Sets Review

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Day 1

Notation

Subsets

Note: Answers to practice questions are in red

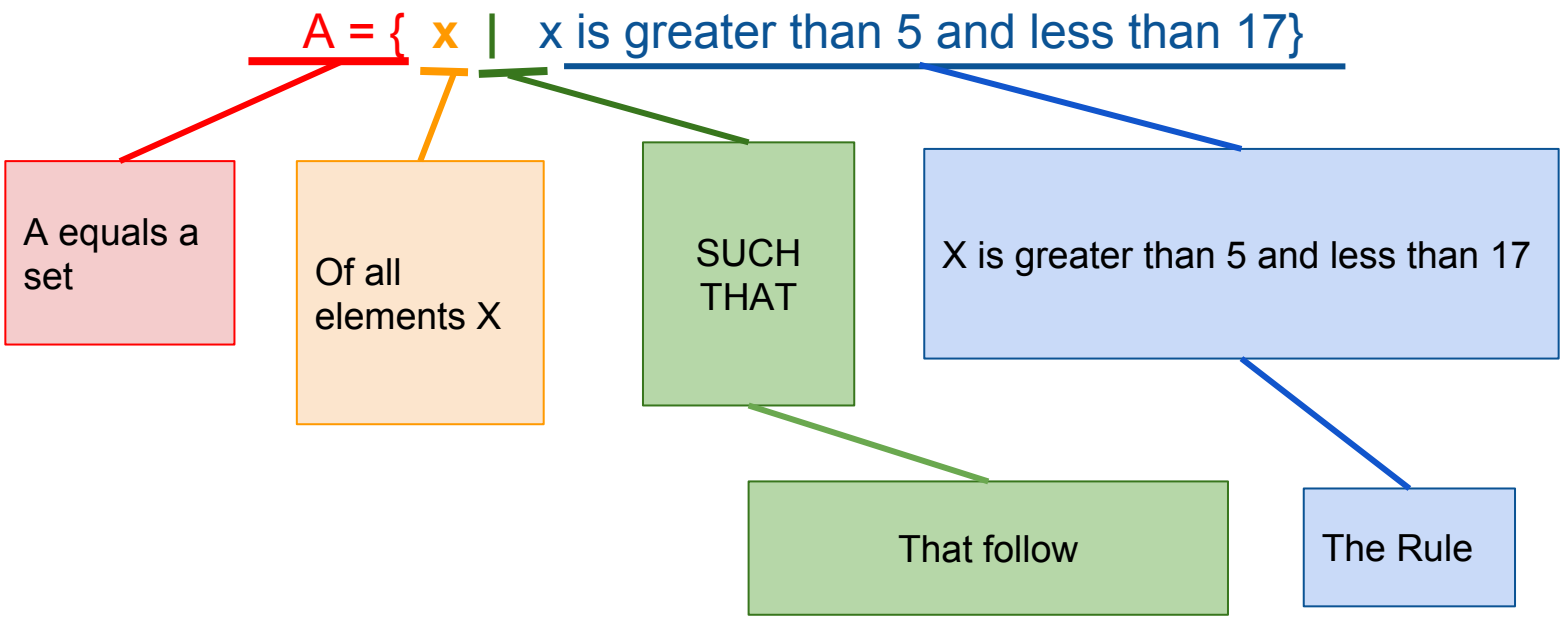
What is a set?

A **set** is a clearly defined collection.

What are elements?

The items in a set are referred to as the **elements** of a set.

$$A = \{ x \mid x \text{ is greater than 5 and less than 17} \}$$



Set Notation

Writing out the **rule**

- Capital letter to name the set
- Open curly brackets
- X | X is …
- Make sure rule clearly defines the set
- Close curly brackets

A = { x | x is a natural number less than 5}

Writing out the **elements**

- Capital letter to name the set
- Open curly brackets
- Commas to separate elements
- Close curly brackets

A = {4, 3, 2, 1}

What went wrong?

What went wrong?

$$c = \{x \text{ is a whole number}\}$$

What went wrong?

$$c = \{x \text{ is a whole number}\}$$

$$C = \{ x \mid x \text{ is a whole number}\}$$

What went wrong?

$$M = \{x \mid 4, 5, 6, 7\}$$

What went wrong?

$$M = \{x \mid 4, 5, 6, 7\}$$

$M = \{ 4, 5, 6, 7\}$

What went wrong?

$$A = x \mid x \text{ is an even number}$$

What went wrong?

$$A = x \mid x \text{ is an even number}$$

$$A = \{ x \mid x \text{ is an even number} \}$$

What went wrong?

$b = \{x \mid x \text{ is a whole number greater than } 5, \text{ less than } 9\}$

$B = \{ x \mid x \text{ is a whole number greater than } 5, \text{ less than } 9\}$

$\in$

This symbol means “is an element of”

$$5 \in A$$

5 is an element of A

$\notin$

This symbol means “is not an element of”

$$7 \notin A$$

7 is NOT an element of A

null set (or empty) set is

a set that contains NO elements

Example: The set of the names of people in the world taller than 4 metres.

Ø or { }

The symbol for the **null set (or empty) set**

Ø or { }

When are two sets equal?

Two sets are equal only if they contain the EXACT same elements.

Breakdown the word

Sub Set

What does “sub” mean?

sub- | sʌb, səb |
prefix

1 at, to, or from a lower level or position: *subalpine*.

- lower in rank: *subaltern* | *subdeacon*.
- of a smaller size; of a subordinate nature: *subculture*.

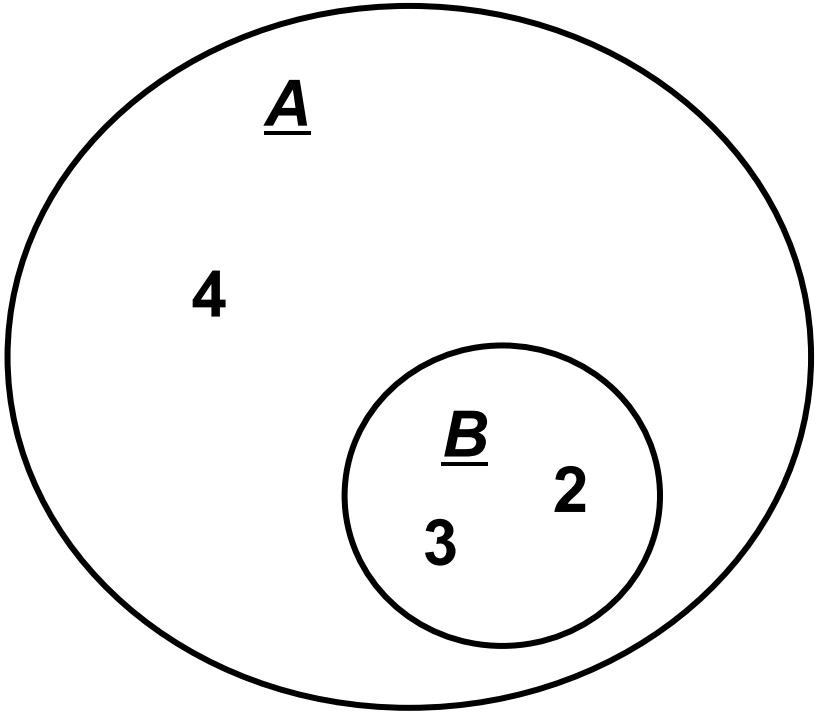
SUB SET = Smaller Set

2 somewhat; nearly; more or less: *subantarctic*.

