MATH 1 – Chapter 10: COUNTING METHODS

Chapter 10 teaches you Counting Methods further enhancing your knowledge of Chapter 2 and prepares you for Chapter 11. Read page 525 before studying the chapter.

Familiarize yourself with Table 2, p.527 for *Rolling two dice* and p.549 for *the standard deck of cards.*

- In 10.1 you learn how to <u>list when needed</u> elements of the set of outcomes when a task with one or more parts is performed. The method is useful only for short lists. In later sections you will learn counting "how many" such outcomes in the list are present without actually having to list.

  Practice 10.1: 1−6, 9−29.

- Start with the Fundamental Counting Principle(p.534) in 10.2. Go over examples 1−8. Recall the Factorial notation $n!$and the Factorial formula $n! = n\cdot(n-1)\cdots 2 \cdot 1$ (p.538). By definition $0! = 1$. Go over *Arrangements of n distinct objects* (p.539) and *Arrangements of n objects with look-alikes* (p.540).

  Practice 10.2: 3, 4, 5−14, 15, 17, 19, 23, 25, Odd numbered problems from 31−57.

- Permutations $_nP_r$ (formula p.545 and *guidelines on p.549*) and Combinations $_nC_r$ (formula p.547 and *guidelines on p.549*) are two important topics. Go over all the worked examples (there are 15 of them). The Problem-solving Hint (p.550) will be useful and so study it.

  Practice 10.3: Odd numbered problems from $1 - 31$, 32, 35, 37, 40, 41, 43, 49, 59.

- The connection between Pascal's Triangle and $_nC_r$ is found on pages 557−559. Application to the BINOMIAL THEOREM (p.560) follows.

  Practice 10.4: Odd numbered problems from $1 - 27$.

- *Magic Squares* are discussed on p.563 and p.564. Go to the Web to read about (i) Albrecht Dürer's work *Melancholia and Dürer's magic square* (ii) *La Familia Sagrada* and *Subirach's magic square.*

  Practice Extension Exercises (p.564−566): Odd numbered problems from 1 to 29, 33, 35, 36.

- Application of counting methods to Set Theory is discussed in 10.5. The Complement Principle (p.567), the Additive Counting Principle (p.569) and the Special Additive Counting Principle (p.569, applies only to disjoint sets) are important and will be used later. Go through all worked examples in this section.

  Practice 10.5: Odd numbered problems from $1 - 41$.

- Read about the Traveling Salesman Problem (TSP, p.574−575).

  Practice Chapter 10 test: 1, 3, 7, 9, 11, 13, 15, 17, 23, 25, 27.