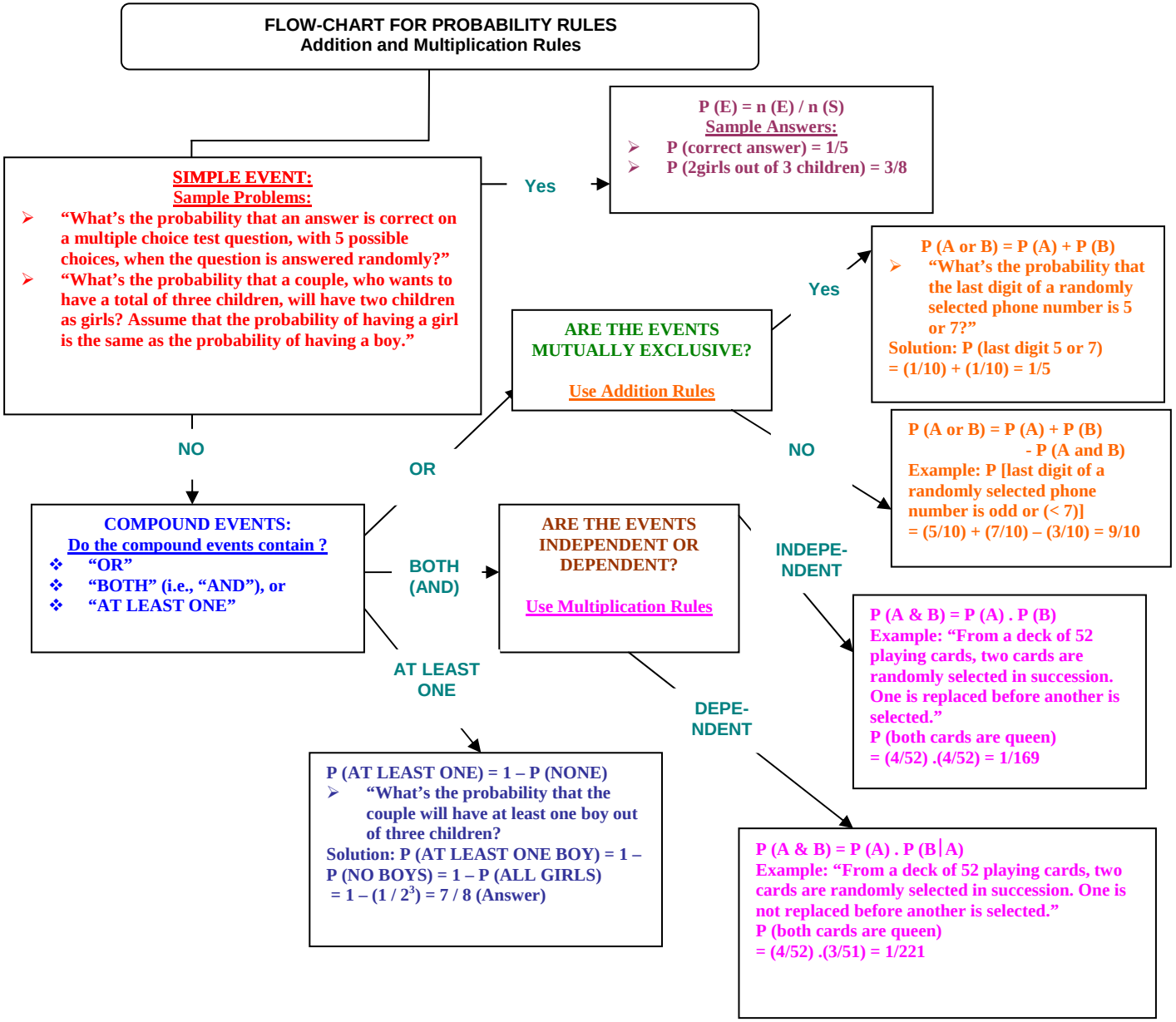
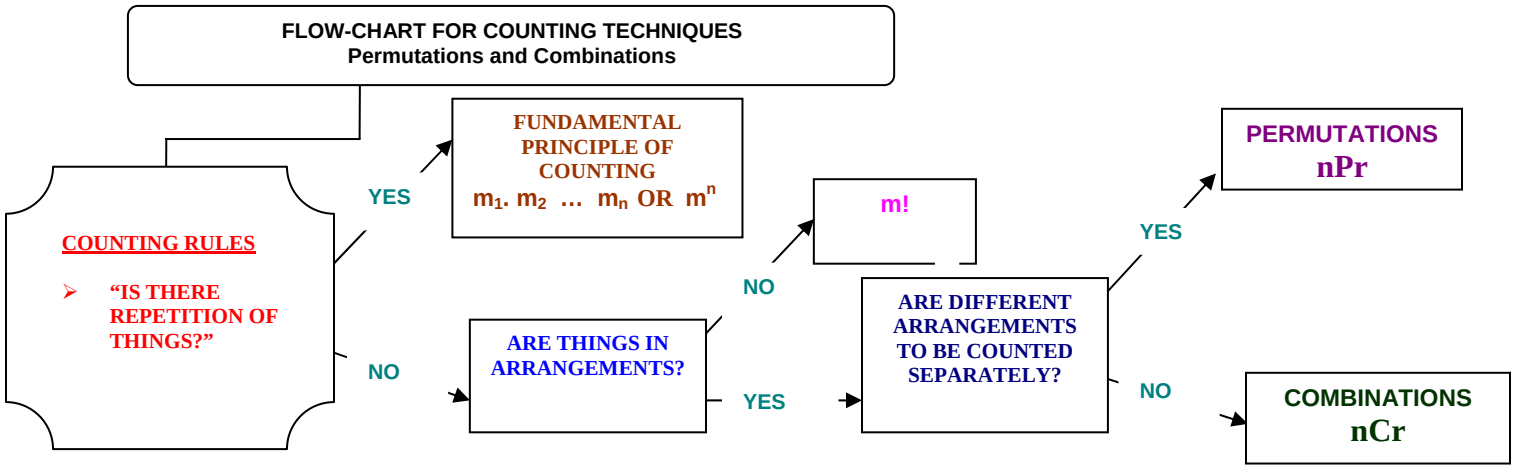

FLOW-CHART FOR PROBABILITY RULES
Addition and Multiplication Rules
SIMPLE EVENT:
Sample Problems:
"What's the probability that an answer is correct on a multiple choice test question, with 5 possible choices, when the question is answered randomly?"
"What's the probability that a couple, who wants to have a total of three children, will have two children as girls? Assume that the probability of having a girl is the same as the probability of having a boy."
Yes
P (E) = n (E) / n (S)
Sample Answers:
P (correct answer) = 1/5
P (2girls out of 3 children) = 3/8
NO
COMPOUND EVENTS:
Do the compound events contain ?
"OR"
"BOTH" (i.e., "AND"), or
"AT LEAST ONE"
OR
ARE THE EVENTS MUTUALLY EXCLUSIVE?
Use Addition Rules
Yes
P (A or B) = P (A) + P (B)
"What's the probability that the last digit of a randomly selected phone number is 5 or 7?"
Solution: P (last digit 5 or 7)
= (1/10) + (1/10) = 1/5
NO
P (A or B) = P (A) + P (B)
- P (A and B)
Example: P [last digit of a randomly selected phone number is odd or (< 7)]
