

# KEY Selected answers

## 7.1 Assignment

Please do all work ON A SEPARATE SHEET OF PAPER!

- For each of 8 colors, I have one shirt and one tie of that color.
  - How many shirt-and-tie outfits can I make if I don't care which shirt I wear with which tie?  $64$
  - How many shirt and tie outfits can I make if I refuse to wear a shirt and a tie of the same color?  $56$
- How many license plates consist of 2 letters followed by 3 numbers (yes, 0 is a number)?  $26^2 \cdot 10^3$
- How many license plates consist of 3 letters, followed by 2 even digits (yes, 0 is even), followed by 2 odd digits?  $26^3 \cdot 5^2 \cdot 5^2$
- How many 3-letter combinations can be formed if the second letter must be a vowel (A, E, I, O, or U), and the third letter must be different from the first letter?  $3250$
- Suppose I have 6 different books, 2 of which are math books. In how many ways can I stack my 6 books on a shelf if I want a math book on both ends of the stack?  $48$
- Again, I have 6 different books, 2 of which are math books. In how many ways can I stack my books if I want to keep the 2 math books together?  $240$
- Rewrite each of the following without the factorial symbol:
  - The first five factors of  $(n+2)!$   
 $(n+2)(n+1)(n)(n-1)(n-2)$
  - $\frac{(n-2)!}{(n-3)!} = n-2$
- Compute the following:
  - ${}_8P_3$   $336$
  - ${}_{20}P_4$   $116280$
  - ${}_{10}P_{10}$   $3628800$
  - ${}_{10}P_1$   $10$
- What is  ${}_nP_n$  for any positive integer  $n$ ?
- What is  ${}_nP_1$  for any positive integer  $n$ ?
- What is  ${}_nP_0$  for any positive integer  $n$ ?
- Our math club has 20 members.
  - In how many ways can we select a President, a Vice President, and a Treasurer if no member can hold more than one office?  $6480$
  - How many ways can we choose our officers if Sarah Dreadful has to be chosen?  $1026$
- How many distinguishable permutations can be formed with the letters:
  - ADD  $3$
  - ELEVEN  $120$
  - MADAM  $30$
- A senate committee has 5 Republicans and 4 Democrats. In how many ways can the committee members sit in a row of 9 chairs, such that all 4 Democrats sit together?  $17,280$
- Five couples go to the movies and sit together in a row of seats.
  - How many different ways can they arrange themselves if no one cares whom they sit next to?  $10!$
  - How many ways can they arrange themselves if all the girls want to sit together and all the boys want to sit together?  $28,800$
  - How many ways can they arrange themselves if each couple sits together?  $3,840$
- In Morse code, there are two symbols – a dot and a dash. Since there are 26 letters in the alphabet, there would have to be 26 different configurations of dots and dashes to use the Morse code successfully. Will any of the letters require a configuration with a total of 5 dots and/or 5 dashes? Why?

**CHALLENGE:** In how many ways can 6 people be seated around a round table? (Two seating arrangements are considered the same if, for each person, the person to his or her left is the same in both arrangements.) Can you generalize your result for  $n$  people?