Name_____

Mid-chapter Review: Permutations and Combinations

1. Solve for n.

a. $\frac{n!}{(n-3)!} = 3n - 3$

$\frac{n(n-1)(n-2)(n-3)!}{(n-3)!} = 3n-3$

$n(n-1)(n-2) = 3(n-1)$

$n(n-2) = 3$ → $n=3$ or $n=-1$ reject

$n^2 - 2n - 3 = 0$

$(n-3)(n+1)=0$

b. $2n\,P(n+3,1) - 3 = \frac{9n+1}{2}$

$2n\left(\frac{(n+3)!}{(n+3-1)!}\right) - 3 = \frac{9n+1}{2}$

$2n\left(\frac{(n+3)(n+2)!}{(n+2)!}\right) - 3 = \frac{9n+1}{2}$

$4n^2 + 12n - 6 - 9n - 1 = 0$

$4n^2 + 3n - 7 = 0$

$(4n+7)(n-1) = 0$

$n = 1$ or $n = \frac{-7}{4}$ rejected as $n \in \mathbb{N}$

2. A baby has 3 blue blocks, 6 green blocks, and 2 yellow blocks. In how many ways can the baby choose 5 blocks.....

   a. If the blocks may be chosen in any way?

   12 ways

   b. If the baby must have at least 2 blue blocks?

   6 ways

   c. If the baby can choose 6 blocks and must have 2 blocks from each colour?

   1 way

B	G	Y
3	2	0
3	1	1
3	0	2
2	3	0

B	G	Y
2	2	1
2	1	2
1	4	0
1	3	1
0	5	0
0	4	1
0	3	2

3. Given Mehran, Borna, Jen, Cory, and Ioan in the class. In how many ways can they be arranged....

   a. In a line?

   120 ways

   b. In a circle?

   24 ways

   c. If Mehran and Borna cannot sit beside each other?

   72 ways

   M B — — —

   Indirect method: $120 -$ (MB sit together) $= 72$ ways

   (MB sit together) $= 4! \times 2!$

4. There are 8 female and 7 male in our class. We have to choose a fund-raising committee composed of president, vice-president, treasurer, and secretary. In how many ways may this committee be chosen if.....

   a. There are no restrictions?

   32 760 ways

   b. The committee must include at least 1 female?

   31 920 ways

   $P(15,4) -$ (no female) $P(7,4) =$

   c. The president and vice-president must be different gender?

   17 472 ways

   $\frac{P}{8} \times \frac{VP}{7} \times \frac{T}{13} \times \frac{S}{12} \times 2! =$

s

5. Willy has 5 tees, 6 pairs of pants, and 4 pairs of shoes. In how many ways can he dress himself?

   120 ways