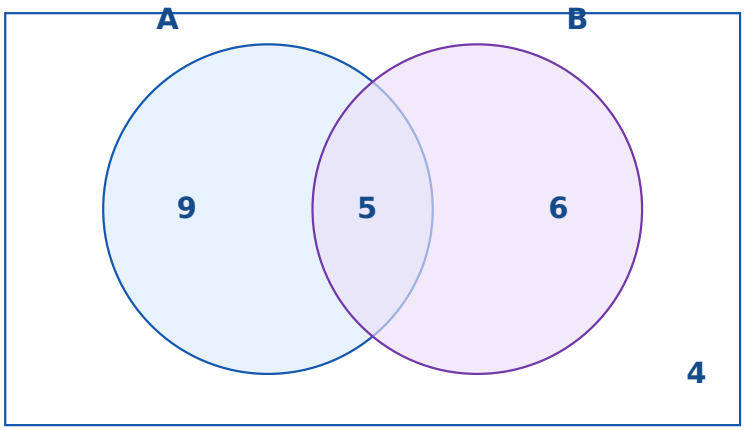
Two-set Venn diagrams

Start by filling in the overlap. “Or” includes people in both sets.



The middle belongs to both sets. The 4 is outside both, but inside the universal set.

In a class of 24, 14 play A, 11 play B and 5 play both. How many play neither?

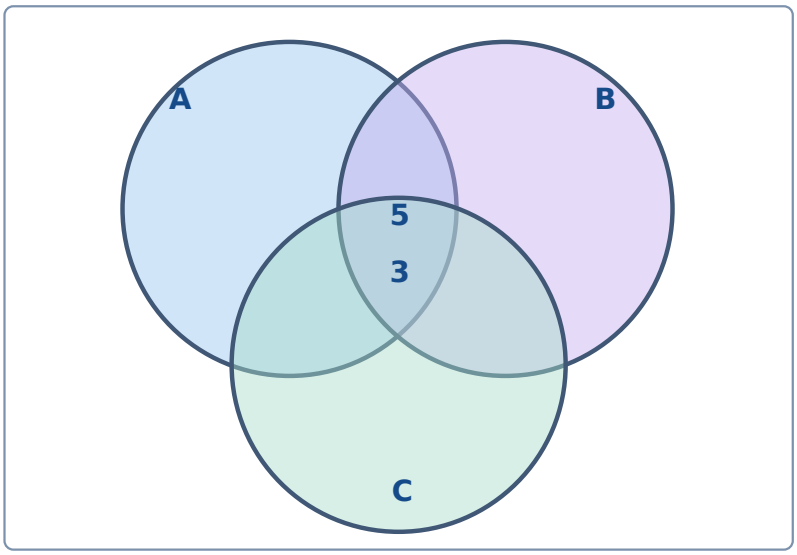
$14-5=9$	These play only A.
$11-5=6$	These play only B.
$9+5+6=20$	The union counts each person once.
$24-20=4$	

Remember

Intersection = common members; union = all members of either set; complement = outside the set but inside the universal set.

Three sets and notation

Fill the centre first, then the pair-only regions, then the single-only regions.



The 5 is in A and B only. The 3 in the centre is in all three sets.

A and B have 8 members in common. Of these, 3 also belong to C. Find the number in A and B but not C.

$\#(A \cap B) = 8$	The pair intersection includes the centre.
$\#(A \cap B \cap C) = 3$	Subtract the triple intersection.

$8 - 3 = 5$

Remember

∈ means “is a member of”; ⊂ means “is a subset of”; ∅ means empty set. ∩ and ∪ are commutative and associative; set difference is neither.

Does order matter in a set operation?

Commutative means swapping operands. Associative means moving brackets without swapping operands.

Use A = {1, 2}, B = {2, 3}, C = {2, 4}. Compare the two bracketings of intersection, and compare the two orders of set difference.

$(A \cap B) \cap C = \{2\}$	Intersect A and B first.
$A \cap (B \cap C) = \{2\}$	Intersect B and C first.
$A \setminus B = \{1\}, \quad B \setminus A = \{3\}$	Keep only members of the first set that are not in the second.

Intersection matches; difference does not.

Remember

This verifies the associative rule for this example. A single counterexample is enough to show that difference is not commutative. Try the same bracket test for union.

Sets

Try the questions before opening the separate answer key. Show one step per line.

9.1 · Fluency

If A = {1, 2, 4} and B = {2, 3}, find A ∩ B and A ∪ B.

9.2 · Variation

With those same sets and C = {2, 4, 5}, find (A ∪ B) ∩ C.

9.3 · Choose a method

There are 30 students. 18 play music, 13 play sport and 6 do both. How many do neither?

Check your work: are the sign, units and level of accuracy appropriate?