= (5/10) + (7/10) – (3/10) = 9/10
BOTH (AND)
ARE THE EVENTS INDEPENDENT OR DEPENDENT?
Use Multiplication Rules
INDEPE-NDENT
P (A & B) = P (A) . P (B)
Example: "From a deck of 52 playing cards, two cards are randomly selected in succession. One is replaced before another is selected."
P (both cards are queen)
= (4/52) .(4/52) = 1/169
AT LEAST ONE
P (AT LEAST ONE) = 1 – P (NONE)
"What's the probability that the couple will have at least one boy out of three children?
Solution: P (AT LEAST ONE BOY) = 1 – P (NO BOYS) = 1 – P (ALL GIRLS)
= 1 – (1 / 2³) = 7 / 8 (Answer)
DEPE-NDENT
P (A & B) = P (A) . P (B|A)
Example: "From a deck of 52 playing cards, two cards are randomly selected in succession. One is not replaced before another is selected."
P (both cards are queen)
= (4/52) .(3/51) = 1/221


FLOW-CHART FOR COUNTING TECHNIQUES
Permutations and Combinations
COUNTING RULES
➢ "IS THERE REPETITION OF THINGS?"
YES
FUNDAMENTAL PRINCIPLE OF COUNTING
$m_1 . m_2 \ldots m_n$ OR m^n
NO
ARE THINGS IN ARRANGEMENTS?
NO
m!
YES
ARE DIFFERENT ARRANGEMENTS TO BE COUNTED SEPARATELY?
YES
PERMUTATIONS
nPr
NO
COMBINATIONS
nCr