

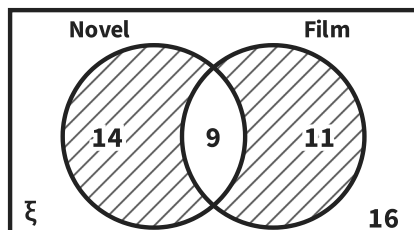
Conditional Probability: Venn Diagrams *stretch*

ANSWERS

1



The Venn diagram shows 50 members of a book club. A member is chosen at random. Given that they did exactly one of the two, find the probability that they read the novel.



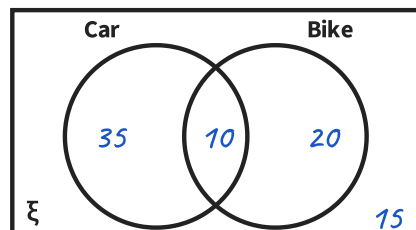
$$14 \text{ out of } 14 + 11 = 25$$

Answer $\frac{14}{25}$

2



Of 80 people, 45 own a car, 30 own a bike and 15 own neither. Complete the Venn diagram. Given that a person owns a bike, find the probability that they also own a car.



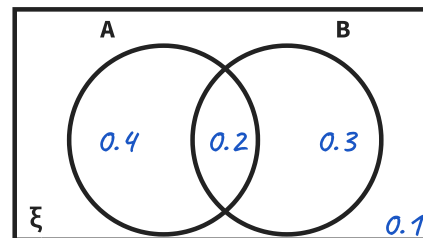
$$45 + 30 + 15 - 80 = 10 \text{ own both; } \frac{10}{30}$$

Answer $\frac{1}{3}$

3



$P(A) = 0.6$, $P(B) = 0.5$ and the probability of neither A nor B is 0.1. Complete the Venn diagram with probabilities. Find the probability of B given A.



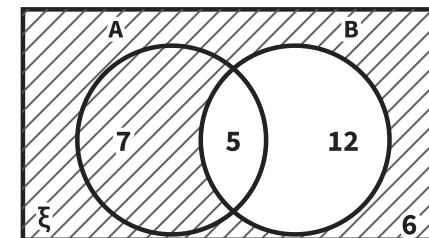
$$P(A \cap B) = 0.2, \text{ so } 0.2 \div 0.6$$

Answer $\frac{1}{3}$

4



The Venn diagram shows 30 people. B' means not in B. Find $P(A | B')$, the probability that a person is in A given that they are not in B.



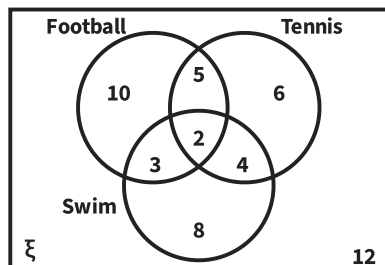
$$\text{outside B: } 7 + 6 = 13$$

Answer $\frac{7}{13}$

5



The Venn diagram shows the sports 50 students play. Given that a student plays exactly two, find the probability that they play football and tennis.



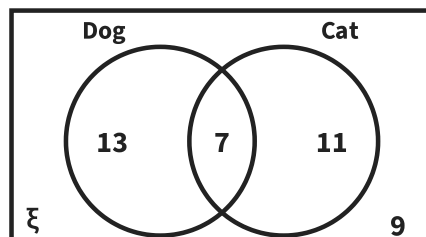
$$\text{exactly two: } 5 + 3 + 4 = 12$$

Answer $\frac{5}{12}$

6



Given that a person has a cat, Ben finds the probability that they have a dog. He writes $\frac{7}{40}$. Explain his mistake and find the correct probability.



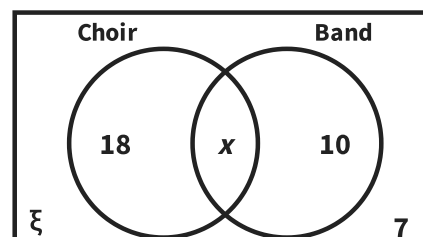
$$\text{the condition shrinks the group to the 18 with a cat, not all 40}$$

Answer $\frac{7}{18}$

7



Given that a student is in the choir, the probability that they are also in the band is $\frac{1}{4}$. Find x , then the probability that a student in the band is also in the choir.



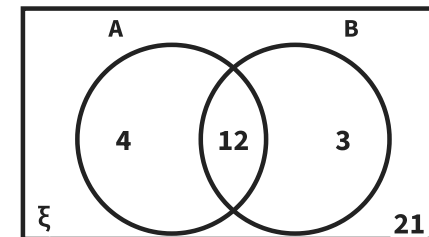
$$\frac{x}{18+x} = \frac{1}{4}, \text{ so } 4x = 18 + x$$

Answer $x = 6, \frac{3}{8}$

8



Asha says that knowing a person is in B can never make it more likely that they are in A. Use the Venn diagram to show that she is wrong.



$$P(A) = \frac{16}{40}, P(A | B) = \frac{12}{15}$$

Reason $P(A) = \frac{2}{5}$ but $P(A | B) = \frac{4}{5}$