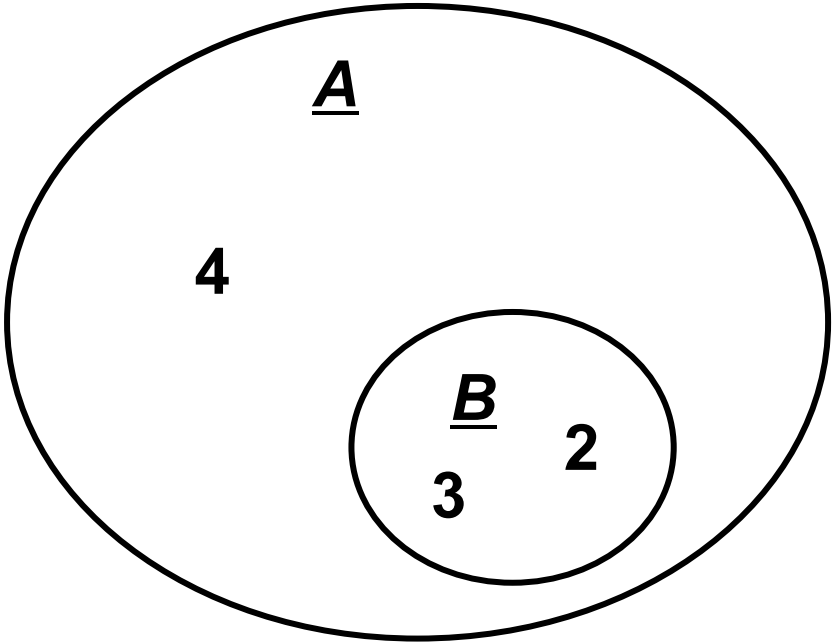
3 denoting subsequent or secondary action of the same kind: *sublet* | *subdivision*.

4 denoting support: *subvention*.

5 *Chemistry* in names of compounds containing a relatively small proportion of a component: *suboxide*.



You can think of a **subset** as a set that "fits inside" of another set.



3 is an element of A and B

2 is an element of A and B

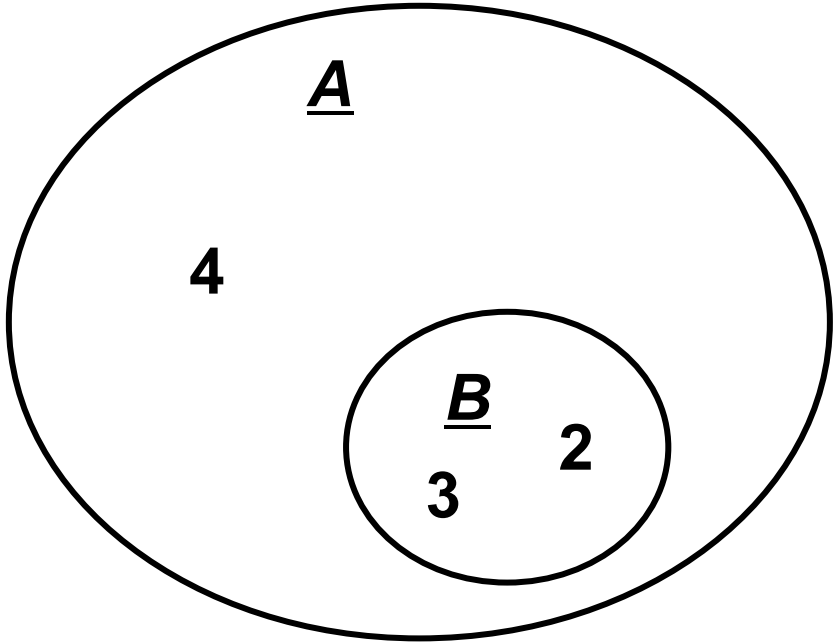
4 is only an element of A

** Only write each element once **

$$A = \{ 4,\ 3,\ 2 \}$$

$$B = \{\quad 3,\ 2 \}$$

Set B is a **subset** of Set A if every element of B is **also** an element of A.



$A = \{ 4, 3, 2 \}$

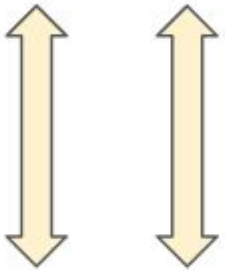
$B = \{ 3, 2 \}$

3 is **also** an element of A

2 is **also** an element of A

ALL elements in the subset can match to elements in the larger or equal set.

$$A = \{ 4, 3, 2 \}$$



$$B = \{ \quad 3, 2 \}$$

Is a subset always smaller?

Set B is a **subset** of Set A if every element of B is **also** an element of A.

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

$$B = \{1, 2, 3\}$$

Set B is a **subset** of Set A if

every element of B is **also** an element of A.

Justify which box contains a set and its subset.

A

$M = \{ 4, 3, 2 \}$

$N = \{ 7, 3, 2 \}$

B

$L = \{ 0, 3, 9 \}$

$P = \{ 3, 9, 0 \}$

Justifying Your Ideas Properly

Restate what you are justifying

Box B contains a set and its subset because **every element of L is also an element of P.**

Use “because”

Give the reason the statement is true

Create three subsets that fit inside of Set B.

B = {3, 5, 7, 9, 11, 13, 15, 17}

Any answer that ONLY uses the elements in B is correct.

Example answer :

$C = \{3, 5\}$

$D = \{3\}$

$E = \{3, 5, 7\}$

Create three subsets that fit inside of Set B.

B = {3, 5, 7, 9, 11, 13, 15, 17}

Why is M = {3, 4, 5} not a subset of B?

M is not a subset of B because not every element of M can be found in B.

