

Sets: Words & Symbols

Name: _____ Date: _____

Instructions: Read the vocab corner first. Then **match** each symbol, decide **true or false**, and **fill in** the blanks.

Worked example

$F = \{\text{apple, banana, grape}\}$

$\text{apple} \in F$ (apple *is in* F)

$\text{carrot} \notin F$ (carrot *is not in* F)

$n(F) = 3$ (three elements)

Vocab corner

Set: a clear collection.

Element: one thing in a set.

Empty set $\emptyset$: no elements.

Finite: you can count to the end.

Equal: same elements. **Equivalent:** same number.

Part 1 · Match each symbol to its meaning

Symbol	Meaning
a) $\in$ → _____	A. union (or)
b) $\notin$ → _____	B. is a subset of
c) $\emptyset$ → _____	C. is an element of
d) U → _____	D. the cardinal number of A
e) $\cap$ → _____	E. the empty set
f) $\subseteq$ → _____	F. the complement of A
g) A' → _____	G. is not an element of
h) $n(A)$ → _____	H. intersection (and)

Part 2 · True or False? Circle T or F.

- a) A **set** is a clear collection of things. **T / F**
- b) $\{1, 2, 3\}$ and $\{3, 2, 1\}$ are **equal** sets. **T / F**
- c) The set of counting numbers $\{1, 2, 3, \dots\}$ is **finite**. **T / F**
- d) $\{a, b\}$ and $\{7, 9\}$ are **equivalent** sets. **T / F**
- e) $\emptyset$ has **one** element. **T / F**
- f) In a Venn diagram, the **rectangle** shows the universal set U . **T / F**

Part 3 · Fill in the blank

- g) A set with **no elements** is called the _____ set.
- h) Each thing in a set is called an _____ or member.
- i) The big rectangle in a Venn diagram is the _____ set, U .
- j) Sets with the **same number** of elements are _____.

Name: _____ Date: _____

Instructions: Write each set the way it asks. Use curly brackets { } and commas.

Worked example

Roster: list them → {2, 4, 6, 8}

Set-builder: give the rule →

$\{x \mid x \text{ is even, } 1 \leq x \leq 9\}$

"|" is read *such that*.

Vocab corner

Roster: list every element once.

Set-builder: describe the rule.

Cardinal number $n(A)$: how many elements.

Infinite: goes on forever (...).

Write each set

a) Write in **roster** form: the vowels in the word *MATH*.

b) Write in **roster** form: the even numbers from 1 to 10.

c) Write in **roster** form: $\{x \mid x \text{ is a whole number, } 3 < x < 8\}$

d) Write in **set-builder** form: {1, 3, 5, 7, 9}

e) Fill in $\in$ or $\notin$: 6 ___ {2, 4, 6, 8} 5 ___ {2, 4, 6, 8}

f) Find the **cardinal number**: $n(\{\text{red, blue, green, pink}\}) = \underline{\hspace{2cm}}$

g) Is it the **empty set**? $\{x \mid x \text{ is a month with 40 days}\}$

h) **Finite** or **infinite**? (i) the letters of the alphabet (ii) {5, 10, 15, 20, ...}

i) **Equal, equivalent** or neither? {1, 2, 3} and {x, y, z}

j) **Equal, equivalent** or neither? {c, a, t} and {a, c, t}

Union, Intersection & More

Name: _____ Date: _____

Instructions: Find each set. List each element **once**. Use $\emptyset$ if a set is empty.

Worked example

$$C = \{1, 2, 3\}, D = \{2, 4\}$$

$$C \cup D = \{1, 2, 3, 4\} \text{ (everything)}$$

$$C \cap D = \{2\} \text{ (only the overlap)}$$

$$C - D = \{1, 3\} \text{ (in C, not in D)}$$

Vocab corner

Union U : in A *or* B.

Intersection $\cap$: in A *and* B.

Complement A' : in U, not in A.

Difference $A - B$: in A, not in B.

