Probability from a Venn diagram

Worked example

In a class of 20 students (E)
- 10 people have cats (C)
- 12 people have dogs (D)
- 4 people have neither

\[ E \cap C = 4 \]
\[ E \cap D = 4 \]
\[ C \cap D = 6 \]
\[ E \cup C \cup D = 16 \]

a) Complete the Venn diagram

- We know that 4 people have neither so that can go outside
- We can now subtract 4 from the total (20 - 4 = 16)

As we have now finished with this number,
- We were told that 10 people have cats and 12 have dogs. In it is: 4, which goes over the people of how we had left. (16). This means that some people must have a cat and a dog. To get this number we can do
- \[ 22 - 16 = 6 \]
- 6 people have both pets.
- We already know that 10 people have cats. To find the amount of people that have only cats, we can do 10 - 6 (the number from the middle) to get 4. Repeat with the other sides.
- To check, add all numbers in the Venn diagram. You should get the original total of 20.

b) Find the probability that a student chosen at random owns a cat and a dog.