

**PMATH 12 - CHAPTER 8 - PRETEST**

signature \_\_\_\_\_

**Multiple Choice - PART 1 - NON-CALCULATOR - 10 MINUTES (#1-5)**

**CIRCLE** the choice that best completes the statement or answers the question.

1. At a school cafeteria, a meal consists of a main dish, a side dish, and a dessert. There are 3 main dishes, 4 side dishes, and 7 desserts to choose from. How many different meals are possible?

- A. 36  
 B. 84  
 C. 45  
 D. 14

$3 \times 4 \times 7$

2. Which expression cannot be evaluated?

- A.  ${}_8P_6$   
 B.  ${}_{10}P_0$   
 C.  ${}_9P_9$   
 D.  ${}_{12}P_{14}$

$n \geq r !!$

3. How many permutations are there of the 5 digits in the number 85 697?

- A. 120  
 B. 20  
 C. 24  
 D. 5

$5! = 5 \times 4 \times 3 \times 2 \times 1$

4. What is the value of  $\binom{8}{3}$ ?

$\frac{8!}{5!3!} = \frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1}$

- A. 56  
 B. 3  
 C. 24  
 D. 8

5. What are the first three terms in the expansion of  $(x+8)^{11}$ ?

- A.  $x^{11} + 8x^{10} + 64x^9$   
 B.  $x^{11} + 11x^{10} + 55x^9$   
 C.  $x^{11} + 88x^{10} + 3520x^9$   
 D.  $x^{11} + 80x^{10} + 2880x^9$

Binomial expansion diagram for  $(x+8)^{11}$  showing terms  $x^{11}$ ,  $\binom{11}{1}x^{10}8^1$ ,  $\binom{11}{2}x^98^2$ , etc.

**MULTIPLE CHOICE - PART 2 - CALCULATOR may be used after 10 minutes**

6. A multiple-choice test has 12 questions. Each question has 6 choices: A, B, C, D, E, or F. How many ways can the test be answered?

- A. 2 985 984  
 B. 18  
 C. 72  
 D. 2 176 782 336

$6^{12}$

7. How many different numbers can be formed by rearranging the digits in 28 759 143?

- A. 36  
 B. 5040  
 C. 40 320  
 D. 8

$8!$

8. Which of these words has exactly 90 720 permutations of all its letters?

- A. PERIDOTITE  $10! \div 2! \cdot 2! \cdot 2!$  C. SERPENTINITE  $12! \div 3! \cdot 2! \cdot 2! \cdot 2!$   
 (B) SANDSTONE  $9! \div 2! \cdot 2!$  D. GRANITE  $7!$

9. A student has 12 different books on her bookshelf. She wants to take 6 of them with her on a train trip. How many selections of 6 books could she make?

- A. 665 280 C. 924  ${}_{12}C_6$   
 B. 720 D. 72  $\frac{12!}{6!6!}$

10. What is the value of the 6th number in row 11 of Pascal's triangle?

- (A)  ${}_{10}C_5$   $10n$  C.  ${}_{11}C_6$   
 B.  ${}_{12}C_7$  D.  ${}_{5}C_{10}$

11. Which row of Pascal's triangle contains the expression  ${}_{15}C_6$ ?

- A. row 15 C. row 16  
 B. row 14 D. row 6

12. What are the first three terms in the expansion of  $(-3x^4 + 2)^5$ ?

- A.  $-243x^{20} + 162x^{16} - 108x^{12}$   
 (B)  $-243x^{20} + 810x^{16} - 1080x^{12}$   
 C.  $-243x^{20} + 810x^{16} - 1080x^3$   
 D.  $x^5 + 5x^4 + 10x^3$
- $(-3x^4)^5$   
 $-243x^{20}$
- ${}_{5}C_1 (-3x^4)^4 (2)$   
 $\frac{5!}{4!} = 5$   
 $5 \cdot 81x^{16} \cdot 2 = 810x^{16}$

**Short Answer - Show your work**

1. Postal codes in Canada have six characters. They have the form A0A 0A0, where A is a letter and 0 is a digit. The letters D, F, I, O, Q, and U are not used. How many different postal codes are possible?

letters  $26 - 6 = 20$   
 digits 10  
 $20 \cdot 10 \cdot 20 \cdot 10 \cdot 20 \cdot 10 = 8,000,000$

2. At a bus stop, 8 passengers get on a bus with 4 empty seats. In how many different ways can some of these passengers be seated?

$8 \cdot 7 \cdot 6 \cdot 5 = 1680$   
 or  ${}^8P_4 = \frac{8!}{4!}$

3. Which of these words has the greater number of permutations of all its letters?

BEAN or BEEN

work

BEAN

$$4! = 24$$

BEEEN

$$\frac{4!}{2!} = 12$$

answer

BEAN — no repeated letters

4. How many 13-digit numbers can be created from the digits 7,7,7,1,1,1,1,5,5,5,5,5?

$$\frac{13!}{3!5!5!} = 72,072$$

5. Solve this equation for  $n$ :  ${}_n C_3 = 84$

$$\frac{n!}{(n-3)!3!} \rightarrow \frac{n(n-1)(n-2)\cancel{(n-3)!}}{\cancel{(n-3)!}3 \cdot 2 \cdot 1} = 84$$

$$n(n-1)(n-2) = 504$$

$$n = 9$$

6. Expand  $(5x-2)^6$ .

$$(5x)^6 + {}_6 C_1 (5x)^5 (-2)^1 + {}_6 C_2 (5x)^4 (-2)^2 + {}_6 C_3 (5x)^3 (-2)^3 + {}_6 C_4 (5x)^2 (-2)^4 + {}_6 C_5 (5x) (-2)^5 + {}_6 C_6 (-2)^6$$

$$15625x^6 + 6(-2)(3125)x^5 + 15(625)(4)x^4 + 20(125)(-8)x^3 + (15)(25)16x^2 + 6(5)(-32)x + 64$$

$$= 15625x^6 - 37500x^5 + 37500x^4 - 20000x^3 + 6000x^2 - 960x + 64$$

**Problem - Show your work**

1. Five couples go to see a movie. They sit together in 10 consecutive seats and couples sit together. How many seating arrangements are possible?

work

$$\begin{array}{ccccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ 10 \cdot 1 & = & 8 \cdot 1 & = & 6 \cdot 1 & = & 4 \cdot 1 & = & 2 \cdot 1 \\ 10 & \cdot & 8 & \cdot & 6 & \cdot & 4 & \cdot & 2 \end{array}$$

answer

$$3840$$

2. A hand of 7 cards is dealt from a standard deck of 52 playing cards. How many hands of 3 hearts and 4 black cards can be dealt?

work

13 - hearts      26 black

$${}_{13}C_3 \times {}_{26}C_4 = \frac{13!}{10!3!} = \frac{26!}{22!4!}$$

answer

$$4,275,700$$

3. Expand  $(5x + 3y)^5$ .

$$(5x)^5 + {}_5C_1 (5x)^4 (3y) + {}_5C_2 (5x)^3 (3y)^2 + {}_5C_3 (5x)^2 (3y)^3 + {}_5C_4 (5x) (3y)^4 + {}_5C_5 (3y)^5$$

$$= 3125x^5 + 5(625)x^4(3y) + 10(125)x^3(9y^2) + 10(25)x^2(27y^3) + 5(5x)(81y^4) + 243y^5$$

$$= 3125x^5 + 9375x^4y + 11250x^3y^2 + 6750x^2y^3 + 2025xy^4 + 243y^5$$