

## 4.E: Probability Using Tree Diagrams and Combinations (Optional Exercises)

### SECTION 8.3 PROBLEM SET: PROBABILITIES USING TREE DIAGRAMS AND COMBINATIONS

Two apples are chosen from a basket containing five red and three yellow apples.

Draw a tree diagram below, and find the following probabilities.

1) $P(\text{both red})$	2) $P(\text{one red, one yellow})$
3) $P(\text{both yellow})$	4) $P(\text{First red and second yellow})$

A basket contains six red and four blue marbles. Three marbles are drawn at random.

Find the following probabilities using the method shown in Example 8.3.2. Do not use combinations.

5) $P(\text{All three red})$	6) $P(\text{two red, one blue})$
7) $P(\text{one red, two blue})$	8) $P(\text{first red, second blue, third red})$

Three marbles are drawn from a jar containing five red, four white, and three blue marbles.

Find the following probabilities using combinations.

9) $P(\text{all three red})$	10) $P(\text{two white and 1 blue})$
11) $P(\text{none white})$	12) $P(\text{at least one red})$

A committee of four is selected from a total of 4 freshmen, 5 sophomores, and 6 juniors. Find the probabilities for the following events.

13) At least three freshmen.	14) No sophomores.
15) All four of the same class.	16) Not all four from the same class.
17) Exactly three of the same class.	18) More juniors than freshmen and sophomores combined.

Five cards are drawn from a deck. Find the probabilities for the following events.

19) Two hearts, two spades, and one club.	20) A flush of any suit ( <i>all cards of a single suit</i> ).
21) A full house of nines and tens ( <i>3 nines and 2 tens</i> ).	22) Any full house.
23) A pair of nines and a pair of tens ( <i>and the fifth card is not a nine or ten</i> ).	24) Any two pairs ( <i>two cards of one value, two more cards of another value, and the fifth card does not have the same value as either pair</i> ).

Jorge has 6 rock songs, 7 rap songs and 4 country songs that he likes to listen to while he exercises.

He randomly selects six (6) of these songs to create a playlist to listen to today while he exercises.

Find the following probabilities:

25) $P(\text{playlist has 2 songs of each type})$	26) $P(\text{playlist has no country songs})$
27) $P(\text{playlist has 3 rock, 2 rap, and 1 country song})$	28) $P(\text{playlist has 3 or 4 rock songs and the rest are rap songs})$

A project is staffed 12 people: 5 engineers, 4 salespeople, and 3 customer service representatives.

A committee of 5 people is selected to make a presentation to senior management.

Find the probabilities of the following events.

29) The committee has 2 engineers, 2 salespeople, and 1 customer service representative.

31) The committee has no engineers.

30) The committee contains 3 engineer and 2 salespeople.

32) The committee has all salespeople.

Do the following birthday problems.

33) If there are 5 people in a room, what is the probability that no two have the same birthday?

34) If there are 5 people in a room, find the probability that at least 2 have the same birthday.

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