Unit 7 Day 1 CW

2. How many three-letter "words" (strings of letters) can be formed using the 26 letters of the alphabet if repetition of letters
   (a) is allowed? (b) is not allowed?

How many three-letter "words" (strings of letters) can be formed using the letters *WXYZ* if repetition of letters
(a) is allowed? (b) is not allowed?

4. Eight horses are entered in a race.
   (a) How many different orders are possible for completing the race?
   (b) In how many different ways can first, second, and third places be decided? (Assume there is no tie.)

A multiple-choice test has five questions with four choices for each question. In how many different ways can the test be completed?

6. Telephone numbers consist of seven digits; the first digit cannot be 0 or 1. How many telephone numbers are possible?

In how many different ways can a race with five runners be completed? (Assume there is no tie.)

8. In how many ways can five people be seated in a row of five seats?

A restaurant offers six different main courses, eight types of drinks, and three kinds of desserts. How many different meals consisting of a main course, a drink, and a dessert does the restaurant offer?

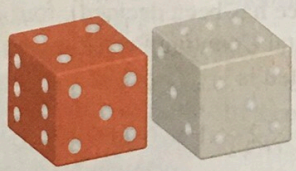
10. In how many ways can five different mathematics books be placed next to each other on a shelf?

Towns A, B, C, and D are located in such a way that there are four roads from A to B, five roads from B to C, and six roads from C to D. How many routes are there from town A to town D via towns B and C?

12. In a family of four children, how many different boy-girl birth-order combinations are possible? (The birth orders *BBBG* and *BBGB* are different.)

A coin is flipped five times, and the resulting sequence of heads and tails is recorded. How many such sequences are possible?

14. A red die and a white die are rolled, and the numbers showing are recorded. How many different outcomes are possible? (The singular form of the word *dice* is *die*.)



A red die, a blue die, and a white die are rolled, and the numbers showing are recorded. How many different outcomes are possible?

16. Two cards are chosen in order from a deck. In how many ways can this be done if
   (a) the first card must be a spade and the second must be a heart?
   (b) both cards must be spades?

A girl has 5 skirts, 8 blouses, and 12 pairs of shoes. How many different skirt-blouse-shoe outfits can she wear? (Assume that each item matches all the others, so she is willing to wear any combination.)

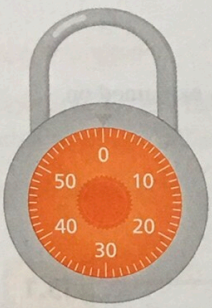
18. A company's employee ID number system consists of one letter followed by three digits. How many different ID numbers are possible with this system?

A company has 2844 employees. Each employee is to be given an ID number that consists of one letter followed by two digits. Is it possible to give each employee a different ID number using this scheme? Explain.

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

Standard automobile license plates in California display a nonzero digit, followed by three letters, followed by three digits. How many different standard plates are possible in this system?

22. A combination lock has 60 different positions. To open the lock, the dial is turned 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 direction. If successive numbers in the combination cannot be the same, how many different combinations are possible?



A true-false test contains ten questions. In how many different ways can this test be completed?

24. An automobile dealer offers five models. Each model comes in a choice of four colors, three types of stereo equipment, with or without air conditioning, and with or without a sunroof. In how many different ways can a customer order an auto from this dealer?

The registrar at a certain university classifies students according to a major, minor, year (1, 2, 3, 4), and sex (M, F). Each student must choose one major and either one or no minor from the 32 fields taught at this university. How many different student classifications are possible?

26. How many monograms consisting of three initials are possible?

27. A state has registered 8 million automobiles. To simplify the license plate system, a state employee suggests that each plate display only two letters followed by three digits. Will this system create enough different license plates for all the vehicles registered?

28. A state license plate design has six places. Each plate begins with a fixed number of letters, and the remaining places are filled with digits. (For example, one letter followed by five digits, two letters followed by four digits, and so on.) The state has 17 million registered vehicles.
(a) The state decides to change to a system consisting of one letter followed by five digits. Will this design allow for enough different plates to accommodate all the vehicles registered?
(b) Find a system that will be sufficient if the smallest possible number of letters is to be used.

