



Set notation

Mana Maths

Te reo Māori terms



huinga

set

Open in Te Aka

tohu

notation

Open in Te Aka

pūtahi

intersection

Open in Te Aka

tūtohi

diagram

Open in Te Aka

Set notation

Set Notation



Key idea

A set is a collection of distinct items, written in curly brackets, e.g. $A = \{1, 2, 3\}$. $x \in A$ means x is in A ; $x \notin A$ means it is not.

Union and intersection

$A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5\}$.

$A \cap B = \{3, 4\}$ (in both).

$A \cup B = \{1, 2, 3, 4, 5\}$ (in either).

Complement

$U = \{1, 2, 3, 4, 5, 6\}$, $A = \{2, 4, 6\}$.

$A' = \{1, 3, 5\}$: everything in U that is not in A .

Common mistake

A set does not count repeats: $\{1, 2, 2, 3\}$ and $\{1, 2, 3\}$ are the same set.

Set notation

Subsets and Reading Notation



Key idea

$A \subset B$ means every element of A is also in B . $n(A)$ means the number of elements in A , and $\emptyset$ is the empty set.

Subset and difference

$A = \{2, 4\}$, $B = \{1, 2, 3, 4, 5\}$: $A \subset B$.

$B \setminus A = \{1, 3, 5\}$ (in B , not A).

Reading notation

$x \in A \cap B$: x is in both. $x \notin A \cup B$: x is in neither. Say each symbol as a short sentence.

Common mistake

Mixing up union and intersection – union combines, intersection keeps only the overlap.

Start Tasks



Identify elements of a set and use $\in$ / $\notin$ notation.

1. $\xi = \{1, 2, 3, \dots, 12\}$.
 $A = \{3, 6, 9, 12\}$ (multiples of 3). Is
 $6 \in A$? Is $8 \in A$?

2. Using the same set A , write
“ $10 \notin A$ ” in words.

3. Write the set
 $B = \{\text{even numbers from 1 to 10}\}$
using roster notation $\{ \}$.

4. What does the symbol $\emptyset$
represent? Give an example of a set
equal to $\emptyset$.

Start Tasks – Answers



1. Yes

4. 5

7. belongs to / is in

2. No

5. $\{2, 4, 6, 8\}$

8. is not in

3. a, e, i, o, u

6. $\{C, A, T\}$

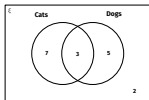
9. the empty set

Start Tasks



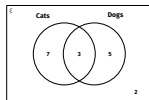
Read cardinalities directly off a Venn diagram using set notation.

5.



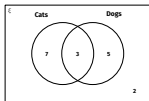
State $n(\text{Cats})$ for this diagram.

6.



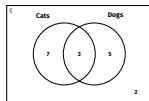
State $n(\text{Cats} \cap \text{Dogs})$.

7.



State $n(\text{Cats} \cup \text{Dogs})$.

8.



State $n(\text{Dogs}') \text{ (not Dogs)}$.

Start Tasks – Answers



10. {3}

13. Yes

16. {1, 2, 3, 6}

11. {1, 2, 3, 4, 5}

14. No

17. {3, 6, 9, 12}

12. {1, 3, 5}

15. $\emptyset$

18. 4

Start Tasks – Answers



19. $\{6, 8\}$

22. 2

25. $\{2, 3, 4\}$

20. Yes

23. 4

26. $n(\{2, 4, 6\})$

21. Example: $\{5\}$

24.
 $\{\text{January, June, July}\}$

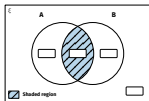
27. Example:
 $\{1, 2\} \subset \{1, 2, 3\}$

Build Tasks



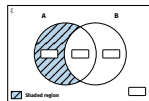
Given a shaded Venn diagram, write the matching set notation expression.

1.



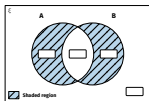
Write the notation for the shaded region.

2.



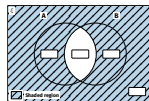
Write the notation for the shaded region.

3.



Write the notation for the shaded region (exactly one set).

4.



Write the notation for the shaded region.