Use $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{1, 2, 3, 4, 5\}$, $B = \{4, 5, 6, 7\}$

a) Union $A \cup B =$

b) Intersection $A \cap B =$

c) Complement $A' =$

d) Complement $B' =$

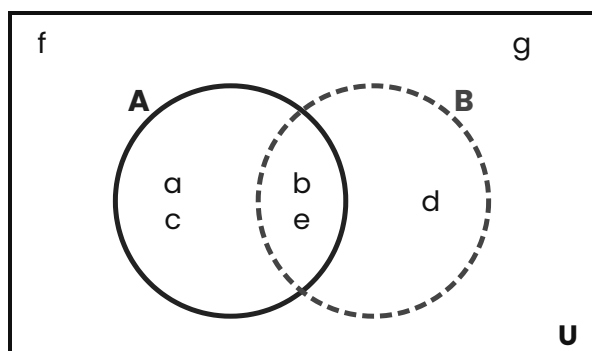
e) Difference $A - B =$

f) Difference $B - A =$

g) $n(A \cup B) = n(A) + n(B) - n(A \cap B) = ___ + ___ - ___ = ___$

h) Is $\{4, 5\}$ a **subset** of A? Is it a **proper subset**?

Read the Venn diagram



i) Write set A: _____

j) Write set B: _____

k) $A \cup B =$ _____

l) $A \cap B =$ _____

m) $A' =$ _____

n) $A - B =$ _____

Venn Diagrams: Shade It!

Name: _____ Date: _____

Instructions: **Shade** lightly with a pencil. Then answer the questions. Tip: draw a Venn diagram for the word problem.

Worked example

Shade $A \cap B$: colour only where the circles **overlap**.

Shade A' : colour everything in the rectangle **outside** circle A.

Counting: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

Vocab corner

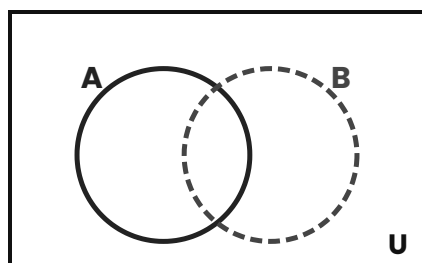
Venn diagram: rectangle = U, circles = sets.

Disjoint: nothing in common, $A \cap B = \emptyset$.

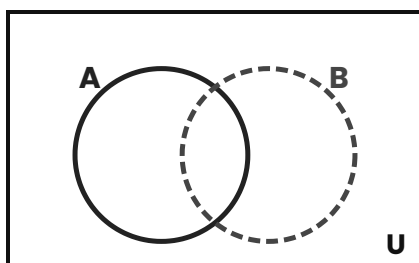
Subset $\subseteq$: every element of A is in B.

Proper subset $\subset$: a smaller subset.

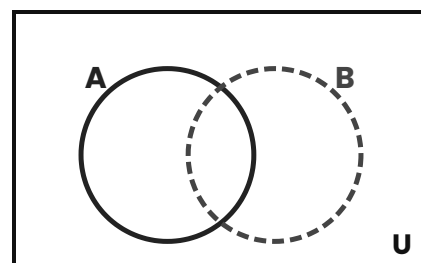
Part 1 · Shade the region for each set



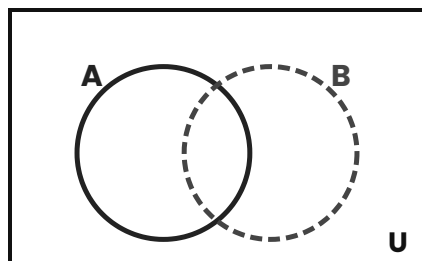
a) $A \cup B$



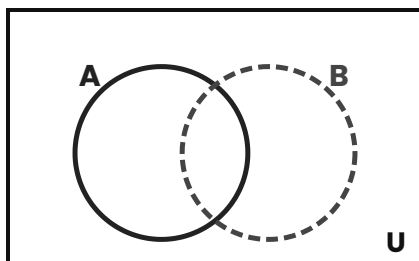
b) $A \cap B$



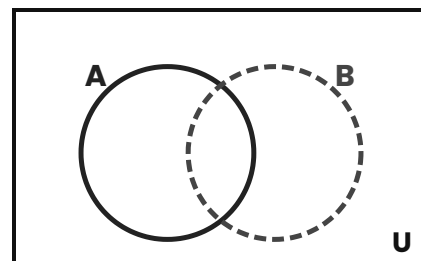
c) A'



d) $A - B$



e) $B - A$



f) $(A \cup B)'$

Part 2 · Disjoint or not?

g) {cat, dog} and {car, bus} are **disjoint**. True or False? _____

h) Give two sets that are **not disjoint**: _____

Part 3 · Word problem

In a class of **30** students, **18** play football, **15** swim, and **8** do **both**.

i) How many play football **only**? _____ j) How many swim **only**? _____

k) How many do football **or** swimming (the union)? _____ l) How many do **neither**? _____