OR

M is not a subset of B because there is an element in M that is not in B.

$\subset$

Translates to “is a subset of”

$$A \subset B$$

A “is a subset of” B

$$B \subset A$$

B “is a subset of” A

$\not\subset$

Translates to “is NOT a subset of”

$A = \{2, 3, 4\}$ $B = \{2, 3\}$

Which is true?

$A \subset B$

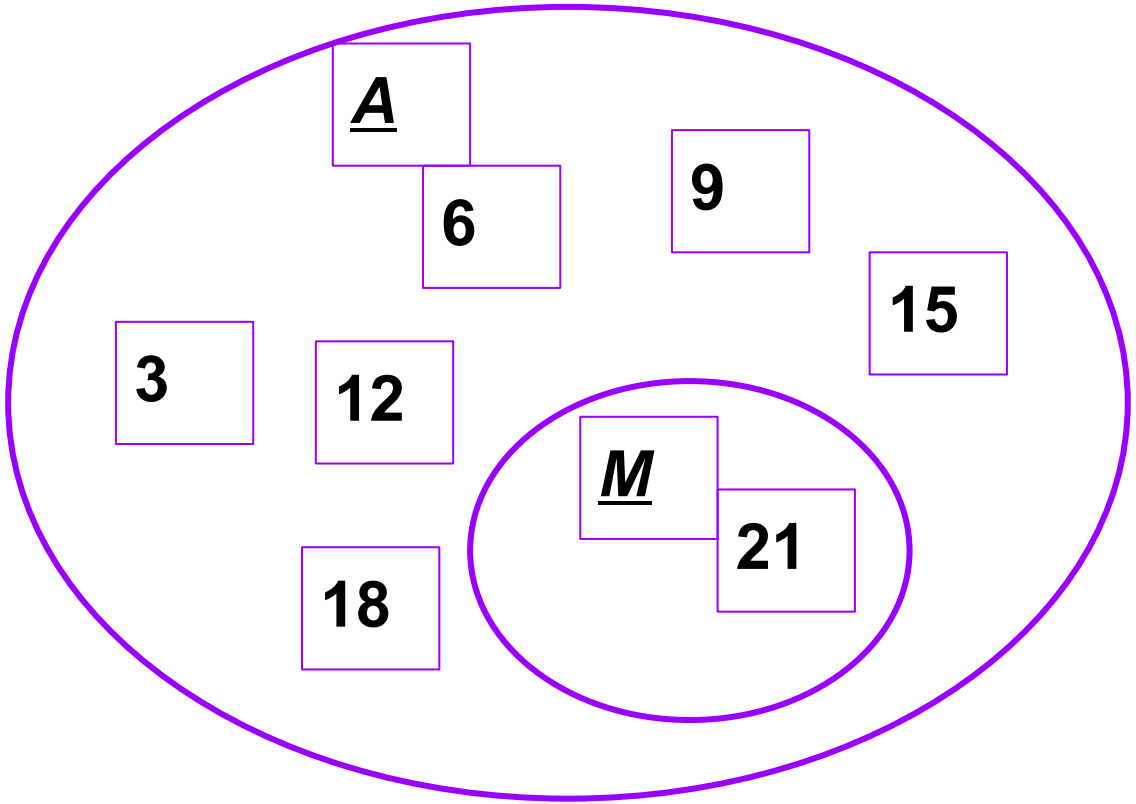
$B \subset A$

How do you know the other is not true?

$B \subset A$ is true B is a subset of A. We know B is a subset of A because every element of B can be found in A.

$A \subset B$ is not true because A is not a subset of B. A is not a subset of B because every element of A cannot be found in B.

List the elements of A and the elements of M.



$$A = \{3, 6, 9, 12, 15, 18, 21\}$$

$$M = \{21\}$$

$M = \{4, 8, 12, 16\}$

$N = \{2, 4\}$

$O = \{12, 16\}$

Which of the following is true? How do you know?

a. $M = N$

b. $O \subset N$

c. $N \not\subset M$

Justify why the other two options are not true.

$N \not\subset M$ is true because N is not a subset of M.
N is not a subset of M because not every element of N can be found in M.

$M = N$ is not true because M and N do not have exactly the same elements.

$O \subset N$ is not true because every element of O cannot be found N.

List the elements of Sets B and K.

B = { x | x is an even, natural number greater than 17 and less than 25}

K = { x | x is a lowercase letter of the English alphabet in print that a curve is always used to make}

Ex. p has a curve in it
x does not have a curve in it

$$B = \{18, 20, 22, 24\}$$

$$K = \{a, b, c, d, e, f, g, j, o, p, q, r, s, u\}$$

True or False?

If false, make the expression true using correct set notation.

1. $3 \in A$
2. $0 \in A$
3. $7 \notin A$
4. $M \in A$
5. $9 \notin A$
6. $A \notin M$

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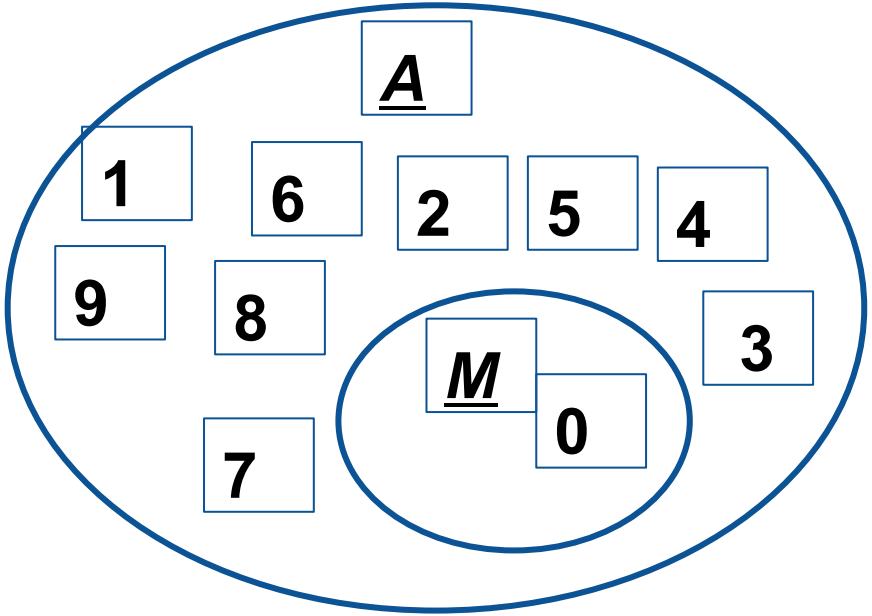
7. What could be a rule for Set A?
   Express it, using proper set notation.

