ALBERTA DISTANCE LEARNING CENTRE

Mathematics 30-2

MAT3792

Unit 2: Counting Methods

Unit Assignment

Student's Questions and Comments

FOR STUDENT USE ONLY
Student Name:
_____

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Assigned to
_____
Marked by
_____
Date received
_____

Summary

	Marks Earned	Total Marks	Percent
Unit 2 Assignment		**58**	

Teacher's Comments:

_____

Teacher's Signature

REVISED December 2019

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Unit 2: Counting Methods
Unit Assignment

Read the course material and complete the practice questions in the Unit 2 Counting Methods Guide for Learning Booklet before working on this Unit Assignment. The following chart shows you which lesson to review if you're having difficulty with the questions in this assignment booklet.

Unit Assignment Question	Lesson
1, 2, 3,	2A
4, 5, 6,	2B
7, 8, 9, 10	2C
11, 12, 13, 14, 15	2D
16	*Logic and Reasoning

*Contact your teacher if you need help with Logic and Reasoning.

For full marks, show all calculations, steps, and/or explain your answers.

Total Marks: 58

1. A student is planning a spring break vacation. The vacation packages that she is considering purchasing have a variety of options. She can go to Mexico or Florida, stay in an all-inclusive resort, a bed and breakfast, or a condo, and choose a room with either an ocean view or a court-yard view.

   a. Draw a tree diagram to illustrate all the possible vacation packages. (1 mark)

   b. How many different packages are there? (1 mark)

2. Use the Fundamental Counting Principle to determine the total number of outcomes for each scenario. (2 marks)

   a. A restaurant offers a set menu service for special occasions. There are 3 salads, 2 soups, 4 main dishes, and 3 desserts to choose from, and diners can choose 1 of each for their meal.

   b. Employees at a sporting goods store are given the following options for their uniform:
      - Shirts: white, black, grey, red
      - Shorts : black, grey, red
      - Hat: white, red, grey, blue

3. A car manufacturer advertises that it offers 60 unique cars that can be created from the exterior, interior, and seat styles it offers.

   If the manufacturer offers 10 different exterior colours and 2 different interior colours, then how many different seat styles does it offer? Show how you determined your answer. (1 mark)

4. Evaluate, if possible.

   a. $\frac{5!4!}{3!2!}$ (1 mark)

   b. $(-8)!$ (1 mark)

   c. $\frac{200!}{198!}$ (1 mark)

5. Simplify each of the following expressions. (4 marks – 2 marks each)

   a. $\frac{(n+8)!}{(n+6)!}$

   b. $\frac{2!(n-3)!}{(n-1)!}$

6. Solve and verify each equation. (6 marks)

Equation	**Solve** (2 marks each)	**Verify** (1 mark each)
a. $\frac{(n-2)!}{(n-3)!} = 5$		
b. $\frac{(n+2)!}{n!} = 42$		

7. A school is upgrading its website and will require students to create a password to access their marks online. In order to create secure passwords, students will be required to meet certain conditions.

   a. Determine the total number of possible 5 character passwords that can be created using each of the following requirements:

      i. the digits 0 to 9, where digits can be repeated (1 mark)

      ii. the digits 0 to 9, where digits cannot be repeated (1 mark)

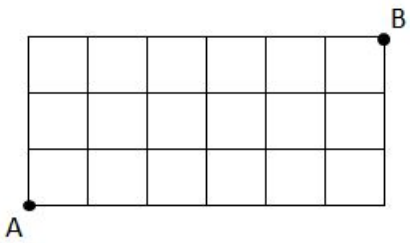
      iii. the digits 0 to 9, where the first digit must be even and last digit must be odd, and where digits can be repeated (1 mark)

      iv. the pattern letter – letter – number – number – number, using the 26 letters of the alphabet, and the digits 0 to 9, where letters and digits can be repeated (1 mark)

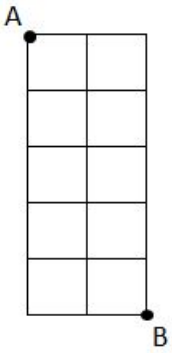
   b. Describe a different set of conditions that can be used to create a secure 5 character password. Determine the total number of possible passwords that can be created using your conditions. (2 marks)