Build Tasks – Answers



1. $\{3, 4\}$

4. $\{1, 3, 5\}$

7. $\{1, 2, 3, 4, 6, 12\}$

2. $\{1, 2, 3, 4, 5, 6\}$

5. **B is a subset of A**

8. $\{4, 8, 12, 16, 20, 24\}$

3. $\{1, 3, 5, 7\}$

6. **Yes, order does not matter**

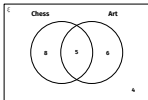
9. $\{2, 3, 5\}$

Build Tasks



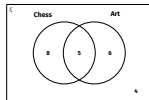
Use set notation to calculate cardinalities, including complements.

5.



State $n(\text{Chess} \cap \text{Art})'$ (everyone NOT doing both).

6.



State $n(\text{Chess} \cup \text{Art})$.

7. ξ has 30 elements. $n(A) = 18$.
Find $n(A')$.

8. $A = \{1, 2, 3, 4, 5\}$,
 $B = \{3, 4, 5, 6, 7\}$. List the elements
of $A \cap B$ and $A \cup B$.

Build Tasks – Answers



10. 3

13. $\{a, e\}$

16. $A \cap B$

11. $\{c\}$

14. $\{a, e\}$

17. $A \cup B$

12. $\{a, b, c, d, e\}$

15. $\{b, d\}$

18. A'

Build Tasks – Answers



19. 2

22. $\{1, 4, 6, 8\}$

25. Sets ignore repeats

20. 5

23. Yes

26. Example: $\{1, 3, 5, 7\}$

21. $\{2, 6\}$

24. No

27. Example: $\{1, 2\}$ and $\{2, 3, 4\}$

Push Tasks

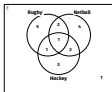


Use subset notation and reason about set relationships.

1. $A = \{2, 4, 6\}$, $B = \{1, 2, 3, 4, 5, 6\}$.
Is $A \subset B$? Justify using the elements of A .

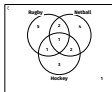
2. If $n(A) = 5$ and $n(A \cap B) = 5$, what can you conclude about A and B using subset notation? Explain.

3.



State $n(\text{Rugby} \cap \text{Netball} \cap \text{Hockey})$ for this three-set diagram.

4.



State the notation and value for exactly two sports.

Push Tasks – Answers



1. {6}

4. {1, 2, 4, 5, 7, 8, 10}

7. 7

2. {2, 3, 4, 6, 8, 9, 10}

5. {2, 4, 8, 10}

8. 2

3. {1, 3, 5, 7, 9}

6. {3, 9}

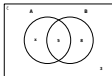
9. 4

Push Tasks



Combine complement, union, and intersection notation; critique an error.

5.



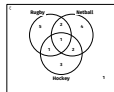
The total is 30. Find x , then state $n(A)$ using notation.

7. ξ has 40 elements. $n(A) = 22$, $n(B) = 15$, $n(A \cap B) = 8$. Find $n((A \cup B)')$.

6. A student writes

$n(A \cup B) = n(A) + n(B)$. Explain using notation why this is wrong when $A \cap B \neq \emptyset$, and give the correct formula.

8.



Is $n(\text{exactly two})$ more than $n(\text{Hockey only}) + n(\text{all three})$?

Push Tasks – Answers



10. $\{4, 6\}$

13. $n(A \cup C)$

16. $A \setminus B$

11. $\{3, 4\}$

14. x is in both A and B

17. $(A \cup B)'$

12. $\{3, 4, 6, 8\}$

15. x is in neither A nor B

18. 4

Push Tasks – Answers



19. $\{3, 4, 5, 6, 7, 8\}$

22. Only the shared elements

25. Example: $U = \{1, 2, 3, 4\}, A = \{2, 3\}$

20. $\{5\}$

23. Union combines; intersection keeps only overlap

26. Example: $A = \{1, 2\}, B = \{1, 2, 3, 4\}$

21. $\{6, 7, 8\}$

24. Example:
 $A = \{1\}, B = \{2\}$

27. Example:
 $A = \{1, 2\}, B = \{2, 3\}, C = \{1, 3\}$