8. What could be a rule for Set M?
   Express it, using proper set notation.



1. True
2. True
3. False. 7 is an element of A.
4. False. M is a subset of A.
5. False. 9 is an element of A.
6. False. A is not a subset of M.

7. A possible rule for set A could be the set of integers greater than -1 and less than 10.

8. A possible rule for M is the set of integers that cannot be a denominator in a fraction.

Day Two

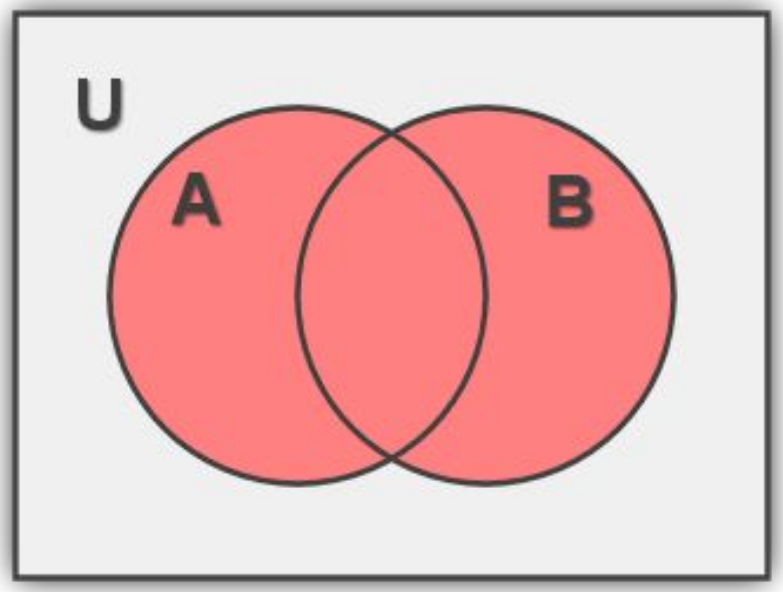
Union and Intersection

Cardinality

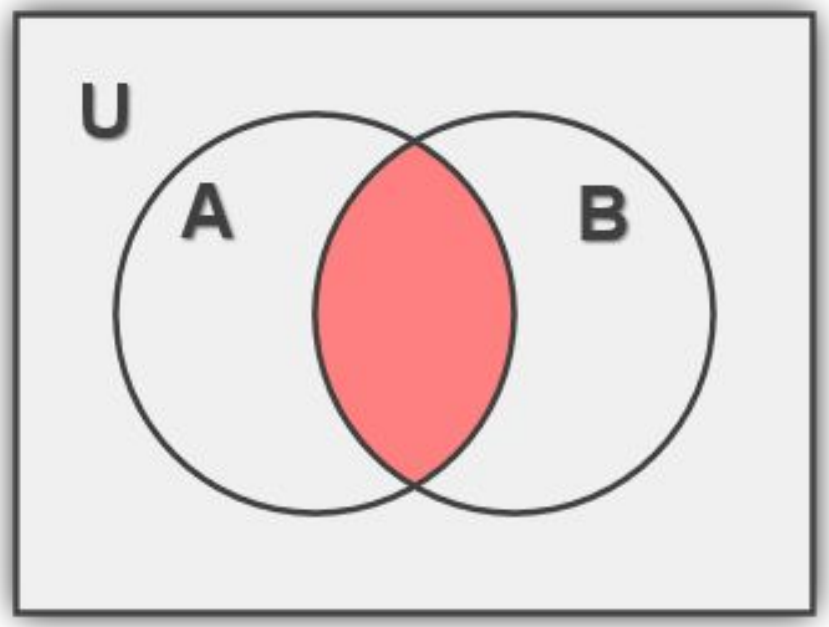
Complement

Visualising Union and Intersection

Shade the Venn Diagram to represent Union.



Shade the Venn Diagram to represent Intersection.



The **intersection** of two sets is the set of elements in common to both.

=

$\cap$ = "*intersect*"

