

# Chapter 6

- Purpose:
  - Partitions
  - Tree Diagrams
  - Bayes' Theorem
  - Project Work

# Section 6-1: Partitions

A set of events form a partition if and only if both of the following conditions are true:

- a. No two events can happen at the same time
- b. All events combined make up the sample space. One of the events must occur.

Mathematically a partition can be defined as:

- a.  $P(A_i \cap A_j) = 0$ , meaning disjoint or mutually exclusive.
- b.  $P(A_1 \cup A_2 \cup A_3 \dots \cup A_n) = 1$ , meaning all the partitions make up the sample space.

See Example 2 (p. 98)

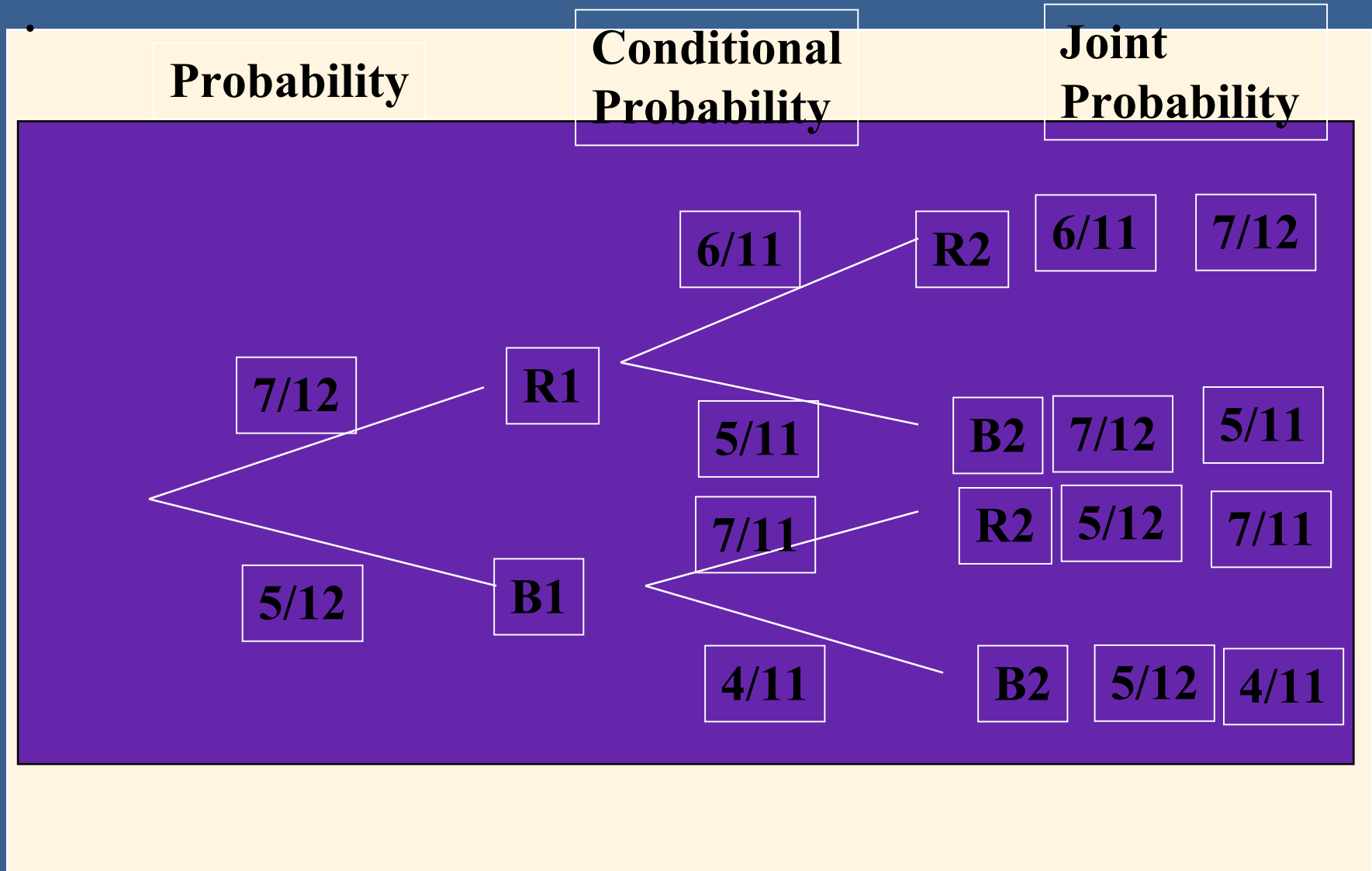
## Section 6-2: Tree Diagrams

- A tree diagram is a useful tool in probability because it allows you to “map out” all the possible events.
- Tree diagrams can map out:
  - Probabilities:  $P(A)$
  - Conditional Probabilities:  $P(A|B)$
  - Joint Probabilities:  $P(A \cap B)$

# Tree Diagram Example

- You have a bag of marbles: 7 red and 5 blue.
  - What is the probability of getting two reds if you don't replace the marble taken?
  - What about two blues?
  - What about a blue and then a red?
  - What if you replace the first marble, how does this change the probability?

# A Tree Diagram



# Bayes' Theorem

- You have a bag of marbles: 7 red and 5 blue.