Chapter 4 Wrap-Up

EXTRA PRACTICE

1. Compute the value of each of the following expressions.

(a) P(4, 4) **(b)** $1! - 0!$ **(c)** $\frac{20 \times 19!}{20!}$

(d) P(5, 0) **(e)** C(5, 5) **(f)** $\binom{18}{2}$

2. Two hundred students have enrolled in at least one Grade 12 university math course this year.

- 68 are in Geometry and Discrete Math
- 78 are in Data Management
- 60 are in Geometry and Discrete Math and AFIC
- 35 are in AFIC and Data Management
- 13 are in Geometry and Discrete Math, and Data Management
- 10 take all three Grade 12 university math courses

(a) Draw a Venn diagram to represent this situation.
(b) Use the Venn diagram to determine the total number of students who take AFIC.

3. A six-sided die is rolled and then a coin is tossed.
(a) Draw the tree diagram that represents all possible results of the two actions taken together.
(b) Determine the number of outcomes in which the roll of the die is an odd number.
(c) Determine the total number of outcomes in which the roll of the die is odd and the coin toss is heads.

4. Design and carry out a simulation to investigate the following situation: If you randomly stop students in the hall and ask them for their birth month, on average, how many students must you ask before you find someone born in the same month as you, assuming birth months are equally likely?

5. Determine the probability of each of the following situations.
(a) a red card is drawn from a standard deck of 52 playing cards
(b) two even numbers are rolled on two consecutive rolls of a die
(c) at least one 3 turns up when three dice are rolled
(d) a five-card poker hand dealt from a standard deck of 52 playing cards results in a full house (three of a kind and two of a kind)
(e) two face cards are drawn in a row (without replacement) from a standard deck of 52 playing cards given that the first card drawn is a king
(f) a committee of six people randomly chosen from seven males and eight females is either all male or all female
(g) in a six-person sprint, Jesse finishes first, Marnie second, and Raul last

6. Use the appropriate counting techniques to answer each of the following.

(a) Twenty books are to be placed on a shelf. Determine the number of ways the first five books can be placed on the shelf.

(b) In how many ways can nine people place themselves in nine seats in a row?

(c) Out of 15 different stores, how many ways can a salesperson visit 10 of the stores once each?

(d) Three identical red blocks, a black block, and two identical blue blocks are to be placed in a row. In how many ways can this be done?

(e) A team consisting of 3 members is to be chosen from a group of 12 people. How many different teams are possible if there must be a chairperson, a secretary, and a treasurer?

(f) The letters of the word STATISTICS are to be arranged among themselves. In how many different ways can this be done?

(g) A class has 12 students. In how many different ways can the students be put into lab groups consisting of 3 students in each group?

(h) How many distinct permutations of the letters of the word OTTAWA begin and end with the letter T?

(i) In how many permutations of the digits 123456789 are the numbers 1 and 2 beside each other?

(j) A school has 480 girls and 520 boys. How many committees of 5 members can be formed if there must be at least 1 boy on each committee?

(k) How many groups consisting of at least 2 people can be chosen from a group of 10 people?

7. Dr. Kai Phoon has found that 25% of her patients have eye problems, 10% have hearing problems, and 5% have both. Are the events "have eye problems" and "have hearing problems" independent? Justify your decision.

8. Toronto is playing Anaheim in the Stanley Cup final. The first team to win four games is the new NHL champion. If the probability that Toronto wins any game is 0.55, determine the probability that

(a) Toronto wins in four straight games

(b) Anaheim wins the Stanley Cup

9. Describe a situation in which two events are

(a) mutually exclusive **(b)** independent

(c) not mutually exclusive **(d)** dependent

10. Given that $P(A \cap B) = 0.4$, $P(A \cap C) = 0.2$, $P(B \mid A) = 0.6$, and $P(B) = 0.5$, find the following.

(a) $P(A \mid B)$ **(b)** $P(B')$ **(c)** $P(A)$

(d) $P(C \mid A)$ **(e)** the odds in favour of B

11. The student council has 15 members.

(a) Determine the probability that the staff adviser selects Yuko, Luigi, and Justine as treasurer, secretary, and liaison to the principal, respectively.

(b) Determine the probability that the staff adviser randomly selects Yuko, Luigi, and Justine from student council to clean up after the Pep Rally.