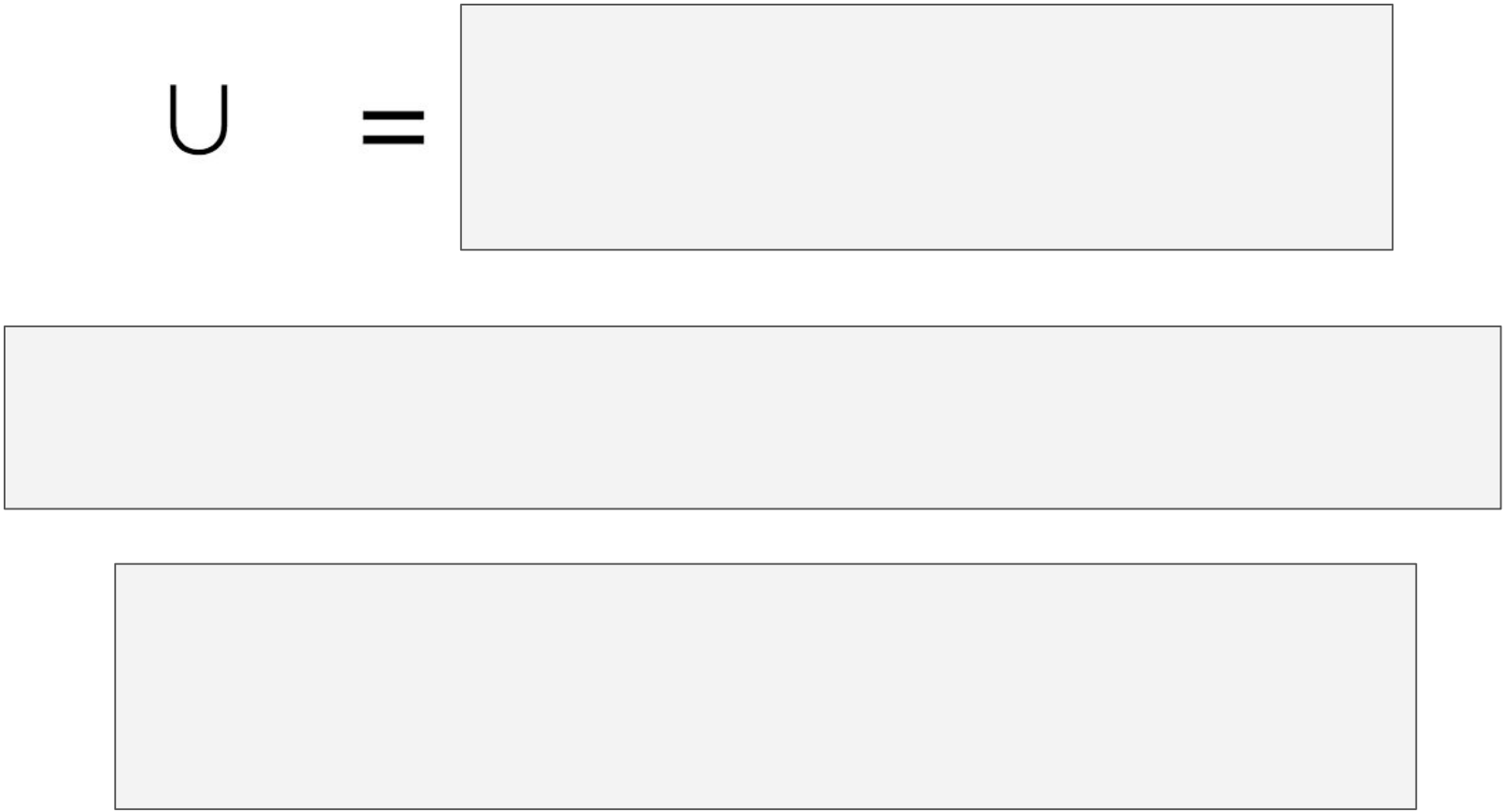
$A \cap B =$

$$\cap \quad = \text{"}intersect\text{"}$$

$$A \cap B = A \text{"}intersect\text{"} B$$

The **union** of two sets A and B is found by putting together in a new set all of the elements of A and B

** Only write each element once **



$\cup$ = "*union*"

* *just think* $\cup$ *for* $\cup$ *nion*

$\cup$ = "*union*"

* *just think* $\cup$ *for* $\cup$ *nion*

$A \cup B =$

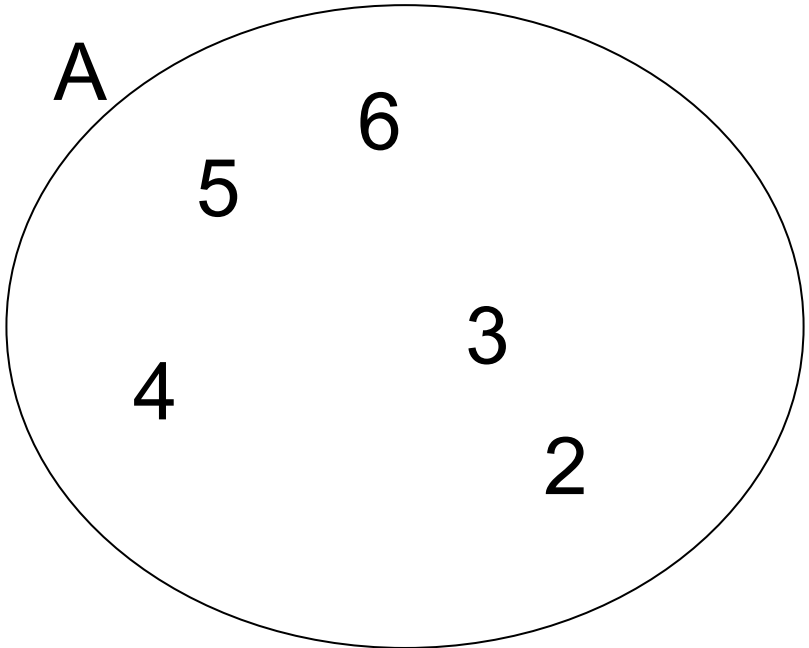
$$\cup \quad = \text{"union"}$$

* *just think* $\cup$ *for* $\cup$ *nion*

$$A \cup B = A \text{ "union" } B$$

Cardinality refers to **the number of items in a set**

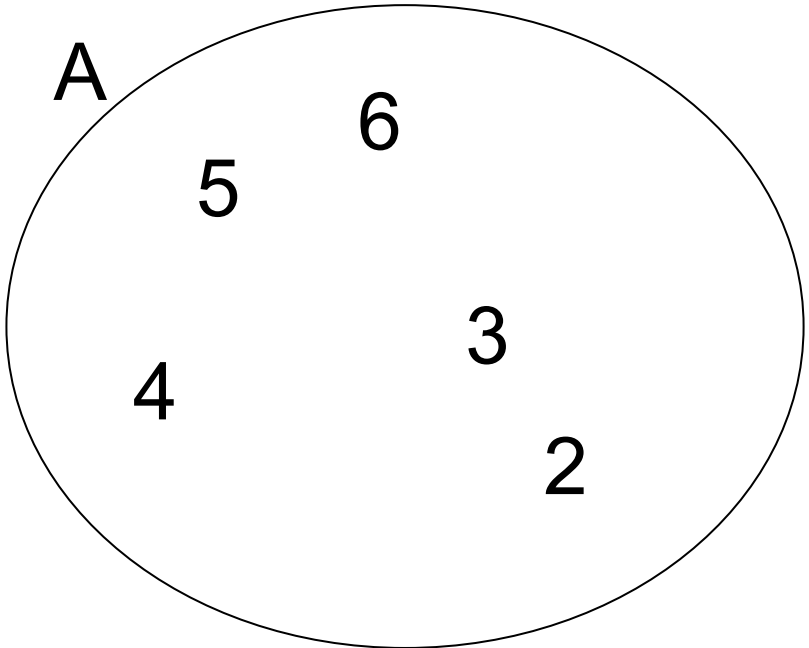
Symbol is a hashtag …. # A = number of items in A



