Name: _____ Date: _____

4 Chapter Test

MULTIPLE CHOICE

1. How many possibilities are there for drawing either a club or a face card from a standard deck of cards?

   A. 16 **B.** 19 **C.** 22 **D.** 25

2. Identify the solutions of $\frac{(n+5)!}{(n+3)(n+2)!} = 12$, where $n \in \mathrm{I}$.

   A. $n = -1$ and $n = -8$ **B.** $n = -1$ **C.** $n = -4$ and $n = -5$ **D.** $n = 4$ and $n = 5$

3. Which situation could give rise to the expression $\frac{12!}{(12-5)!}$?

   A. counting arrangements of 12 objects, 5 of which are identical

   B. counting arrangements of 5 objects chosen from 12 different objects

   C. choosing a basketball team of 5 from a starting line-up of 12 players

   D. forming a sequence using 5 different symbols followed by 7 different digits

4. Raychelle is determining the number of arrangements of n marbles in a row, of which a marbles are white and the other b marbles are blue. Which formula applies to this problem?

   A. ${}_nC_a$ **C.** The formulas are equivalent and both apply.

   B. $\frac{n!}{a! \cdot b!}$ **D.** Neither formula applies.

5. Which of the following is NOT a useful step in solving the equation $4{}_nC_2 = {}_{n+2}C_3$?

   A. writing algebraic expressions for ${}_nC_2$ and ${}_{n+2}C_3$

   B. removing a factor of n from both sides

   C. factoring to solve a quadratic equation in n

   D. subtracting to get 0 on one side of the equal sign

6. Four players are each dealt a 13-card hand from a standard deck of playing cards. Which of the following does this situation involve?

   A. permutations and the Fundamental Counting Principle

   B. permutations and the Principle of Inclusion and Exclusion

   C. combinations and the Principle of Inclusion and Exclusion

   D. combinations and the Fundamental Counting Principle

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NUMERICAL RESPONSE

7. How many four-digit codes are possible using the digits 0 through 9

a) if digits can be repeated? _____ codes **b)** with no repeated digits? _____ codes

8. Simi draws a single card from a standard deck of playing cards. How many possibilities does she have to draw

a) either an ace or a red face card?

_____ possibilities

b) either a heart or a 9?

_____ possibilities

9. **a)** A president, vice-president, and secretary from a council of 10 students can be chosen in _____ ways.

b) A subcommittee of 4 from the remaining 7 students can be chosen in _____ ways.

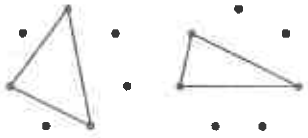
10. _____ different arrangements of the letters in the word SEQUENCES are possible.

11. The number of possible sequences of all the hearts from a standard deck, given that the ace and king cannot be next to each other and that the 13 cards are dealt in a single row, is _____.

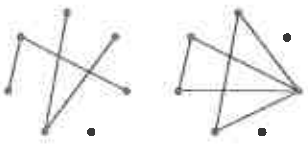
12. In Oscar Wilde's play *The Importance of Being Earnest*, there are 5 male roles and 4 female roles. However, one of the female roles, Lady Bracknell, is sometimes played by a male actor. Suppose 8 men and 6 women audition for a production of this play. After all the roles have been cast, _____ different groups of unsuccessful auditioners are possible.

13. Suppose 7 points are arranged in a circle.

a) Triangles can be formed by joining sets of three of the points, for example as shown. _____ different triangles can be formed by joining these points.



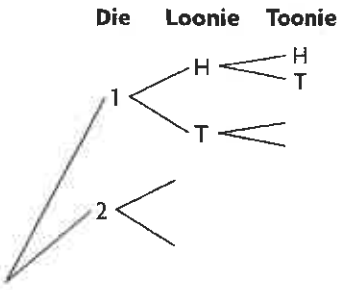
b) If different pairs of points are joined by straight lines, for example as shown, a pattern of straight lines is formed. _____ different patterns of straight lines can be formed from the 7 points.



Name: _____ Date: _____

WRITTEN RESPONSE

14. Yelena rolls a die and tosses two coins, a loonie and a toonie.



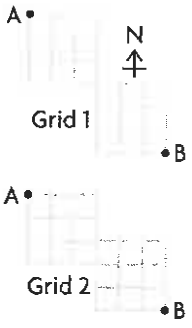
a) Complete the tree diagram and use it to determine the total number of outcomes Yelena could achieve.

b) Use the Fundamental Counting Principle to verify your answer to part a). Show your work.

c) Based on the tree diagram, how many outcomes are possible for which Yelena rolls a multiple of 3 or gets at least one tail?

d) Use the Principle of Inclusion and Exclusion to verify your answer to part b). Show your work.