29. In how many ways can a president, vice president, and secretary be chosen from a class of 30 students?

30. In how many ways can a president, vice president, and secretary be chosen from a class of 20 females and 30 males if the president must be a female and the vice president a male?

31. A senate subcommittee consists of ten Democrats and seven Republicans. In how many ways can a chairman, vice chairman, and secretary be chosen if the chairman must be a Democrat and the vice chairman must be a Republican?

32. Social Security numbers consist of nine digits, with the first digit between 0 and 6, inclusive. How many Social Security numbers are possible?

33. Five-letter "words" are formed using the letters *A*, *B*, *C*, *D*, *E*, *F*, *G*. How many such words are possible for each of the following conditions?
(a) No condition is imposed.
(b) No letter can be repeated in a word.
(c) Each word must begin with the letter *A*.
(d) The letter *C* must be in the middle.
(e) The middle letter must be a vowel.

34. How many five-letter palindromes are possible? (A *palindrome* is a string of letters that reads the same backward and forward, such as the string *XCZCX*.)

35. A certain computer programming language allows names of variables to consist of two characters, the first being any letter and the second any letter or digit. How many names of variables are possible?

36. How many different three-character code words consisting of letters or digits are possible for the following code designs?
(a) The first entry must be a letter.
(b) The first entry cannot be zero.

37. In how many ways can four men and four women be seated in a row of eight seats for the following situations?
(a) The women are to be seated together, and the men are to be seated together.
(b) They are to be seated alternately by gender.

38. In how many ways can five different mathematics books be placed on a shelf if the two algebra books are to be placed next to each other?

39. Eight mathematics books and three chemistry books are to be placed on a shelf. In how many ways can this be done if the mathematics books are next to each other and the chemistry books are next to each other?

40. Three-digit numbers are formed using the digits 2, 4, 5, and 7, with repetition of digits allowed. How many such numbers can be formed if
(a) the numbers are less than 700?
(b) the numbers are even?
(c) the numbers are divisible by 5?

41. How many three-digit odd numbers can be formed using the digits 1, 2, 4, and 6 if repetition of digits is not allowed?

DISCOVERY • DISCUSSION

Pairs of Initials Explain why in any group of 677 people, at least two people must have the same pair of initials.

Unit 7 Day 1 HW

1. An ice cream parlor offers 12 different flavors of ice cream. There are four choices for the container (cup, regular cone, sugar cone, and waffle cone).

2. A computer password consists of four letters followed by a single digit. Assume that the passwords are not case sensitive (i.e., that an uppercase letter is the same as a lower case letter).

a) How many different passwords are possible?

b) How many different passwords end in 1?

c) How many different passwords do not start with Z?

d) How many different passwords have no Z's in them?

3. A French restaurant offers a menu consisting of 3 different appetizers, 2 different soups, 4 different salads, 9 different main courses, and 5 different desserts.

a) A fixed-price lunch meal consists of a choice of appetizer, salad, and main course. How many different lunch fixed-price meals are possible?

b) A fixed-price dinner meal consists of a choice of appetizer, a choice of soup or salad, a main course, and a dessert. How many different dinner fixed-price meals are possible?

4. A set of reference books consists of 8 volumes numbered 1 through 8. In how many ways can the 8 books be arranged on a shelf?

5. Four women and 4 men line up a checkout stand in a grocery store.

a) In how many ways can they line up?

b) In how many ways can they line up if the first person in line must be a woman?

c) In how many ways can they line up alternately by gender?

6. How many 7-digit numbers (i.e., numbers between 1,000,000 and 9,999,999)

a) are even?

b) are divisible by 5?

7. The ski club at East Carolina University has 35 members (15 girls and 20 boys). A committee of 3 members – a President, a Vice-President, and a Treasurer – must be chosen.

a) How many different 3-member committees can be chosen?

b) How many different 3-member committees can be chosen if the president must be a girl?

*c) Bonus: How many different 3-member committees can be chosen if the committee *cannot* have all boys or all girls?