 # A = 5

Cardinality refers to **the number of items in a set**

Symbol is a hashtag …. # A = number of items in A



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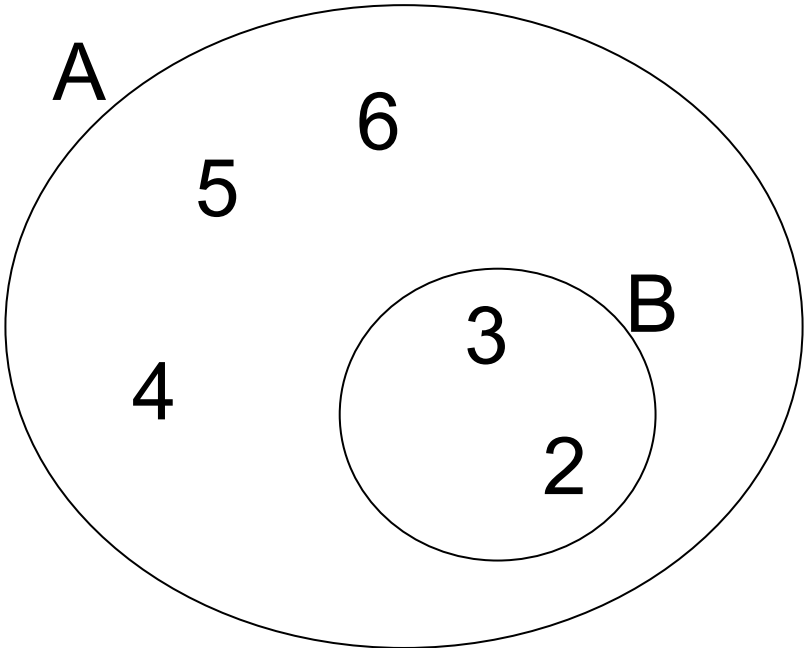
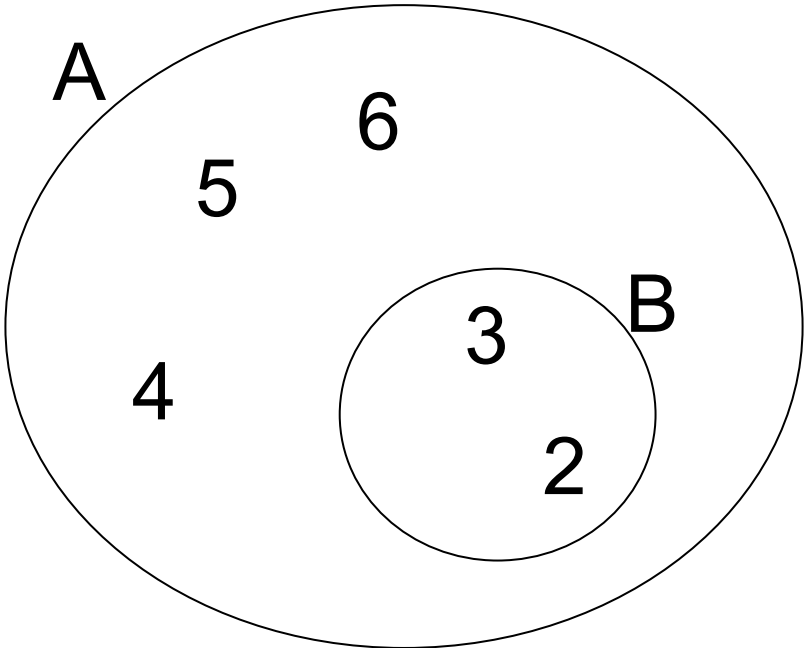


 # A =

 # B =

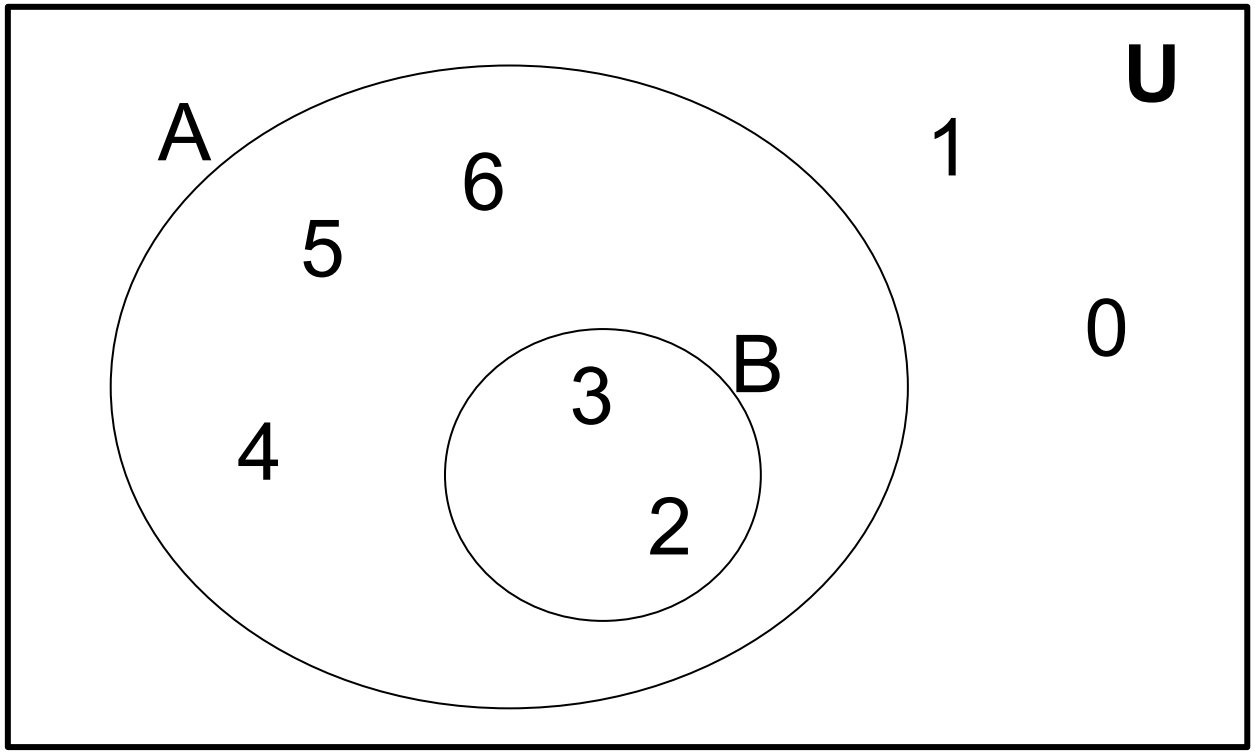
Cardinality refers to **the number of items in a set**



