

- (1) List the members of these sets.
- $\{x \mid x \text{ is a real number such that } x^2 = 1\}$
 - $\{x \mid x \text{ is a positive integer less than } 12\}$
 - $\{x \mid x \text{ is the square of an integer and } x < 100\}$
 - $\{x \mid x \text{ is an integer such that } x^2 = 2\}$
- (2) Use set builder notation to give a description of each of these sets.
- $\{0, 3, 6, 9, 12\}$
 - $\{-3, -2, -1, 0, 1, 2, 3\}$
- (3) Describe the set of even integers $2\mathbb{Z}$, the set of odd integers $2\mathbb{Z} + 1$, and the set of integers that are divisible by three $3\mathbb{Z}$ using set builder notation.
- (4) Let $S = \{x \in \mathbb{Z} \mid x = 2n + 1 \text{ for some } n \in \mathbb{Z}\}$ and $T = \{s^2 : s \in S\}$. Write out a description of T using the same notation as the one used for S . Then write out a description of S using the same notation as the one used for T .
- (5) For each of the following sets, say what the universal set is and write out the defining property. For example, if we wish to describe the set of all women, the universal set might be all people, and the defining property would be “ x is a woman”. Use complete sentences.
- The collection A of all members of the school band.
 - The collection B of all irrational numbers.
 - The collection of all prime numbers greater than or equal to 4 and less than 7.
- (6) What can you say about the following sets?
- $A = \{x \in \mathbb{R} \mid x^2 + x + 1 = 0\}$.
 - $B = \{x \in \mathbb{N} \mid \exists y \in \mathbb{R}, x = y^2\}$.
- (7) For each of these pairs of sets, determine whether the first is a subset of the second, the second is a subset of the first, or neither is a subset of the other.
- the set of airline flights from London to Colombo, the set of nonstop airline flights from London to Colombo.
 - the set of people who speak English, the set of people who speak Chinese.
 - the set of flying squirrels, the set of living creatures that can fly
- (8) Determine whether each of these pairs of sets are equal.
- $\{1, 4, 4, 4, 7, 7, 7, 7, 7, 7\}$, $\{4, 7, 1\}$
 - $\{\{1\}\}$, $\{1, \{1\}\}$
 - \emptyset , $\{\emptyset\}$
- (9) Suppose that $A = \{2, 4, 6\}$, $B = \{2, 6\}$, $C = \{4, 6\}$, and $D = \{4, 6, 8\}$. Determine which of these sets are subsets of which other of these sets.
- (10) For each of the following sets, determine whether 2 is an element of that set.
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| (a) $\{x \in \mathbb{R} \mid x \text{ is an integer greater than } 1\}$ | (d) $\{\{2\}, \{\{2\}\}\}$ |
| (b) $\{x \in \mathbb{R} \mid x \text{ is the square of an integer}\}$ | (e) $\{\{2\}, \{2, \{2\}\}\}$ |
| (c) $\{2, \{2\}\}$ | (f) $\{\{\{2\}\}\}$ |
- (11) Determine whether each of these statements is true or false.
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| (a) $0 \in \emptyset$ | (e) $\emptyset \in \{0\}$ |
| (b) $\{0\} \subset \emptyset$ | (f) $\emptyset \subset \{0\}$ |
| (c) $\{0\} \in \{0\}$ | (g) $\{0\} \subset \{0\}$ |
| (d) $\{\emptyset\} \subseteq \{\emptyset\}$ | |
- (12) Determine whether each of these statements is true or false.
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| (a) $x \in \{x\}$ | (d) $\{x\} \in \{\{x\}\}$ |
| (b) $\{x\} \subseteq \{x\}$ | (e) $\emptyset \subseteq \{x\}$ |
| (c) $\{x\} \in \{x\}$ | (f) $\emptyset \in \{x\}$ |