

Venn Diagrams, Sample Space Diagrams and Combined Events

Year 11 · Probability · y11-prob

Name: _____

Date: _____

Class: _____

Score: ____ / ____

Instructions

Answer every question in Practice. Try the Challenge section once Practice is complete. 10 questions in total.

Practice

1. A universal set has $n(x_i) = 30$. $n(A) = 15$, $n(B) = 10$, $n(A \text{ intersect } B) = 4$. Using $n(A \text{ union } B) = n(A) + n(B) - n(A \text{ intersect } B)$, what is $n(A \text{ union } B)$?
2. Two dice are rolled. Using a sample space diagram of all 36 equally likely outcomes, how many outcomes give a total of 8? (pairs: 2+6, 3+5, 4+4, 5+3, 6+2)
3. $P(A) = 0.4$ and $P(B) = 0.3$, and A, B are independent. Using $P(\text{exactly one}) = P(A) \times P(B') + P(A') \times P(B)$, what is $P(\text{exactly one of A or B happens})$?
4. A universal set has $n(x_i) = 30$. $n(A) = 15$, $n(B) = 10$, $n(A \text{ intersect } B) = 4$, so $n(A \text{ union } B) = 21$. What is $n((A \text{ union } B)')$, the number of elements in neither A nor B?
5. Two dice are rolled. Using a sample space diagram of all 36 outcomes, how many outcomes give a total of 5? (pairs: 1+4, 2+3, 3+2, 4+1)
6. $n(A \text{ union } B)$ counts every element in A or B once, so subtract the overlap $n(A \text{ intersect } B)$ once: $n(A \text{ union } B) = n(A) + n(B) - n(A \text{ intersect } B)$. $n(A) = 12$, $n(B) = 9$, $n(A \text{ intersect } B) = 3$. What is $n(A \text{ union } B)$?
7. List every ordered pair systematically to avoid missing outcomes in a sample space diagram. Two dice are rolled. How many of the 36 outcomes give a total of 7? (pairs: 1+6, 2+5, 3+4, 4+3, 5+2, 6+1)
8. "Exactly one" means A happens and B doesn't, OR B happens and A doesn't — you must add both cases. $P(A) = 0.5$, $P(B) = 0.2$, independent. What is $P(\text{exactly one of A or B})$?

Challenge

1. A universal set has $n(\xi) = 35$. $n(A) = 18$, $n(B) = 15$, $n(A \cap B) = 7$. What is $n((A \cup B)')$, the number of elements in neither A nor B?

2. Two independent events have $P(A) = 0.3$ and $P(B) = 0.6$. What is $P(\text{exactly one of A or B happens})$?