8. Determine the number of routes there are to get from Point A to Point B, if you can only travel in the stated direction. (3 marks)

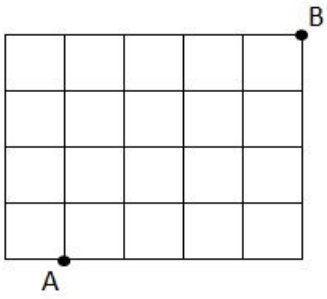
   a. North and East



   b. South and East



   c. North and East



9. Determine the number of permutations for each of the following.

   a. 5 red flags and 3 blue flags (1 mark)

   b. letters of the word YELLOWKNIFE (1 mark)

10. Explain why there are 4 times as many permutations of the word CARPET as compared to the word CAREER. (1 mark)

11. A class of 22 students consists of 12 girls and 10 boys. A committee of five students is being chosen from this class to plan a school event. Determine the number of 5 student committees that can be formed if:

    a. the five students are chosen at random (1 mark)

    b. the committee must consist of 3 girls and 2 boys (1 mark)

    c. the committee must have 4 boys (1 mark)

    d. the committee must have 1 or 2 girls. (1 mark)

    e. Sam and Jordan must be on the committee, and the remaining students are randomly selected. (1 mark)

    f. there must be at least one boy on the committee (1 mark)

12. At the school awards night, a door prize is given to one person in attendance. The winner of the door prize can select 4 books from 15 different books in a box.
    a. In how many ways can the winner select the 4 books? (1 mark)

    b. In how many ways can the winner select the 4 books and then arrange them on a shelf? (1 mark)

    c. Explain why the answers to part a. and part b. above, are not the same. (1 mark)

13. State if each of the following scenarios involves permutations or combinations. Give a reason for your answer.
    a. Forming a 6 person graduation committee from a graduating class of 35 students. (1 mark)

    b. Selecting the president, vice-president, and secretary for a club. (1 mark)

    c. Creating a 4-digit pin for your bank card. (1 mark)

    d. Dealing 4 cards from a standard deck of 52 cards. (1 mark))

    e. Making a 3 topping pizza when there are 7 toppings to select from. (1 mark)

    f. The number of ways to arranging the letters of the word TABLE. (1 mark)

14. Match the question in the left column with the right column. (5 marks)

Question	Answer
a. Selecting 3 boys and 4 girls from a group of 7 boys and 7 girls.	**i.** ${}_7P_3$
b. Arranging the letters in the word MACHINE.	**ii.** $\binom{7}{4}$
c. Ordering 3 of the letters from the word CASHIER.	**iii.** 7•6•5•4•3•2•1
d. Choosing 4 of 7 toppings for a frozen yogurt.	**iv.** 3!7!
e. Positioning nine people in line for a picture if the three shortest people must be grouped together.	**v.** ${}_7C_3 \bullet {}_7C_4$

a. _____ b. _____ c. _____

d. _____ e. _____

15. Evaluate, using the permutation or combination formula. For full marks, show all calculations. (6 marks)

a. ${}_8P_5$ b. ${}_{11}C_6$ c. $\binom{9}{4}$

d. ${}_5P_5$ e. ${}_5C_5$ f. ${}_7P_1$

16. Patterns and Games: Continue the Pattern

The diagram below shows the first three steps of a pattern. In Diagram 1, each side is one unit long resulting in 1 unit cube. To form Diagram 2, each side length becomes two units long, resulting in 8 unit cubes. This process is continued for subsequent Diagrams.

Diagram 1

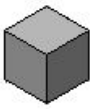


Diagram 2

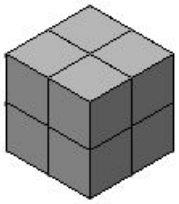
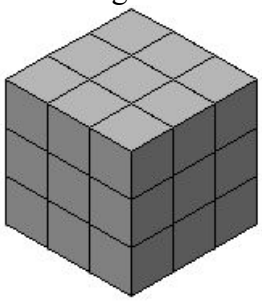


Diagram 3



Describe the pattern above. Then, calculate the number of individual unit cubes in Diagram 5. (2 marks)

End of Assignment

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