15. Two 3-by-3 grids are joined in two different ways, as shown to the right.



a) Predict which combined grid has the greater number of routes from Point A to Point B, moving only east or south. Give reasons, but do not calculate.

b) Check your prediction by calculating the number of routes for each grid.

16. How many different 6-card hands with at least 2 aces can be dealt from a standard deck of cards?

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1. C. **2.** B. **3.** B. **4.** C. **5.** B. **6.** D.

7. a) 10 000 codes b) 5040 codes

8. a) 10 possibilities b) 16 possibilities

9. a) 720 ways b) 35 ways

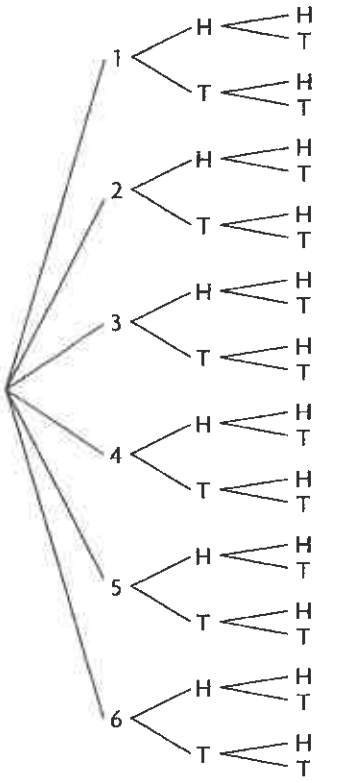
10. 30 240 arrangements

11. 3 269 817 087 sequences

12. 30 240 groups

13. a) 21 triangles b) 2 097 152 patterns

14. a)



24 outcomes

b) e.g., total number of outcomes
= outcomes for die · outcomes for loonie · outcomes for toonie
= 6 · 2 · 2, or 24

c) 20 outcomes

d) e.g., number of outcomes
= outcomes with multiple of 3 + outcomes with at least one tail
− outcomes with multiple of 3 and at least one tail
= 8 + 18 − 6, or 20

15. a) e.g., grid 2, because there are two ways to go across the join between the two parts of the grid

b) grid 1: 400 routes; grid 2: 600 routes

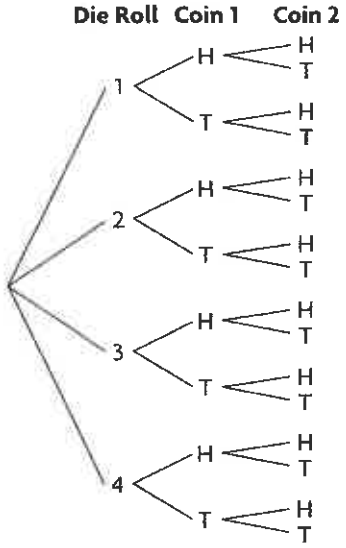
16. 1 237 792 hands

Chapter 5

Getting Started, page 118

1. a) intersection b) combination c) sample space
d) experimental e) Fundamental Counting Principle
f) permutation g) theoretical

2.



3. a) 720 b) 21 c) 336 d) 604 800 e) 10 f) 113

4. a)

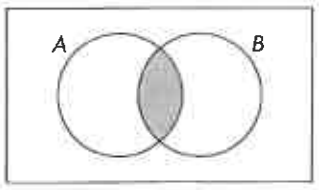
	1	2	3	4	5	6
1	0	1	2	3	4	5
2	1	0	1	2	3	4
3	2	1	0	1	2	3
4	3	2	1	0	1	2
5	4	3	2	1	0	1
6	5	4	3	2	1	0

b) $\frac{2}{9}$

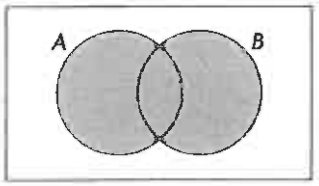
c) $\frac{1}{36}$

d) $\frac{1}{18}$

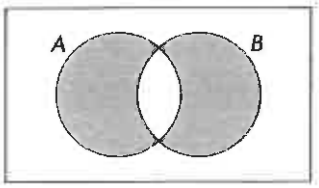
5. a)



b)



c)



6. 90 090 ways

7. 9 979 200 ways

Lesson 5.1, page 120

1. e.g., adding one bracelet of some colour other than blue

2. a) fair, since both have a $\frac{3}{16}$ chance of winning

b) not fair, since Sabrina has only a $\frac{1}{4}$ chance of winning

3. A.