Example 2: How many committees of three people can be selected from a class of 20 students?

$nCr = \frac{n!}{r!(n-r)!}$ $n=20$ $r=3$

$= \frac{20!}{3!(20-3)!} = \frac{20!}{3!17!} = 1140$ ways

Example 3: There are 15 engineers and 12 chemists at an oil company.

a) Determine the number of five-person committees that can be formed from this company.

nCr

$27C_5 = 80730$ ways

b) Determine the number of five-person committees that can be formed if there must be exactly 3 engineers on the committee.

Engineer $15C_3 = 455$ ways

Physics $12C_3 = 66$ ways

number $= 5 \times 3 = 15$ $n=15$ $r=3$

$455 \times 66 = 30030$ ways

Example 4: A school principal is selecting students from a group of volunteers to organize a social event. There are 12 students in a group, 8 students from Class A and 4 students from Class B.

a) How many different groups of 5 students can be created if there are no restrictions?

$12C_5 = 792$

b) How many different groups of 5 students are possible which include at least 1 student from Class B?

Case I: Class B — Class A

$4C_1 \times 8C_4 = 280$ (4) (70)

Case II: $4C_2 \times 8C_3 = 336$ (6) (56)

(3) $4C_3 \times 8C_2 = 112$ (4) × (28)

(4) $4C_4 \times 8C_1 = 8$ 1 × 8

TOTAL: $280 + 336 + 112 + 8 = 736$ ways

Example 5:

a) Debbie is planning a party. She has 9 friends. She must choose 5 friends to invite to her party. How many guest lists are possible?

$9C_5 = 126$ ways

b) How many guest lists are possible if Julie, one of the 9 friends, refuses to come?

$n =$ Subtract 1 from 9 $= 8$

$8C_5 = 56$ ways