Name: _____ Student #:_____

Date: _____ T.A. #: _____

Mathematics 12 Pre-Calculus
LEARNING GUIDE 18 TEST – PERMUTATIONS & COMBINATIONS

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***Full marks will NOT be given for the final answer only.**
When using a calculator, you should provide a decimal answer that is correct **to at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

1. A restaurant offers 2 appetizers, 4 main courses, and 3 deserts. How many different meals can one select? (1 mark)

$2 \times 4 \times 3 = 24$

2. How many three letter permutations are there in the word FRAGILE? (1 mark)

$_7P_3 = 210$

3. How many ways can 6 books be arranged on the shelf if: (1 mark each)

a) The books are all different?

$_6P_6 = 720$

b) Two of the books are the same?

$\frac{6!}{2!} = 360$

c) The French book must be on one of the ends?

$5! \times 2 = 240$

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4. License plates for cars in BC consist of three numbers followed by 3 letters. Assuming numbers and letters can be repeated, how many different license plates are possible? (1 mark)

$10^3 \times 26^3 = 17\,576\,000$

5. Explain what ${}_7P_3$ means. Explain why does ${}_3P_7$ not make sense. (2 marks)

- HOW MANY WAYS YOU CAN SELECT 3 THINGS OUT OF 7 WHERE ORDER MATTERS
- YOU CAN'T CHOOSE 7 OUT OF 3 THINGS.

6. Solve for n. (1 mark each)

a) ${}_nP_2 = 30$

$n(n-1) = 30$

$n^2 - n - 30 = 0$

$(n-6)(n+5) = 0$

$n = 6, -5$ ← REJECT

$n = 6$

b) ${}_{n+2}C_n = 21$

$\frac{(n+2)(n+1)}{2} = 21$

$(n+2)(n+1) = 42$

$n^2 + 3n + 2 = 42$

$n^2 + 3n - 40 = 0$

$(n+8)(n-5) = 0$

REJECT

$n = -8, 5$

$n = 5$

7. A work crew consists of 10 people. How many ways can a group of four be selected for a job? (2 marks)

$10C_4 = 210$

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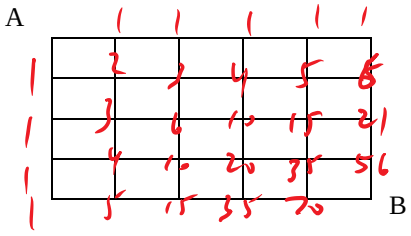
8. How many possible ways can a person get from A to B if one can only move down or to the right? (1 mark)



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9. Expand $(a - 2b)^3$ using the binomial theorem. (2 marks)

$${}_3C_0(a)^3(-2b)^0 + {}_3C_1(a)^2(-2b)^1 + {}_3C_2(a)^1(-2b)^2 + {}_3C_3(a)^0(-2b)^3$$

$$= a^3 + (3)(a^2)(-2b) + (3)(a)(4b^2) + (-8b^3)$$

$$= a^3 - 6a^2b + 12ab^2 - 8b^3$$

10. Determine the indicated term.

a) the 5th term in the expansion of $(x + 2)^{12}$. (1 mark)

$$t_5 = {}_{12}C_4(x)^8(2)^4$$

$$= 495(x^8)(16)$$

$$= 7920x^8$$

b) the middle term in the expansion of $(x - 3)^{10}$. (1 mark)

$$t_6 = {}_{10}C_5(x)^5(-3)^5$$

$$= -61236x^5$$

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