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. Lisa has 2 blouses, 4 skirts, and 2 sweaters, how many different outfits can she select to wear to school? (1 mark)

$2 \times 4 \times 2 = 16$

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

$5P_2 = 20$

3. Brent is writing an exam with 10 multiple choice questions on it. Each question has 4 possible answers (A, B, C, and D).

   a) How many ways can he answer the exam? (1 mark)

$4^{10} = 1048576$

   b) Brenda wrote the test a few days earlier and got 100% . He told Brent the following: "these are the answers to the test: 3A's, 2B's, 2C's and 3D's." How many ways can Brent answer the test using this information? (2 marks)

$\frac{10!}{3!2!2!3!} = 25\,200$

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4. Marge has become a member of the PTA. There are 20 members on the PTA. Calculate the number of ways a 4 person executive consisting of four people (president, vice-president, treasurer, and secretary) can be chosen. (1 mark)

$_{20}P_4 = 116\,280$

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

- # OF WAYS OF SELECTING 3 OUT OF 7 WHERE ORDER MATTERS.

- YOU CAN'T SELECT 7 WHEN YOU ONLY HAVE 3.

6. Solve for n. (1 mark each)

a) $_nP_2 = 56$

$n(n-1) = 56$

$n^2 - n - 56 = 0$

$(n-8)(n+7) = 0$

$n = 8, -7$ ← REJECT

$n = 8$

b) $_nC_{n-2} = 45$

$\frac{n(n-1)}{2} = 45$

$n^2 - n = 90$

$n^2 - n - 90 = 0$

$(n-10)(n+9) = 0$

$n = 10$

7. A work crew consists of 12 people. How many ways can a group of three be selected for a job? (2 marks)

$_{12}C_3 = 220$

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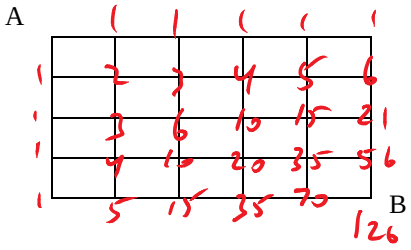
8. How many possible ways can a person get from A to B if one can only move down or to the right? (1 mark)



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

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

$$= 27a^3 + 3(9a^2)(2b) + 3(3a)(4b^2) + 1(1)(8b^3)$$

$$= 27a^3 + 54a^2b + 36ab^2 + 8b^3$$

10. Determine the indicated term.

a) the 4th term in the expansion of $(x - 1)^{12}$. (1 mark)

$$t_4 = {}_{12}C_3 (x)^9 (-1)^3$$

$$= (220)(x^9)(-1)$$

$$= -220x^9$$

b) the middle term in the expansion of $(x - 4)^8$. (1 mark)

$$t_5 = {}_8C_4 (x)^4 (-4)^4$$

$$= 17920x^4$$

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