 # A = 5

 # B = 2

Complement of A refers to the set of items NOT in A

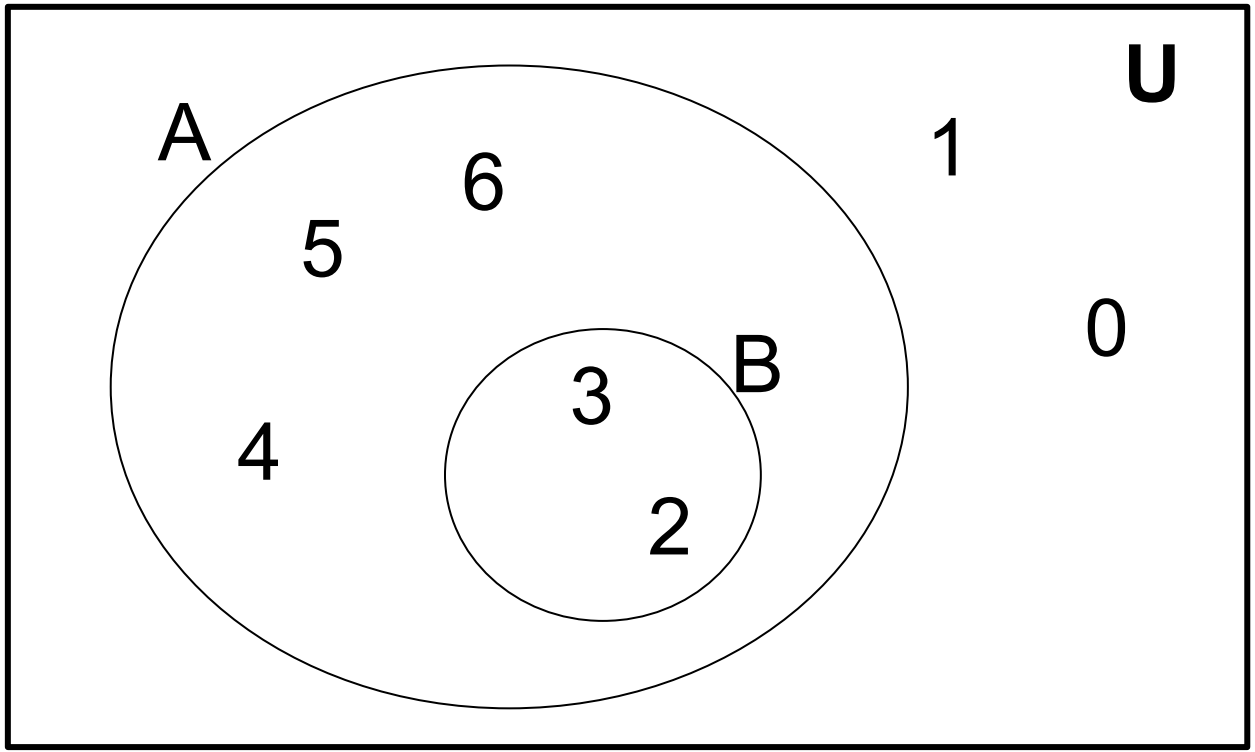


The symbol for finding the complement is an apostrophe.

A' = the set of everything NOT in A

A' =

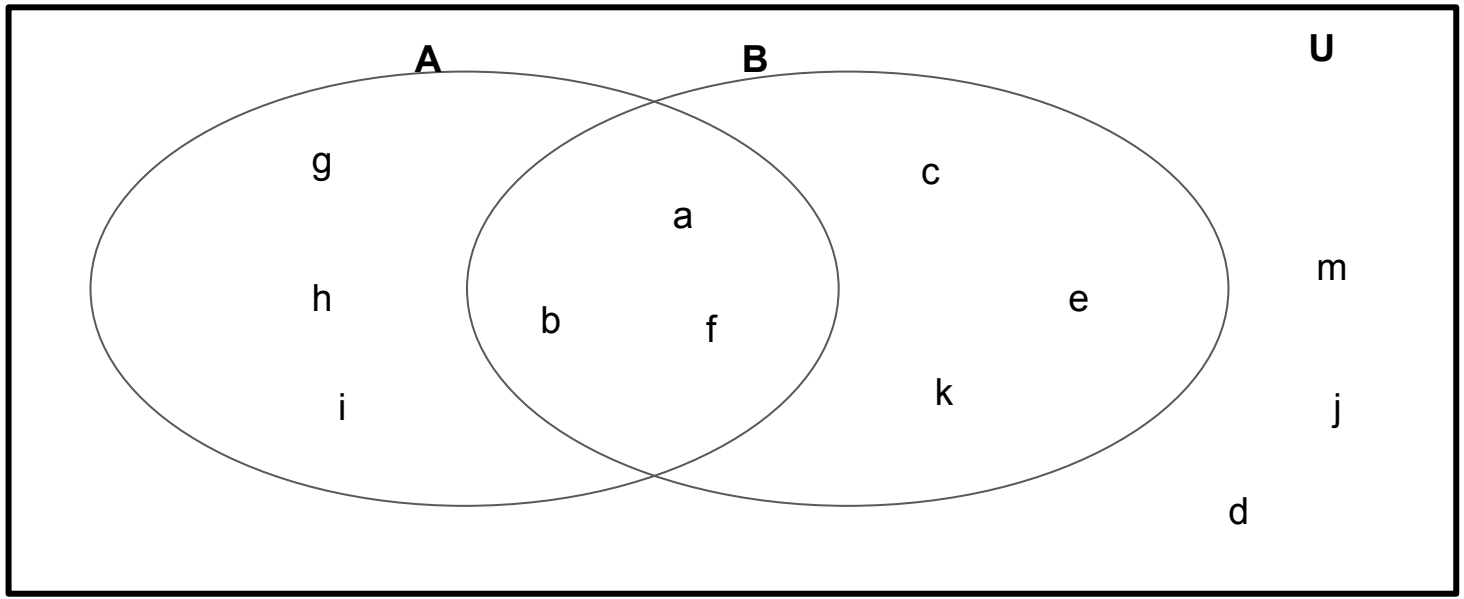
Complement of A refers to the set of items NOT in A



The symbol for finding the complement is an apostrophe.