Page 1 · Words & Symbols

- a) $\in \rightarrow \mathbf{C}$ (is an **element** of)
b) $\notin \rightarrow \mathbf{G}$ (is **not an element** of)
c) $\emptyset \rightarrow \mathbf{E}$ (the **empty set**)
d) $\cup \rightarrow \mathbf{A}$ (**union** (or))
e) $\cap \rightarrow \mathbf{H}$ (**intersection** (and))
f) $\subseteq \rightarrow \mathbf{B}$ (is a **subset** of)
g) $A' \rightarrow \mathbf{F}$ (the **complement** of A)
h) $n(A) \rightarrow \mathbf{D}$ (the **cardinal number** of A)
- a) T b) T c) F d) T e) F f) T
- g) empty ($\emptyset$) h) element i) universal j) equivalent

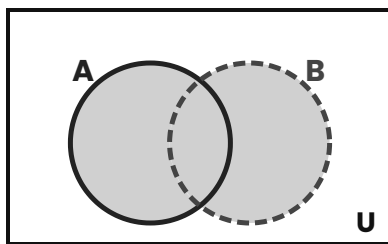
Page 2 · Writing Sets

- a) $\{a\}$
b) $\{2, 4, 6, 8, 10\}$
c) $\{4, 5, 6, 7\}$
d) $\{x \mid x \text{ is an odd number, } 1 \leq x \leq 9\}$
e) $6 \in, 5 \notin$
f) 4
g) Yes, $\emptyset$
h) (i) finite (ii) infinite
i) equivalent (not equal)
j) equal (and equivalent)

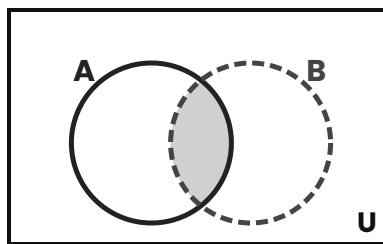
Page 3 · Union, Intersection & More

- a) $A \cup B = \{1, 2, 3, 4, 5, 6, 7\}$
 b) $A \cap B = \{4, 5\}$
 c) $A' = \{6, 7, 8, 9, 10\}$
 d) $B' = \{1, 2, 3, 8, 9, 10\}$
 e) $A - B = \{1, 2, 3\}$
 f) $B - A = \{6, 7\}$
 g) $5 + 4 - 2 = 7$
 h) Yes; yes, proper (A has more elements)
 i) $\{a, b, c, e\}$
 j) $\{b, d, e\}$
 k) $\{a, b, c, d, e\}$
 l) $\{b, e\}$
 m) $\{d, f, g\}$
 n) $\{a, c\}$

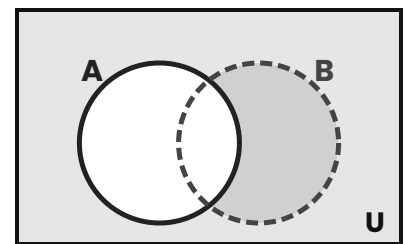
Page 4 · Shading



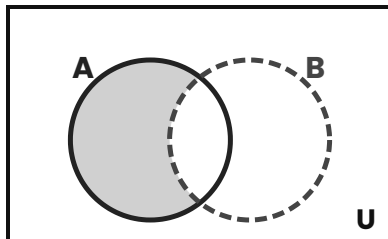
a) $A \cup B$



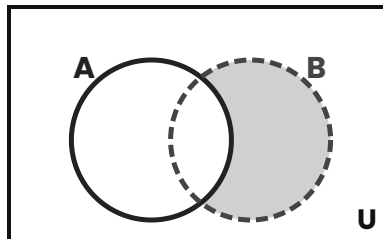
b) $A \cap B$



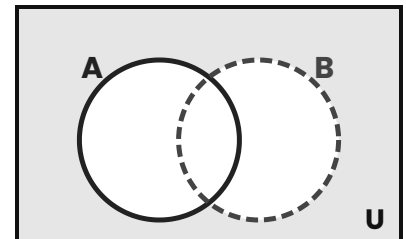
c) A'



d) $A - B$



e) $B - A$



f) $(A \cup B)'$

- g) True (nothing in common) h) Any two sets that share an element, e.g. $\{1, 2\}$ and $\{2, 3\}$
 i) $18 - 8 = 10$ j) $15 - 8 = 7$ k) $18 + 15 - 8 = 25$ l) $30 - 25 = 5$