



# ASQ CRE Prep course

Lesson II. A. 2. a.

Basic Probability Concepts

Probability

A serene sunset scene over a vast ocean. The sun is a bright, glowing orb in the upper center, casting a shimmering path of light across the water's surface. Several birds are silhouetted against the sky, and dark rocks are visible in the foreground. The overall mood is peaceful and contemplative.

Let's calculate the odds

# BASIC PROBABILITY CONCEPTS



# Conditions for Probability

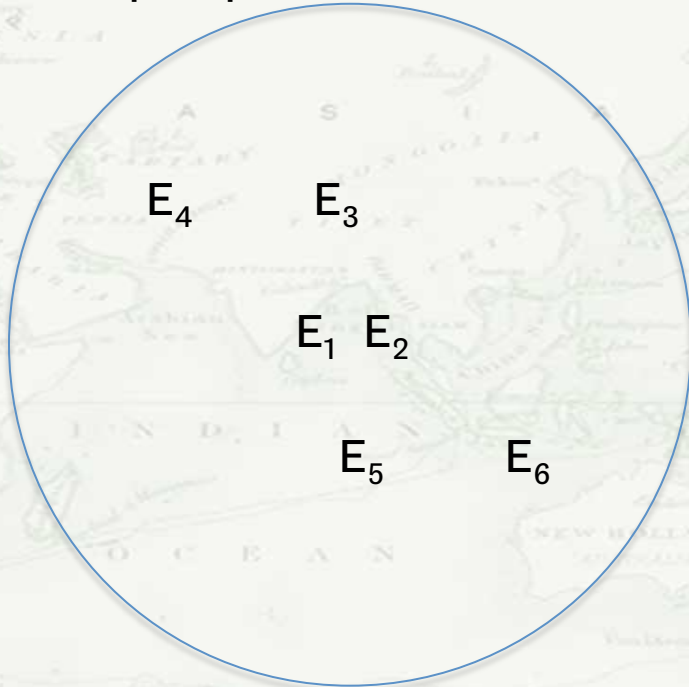
- **The probability of an event,  $E$ , lies between zero and one**
- **The sum of the probabilities of all possible events in the sample space,  $S$ , is one**
- **A fair coin**
- **A fair 6-sided die**
- **A product chance to survive a year**

# Union

Sample space,  $S$

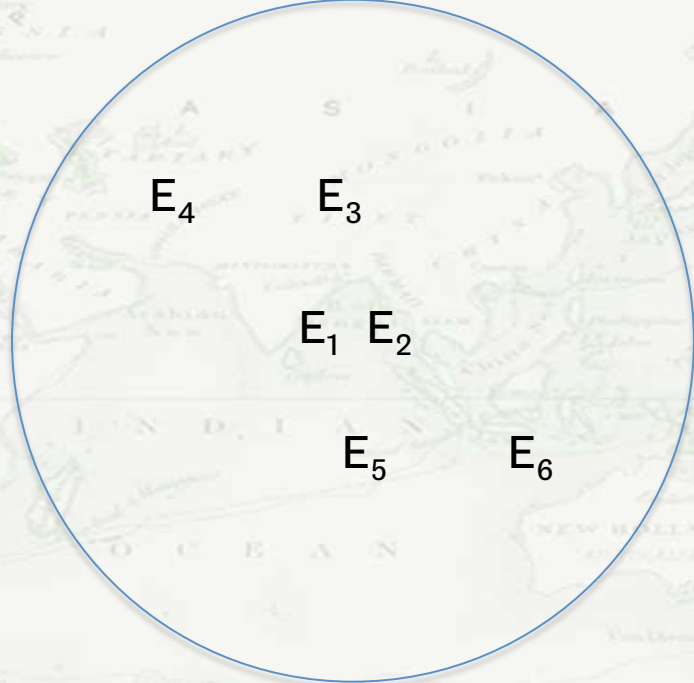
If  $A$  and  $B$  are two events in a sample space,  $S$ , the union of  $A$  and  $B$  contains all sample points in event  $A$  or  $B$  or both.

Which Events,  $E$ 's, are in  $A \cup B$ ?