A' = the set of everything NOT in A

A' = {3, 2}



$A' =$

$A \cup B =$

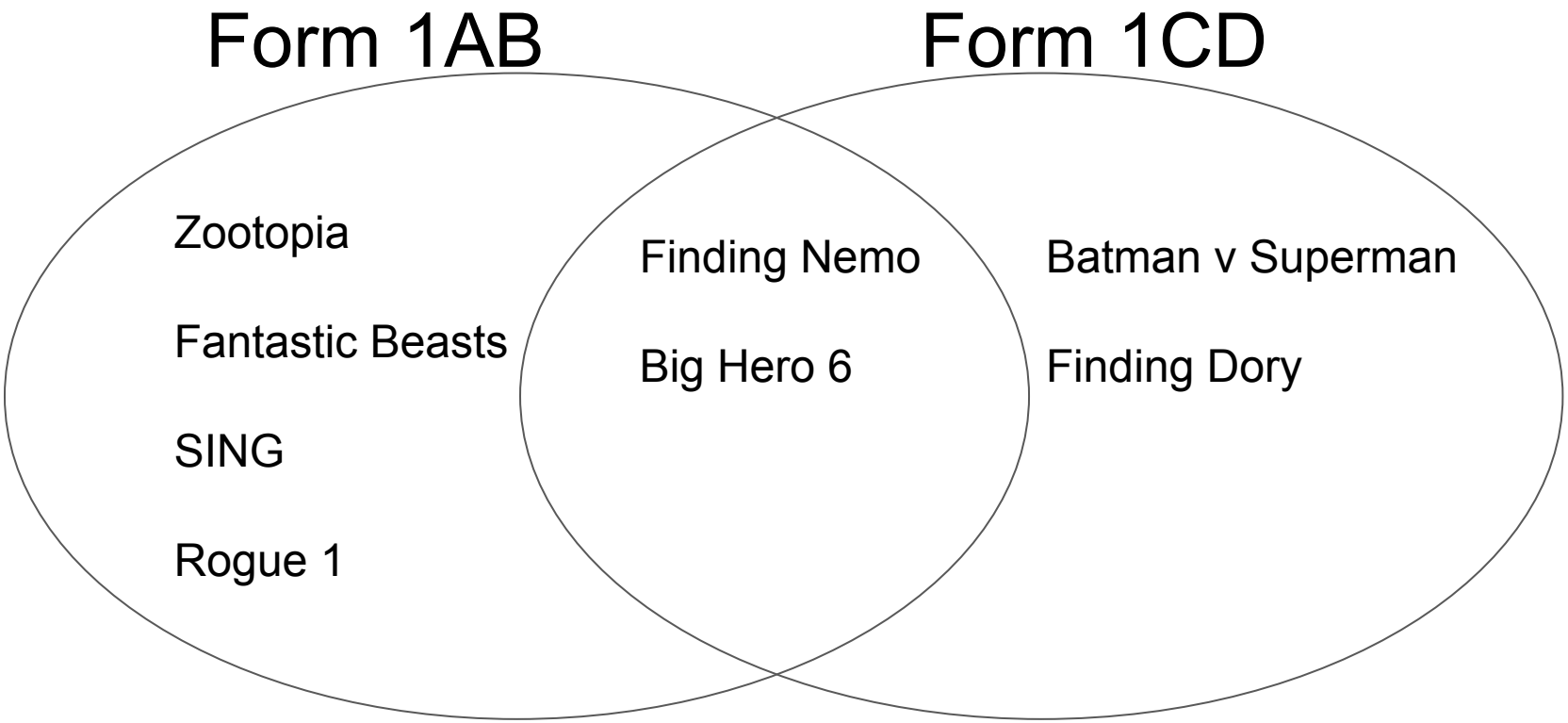
$\#A =$

$(A \cup B)' =$

$A \cap B =$

$\#(A \cap B) =$

The forms top favorite movies



1) How would you describe where *Big Hero 6* and *Finding Nemo* are?

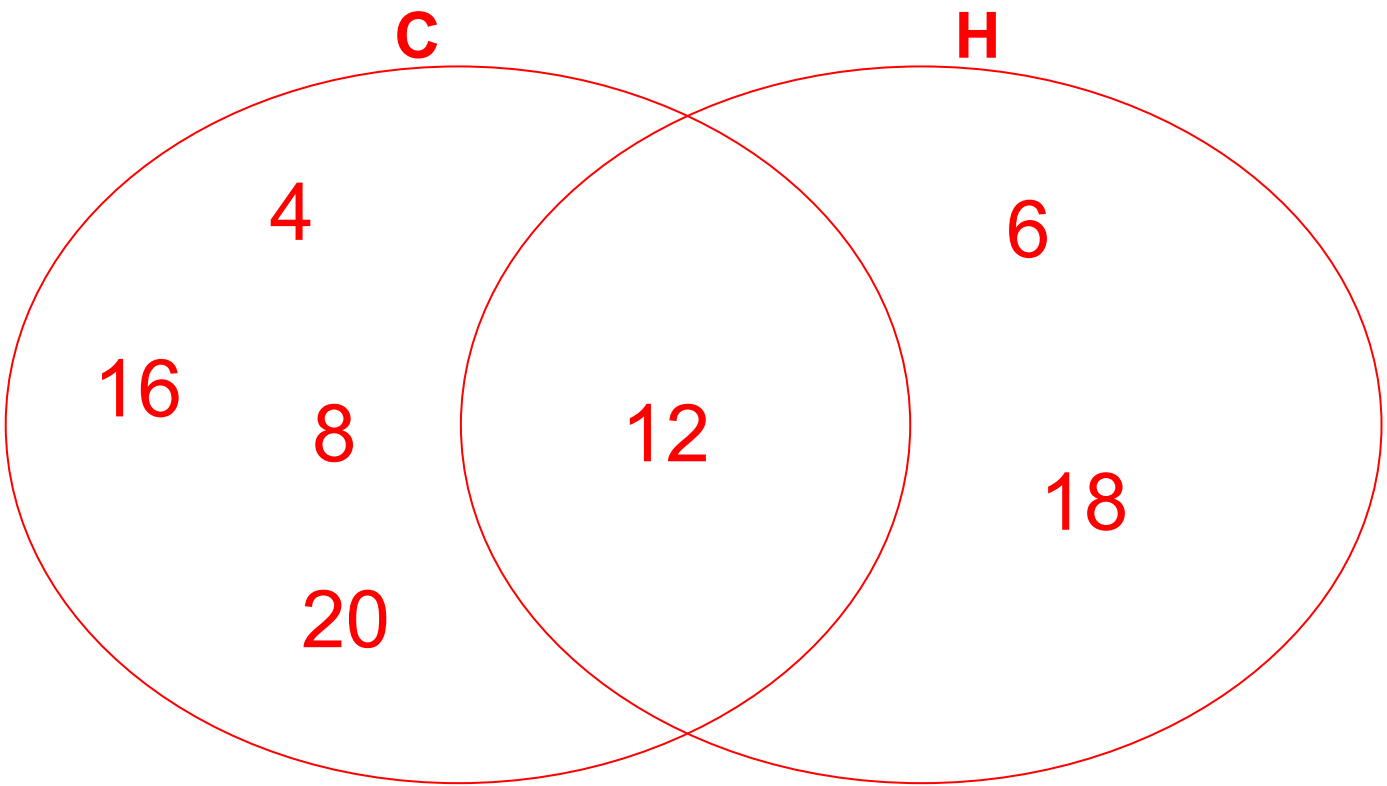
2) How would you describe where *Batman vs Superman* and *Finding Dory* are?

Put the following sets into the Venn Diagram.

$U = \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}$

$C = \{x \mid x \text{ is a multiple of } 4\}$

$H = \{x \mid x \text{ is a multiple of } 3\}$


C
H
4
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