**HW 1 - Fundamental Counting Principle NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***COMPLETE ALL PROBLEMS ON A SEPARATE SHEET OF PAPER.***

1. When Jill is purchasing her first new car, she is given a choice of two upholstery materials (cloth and leather) and four colors (black, blue, red, and white).

 a) Draw a tree diagram for this situation b) How many different choices does she have?

2. Show with a tree diagram the number of methods of travelling from Toronto to Vancouver via Calgary, if you can go from Toronto to Calgary by either plane or train and from Calgary to Vancouver by bus, plane, or train.

3. An all-star baseball team has a roster of seven pitchers and three catchers. How many pairs of pitcher and catcher can the manager select from this roster?

4. a) If repetition of digits is allowed, how many two-digit numbers can be formed using the digits 0, 1, 2, 3, 4, and 5?

 b) How many numbers consisting of two *different* digits can be formed by using these same digits?

 5. How many 3 digit ODD numbers can be formed using 0 through 9 if repetition is allowed?

6. Draw a tree diagram to show win-loss possibilities for one of the teams in a best-two-of-three playoff series. Using the tree diagram, count the number of ways a team could win the series despite losing one game.

7. Larry prefers classical music but he also enjoys country and western songs. His friend Lee has a collection of record albums including 35 classical albums, 20 rock, and 12 country and western. In how many ways can Lee select one album that will match Larry’s musical tastes?

8. A team of students for the county computer programming contest will be chosen according to the following rules: one student from grade 9 or 10, two students from grade 11, and one student from grade 12. At Smithfield High, there are 5 interested students in grade 9, 2 in grade 10, 2 in grade 11, and 4 in grade 12. How many different teams can be formed?

9. Four dice of different colors are rolled. We look at the uppermost faces of the dice. How many possible configurations are there?

10. New houses in a subdivision are available in three-, four-, and five-bedroom models, which may be built with six different exterior finishes, with or without a swimming pool. How many distinct selections can be made by the customer?

11, A combination lock has 60 different positions. To open the lock, you move to a certain number in the clockwise direction, then to a number in the counterclockwise direction, and finally to a third number in the clockwise position. If consecutive numbers in the combination cannot be the same, how many different combinations are there?

12. a) How many ways can a queen be selected from a deck of cards?

 b) How many ways can a number card less than 5 be selected from a deck of cards?

 c) How many ways can either a queen or a number card less than 5 be selected from a deck of cards?

13. Draw a tree diagram representing the makeup (M, F) of a family with three children.

a) Using the tree diagram, count the number of variations with exactly two girls.

b) How many different families have either a boy as eldest or boys as eldest and middle children?

**Find the value for each expression:**

14. $\frac{8!}{5!}$ 15. $\frac{21!}{17!4!}$ 16. $\frac{15!}{9!6!}+\frac{15!}{10!5!}$ 17. $\frac{7!}{2!5!}+\frac{7!}{3!4!}$

**Simplify the following:**

18. n(n – 1)! 19. n! (n + 1) 20. (n – 1)!(n2 + n) 21. (n+2)! (n2 + 7n + 12)

**Solve for n:**

22. $\frac{(n+1)!}{n!}=9$ 23. $\frac{(n+1)!}{(n-1)!}=6$