	U	$\{\{1\},\{1,2\},1,2,3\}$
$\{1\}$	W	N	E	G	$\{\{1,2\},1,2,3\}$

Look ahead: powersets

Definition 1. *Let A be a set. The* powerset *of A, denoted $\mathcal{P}(A)$, is the set of all subsets of A.*

Write the powerset of A.
Hint: use circle, heart and triangle to box the three elements of the later sets, as a visual aid

1. $A = \{\bigcirc, \heartsuit, \triangle\}$

2. $A = \{\{1\}, \emptyset, \{2,3\}\}$

3. $A = \{\{\emptyset\}, \{1\}, 2\}$