Name: _____

Foundations 12:
Permutations & Combinations Quiz #3

$${}_nP_r = \frac{n!}{(n-r)!} \qquad {}_nC_r = \frac{n!}{(n-r)!\,r!}$$

$$n! = (n)(n-1)(n-2)\ldots(3)(2)(1)$$

Full credit will only be awarded for all work shown in a neat and organized manner.

In a deck of cards there are…

- 52 cards total
- 26 black cards (Clubs and Spades)
- 26 red cards (Hearts and Diamonds)
- 13 cards of each suit (Clubs, Spades, Hearts Diamonds)
- 4 Cards of each type (A, 2-10, J, Q, K)

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1. How many 5-card hands can be made with:
   a. exactly 3 Diamonds?

   b. exactly 2 kings and 2 queens?

   c. at most 2 red cards?

   d. at least 1 Club?
   (Use complement for full marks)

2. How many ways can we arrange the letters in the word "WORKBOOK" if:
   a. no restrictions?

   b. the letter "K" must be last?

   c. the first two letters are both "O"?

   d. all the "K"s are together?

3. Mr. G is coaching the Lord Byng Junior Volleyball team. He has 14 players on the team in total.
    a. If he needs to choose 6 of them (positions don't matter) for the starting lineup, and Tim (team captain) must be on the starting lineup, how many starting lineups are possible?

    b. If he needs to choose 6 of them (positions don't matter) for the starting lineup, but Sam and Howard can't both be on the starting lineup, how many lineups are possible?

    c. Mr. G is making a promo poster for the team. He wants 9 total students standing in a row, with Tim in the middle, for a picture on the poster. How many ways can Mr. G arrange the team members for the photo?

4. A school schedule has 8 blocks (4 blocks day 1; 4 blocks day 2). A student has to choose 5 academic courses and 3 elective courses. There are 9 different academic courses and 12 different elective courses to choose from. If each course is offered every block and schedule order is important, how many different schedules can be made?