# Intersection

Sample space,  $S$

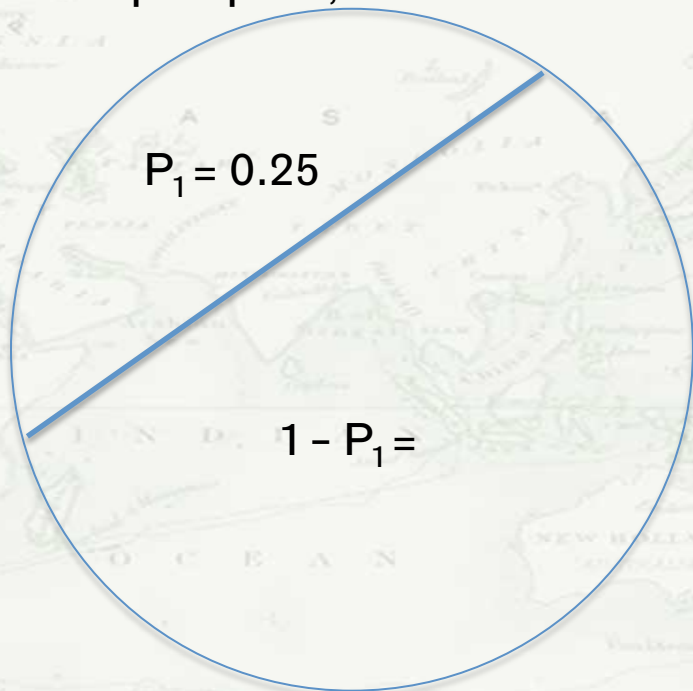


If  $A$  and  $B$  are two events in a sample space,  $S$ , the intersection of  $A$  and  $B$  is composed of all sample points that are in both  $A$  and  $B$ .

Which Events,  $E$ 's, are in  $A \cap B$ ?

# Complement

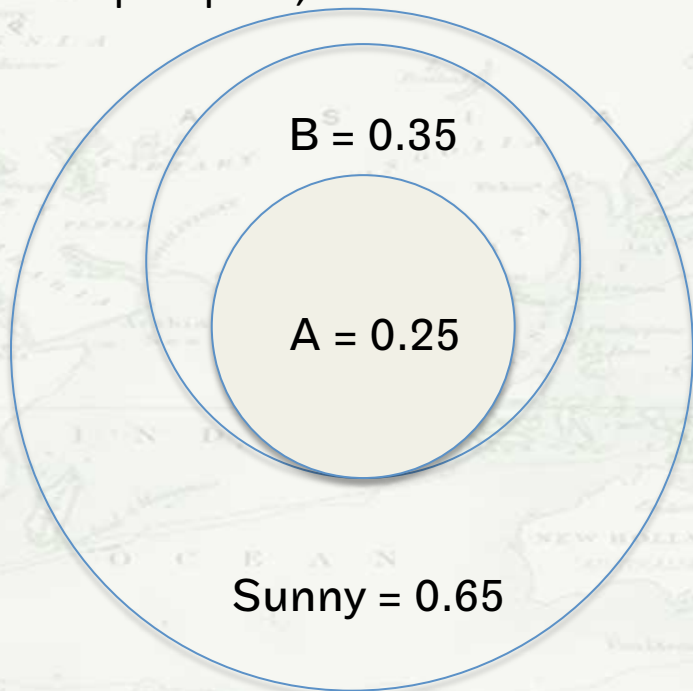
Sample space,  $S$



The complement of an event  $A$  is all sample points in the sample space,  $S$ , but not in  $A$ .

# Conditional

Sample space, S

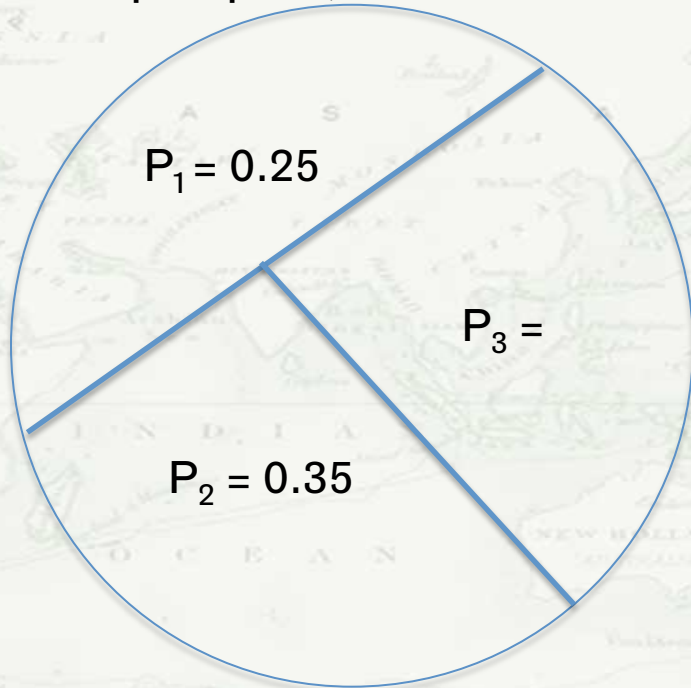


The conditional probability of event A given That B has occurred is:

$$P(A|B) = \frac{P(A \cap B)}{P(B)}, P(B) \neq 0$$

# Mutually Exclusive

Sample space, S



If two events are mutually exclusive when  
They do not share any sample points



# Independent

**Two events are independent when**

$$P(A \cap B) = P(A) \times P(B)$$

$$P(A | B) = P(A)$$

Is this coming back  
to you?

Don't Panic



# ASQ CRE Prep course

Lesson II. A. 2. b.

Basic Probability Concepts

Laws and Counting