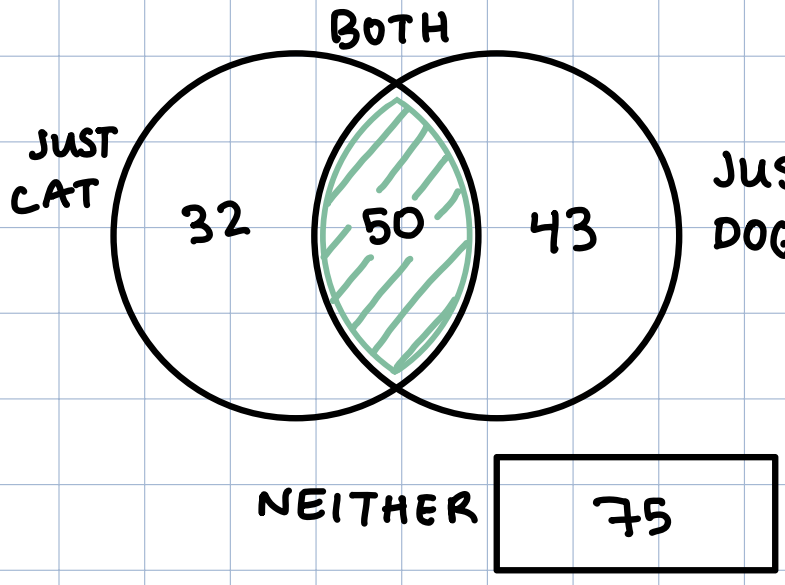
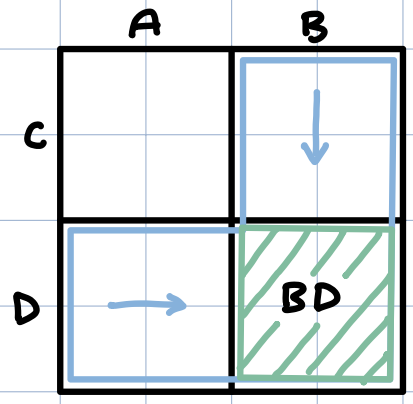
	1+ CATS	NO CATS	
1+ DOGS	50	43	93
NO DOGS	32	75	107
	82	118	200



- both venn diagrams and 2-way tables show intersections
- to find the intersection in a 2-way table, follow the rows to where they meet - at the intersection of two variables



← example of finding the intersection of B & D by using rows

- to find the union of two events using a 2-way table, you can easily input data

from the table into the equation:

$$P(A \cup B) = (P(A) + P(B)) - P(A \cap B)$$

	1+ CATS	NO CATS	
1+ DOGS	50	43	93
NO DOGS	32	75	107
	82	118	200

example:

$P(1+C) + P(NO\cdot D) - P(1+C \cap NO\cdot D) = P(1+C \cup NO\cdot D)$

$P(\frac{82}{200}) + P(\frac{107}{200}) - P(\frac{32}{200}) = \frac{157}{200}$

$P(1+CATS \cup NO\ DOGS) = \frac{157}{200}$

to find these fractions, take the total number of a certain variable (for example, the total number of B in the graph below is 16 people. And for F, 19 people. Then, put that number over the overall total, so you get $\frac{16}{45}$ and $\frac{19}{45}$.

	A	B	C	
D	2	1	7	10
E	3	9	4	16
F	8	6	5	19
	13	16	16	45

- to determine conditional probability with a 2-way table, use the $P(A \cap B)$ but put the total of the variable as the denominator (instead of the complete total): $\frac{P(A \cap B)}{\text{Total of A or B}}$

	1+ CATS	NO CATS	
1+ DOGS	50	43	93
NO DOGS	32	75	107
	82	118	200

example:

what percentage of cat owners also own dogs?

$$P(1+C \cap 1+D) = \frac{50}{200}$$

this is the intercept of 1+C and 1+D

$$\frac{50}{200} \rightarrow \frac{50}{82} \approx 61\%$$

- 82 is the total number of cat owners, and since the question wants to know the percentage of dog owners out of cat owners, the denominator must be the total number of cat owners.