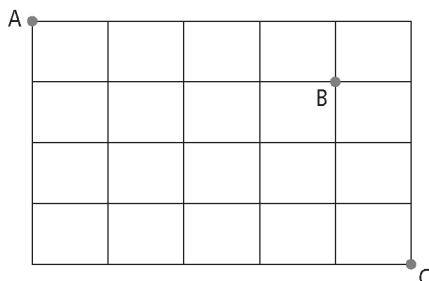Name: _____ Date: _____

Chapter 11 Test

Multiple Choice

For # 1 to #6, choose the best answer.

1. The number of 3-digit numbers, with repeats, that are multiples of 5 and less than 600 that can be formed from the digits 1, 3, 5, 7, and 9 is
A 6
B 9
C 15
D 25

2. The grid shows the roads from point A to point C.

If the only allowed directions are south and east, the number of pathways from point A to point C that do *not* pass through point B is

A $\dfrac{9!}{5!4!} - 5!4!$

B $\dfrac{9!}{5!4!} - 5!3!$

C $\dfrac{9!}{5!4!} - \dfrac{5!}{4!}$

D $\dfrac{9!}{5!4!} - \dfrac{5!}{3!}$

3. The number of different arrangements of the letters of the word CONFERENCE is

A $\dfrac{10!}{3!4!}$

B $\dfrac{10!}{3!}$

C $\dfrac{10!}{2!3!}$

D $\dfrac{10!}{2!2!3!}$

4. If $_nP_3 = 2(_nC_4)$, then $_nC_6$ equals
A 1716
B 3003
C 5005
D 8008

5. Given that the first 4 terms of a row in Pascal's triangle are 1, 9, 36, and 84, which of the following is equivalent to the middle term of the next row?
A $_{10}C_6$
B $2(_{10}C_5)$
C $2(_9C_6)$
D $_9C_4 + _9C_5$

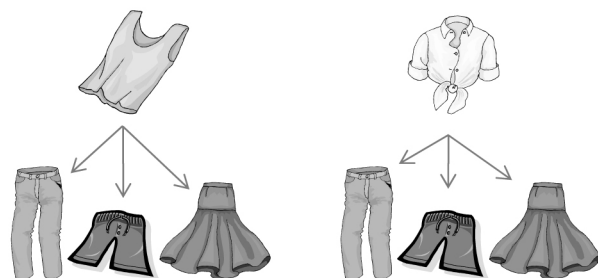**6.** Which of the following statements is always correct?
A The number of permutations of *n* different elements taken *r* at a time is less than the number of combinations of *n* different elements taken *r* at a time.
B The number of permutations of *n* different elements taken *r* at a time is greater than the number of combinations of *n* different elements taken *r* at a time.
C The number of permutations of *n* different elements taken *r* at a time is less than or equal to the number of combinations of *n* different elements taken *r* at a time.
D The number of permutations of *n* different elements taken *r* at a time is greater than or equal to the number of combinations of *n* different elements taken *r* at a time.

Short Answer

7. For a graduation ceremony, there are 8 people sitting on stage in one row. If the master of ceremonies must sit on the far left and the valedictorian must sit next to the principal, how many arrangements are possible?

8. A pizzeria advertises that it has 12 toppings. How many different pizzas can be made with 0 to 5 toppings? Assume each topping can be chosen only once per pizza.

9. Assume that a handshake takes 6 s. How long, in minutes, does it take for all 45 students in a graduating class to shake hands with each other, if everyone shakes hands once with every other person in the class?

10. Arrange the following expressions from least in value to greatest:

$$_7C_3, \ _6P_4, \ 3\left(\frac{6!}{2!4!}\right), \ \frac{_{14}P_3}{_{13}C_2}$$

11. Solve for n: $_nC_5 = \ _nC_7$

12. Determine the value of the term independent of x in the expansion of $\left(3x^2 - \frac{1}{x^3}\right)^5$.

Extended Response

13. Mary is packing for her trip. She laid out her clothes and drew the following diagram.

  a) How many different outfits are possible?
  b) Mary decides to add one more top and one more bottom. How many more outfits are possible?

14. Three students were selected from the 23 grade 12 students to be the president, vice-president, and secretary of the student council. Three other students from the 38 grade 10 and grade 11 students were also selected to be on the council.
  a) Determine the total number of ways that the 6 members of the student council can be selected.
  b) Explain why both permutations and combinations are needed to answer part a).

15. Solve for n algebraically: $126(_nC_3) = \ _{n+1}P_5$.

16. The social justice group is comprised of 4 grade 10 students, 5 grade 11 students, and 6 grade 12 students. Determine how many ways a committee of 5 students can be selected if
  a) there are no restrictions.
  b) there are exactly 2 grade 12 students on the committee.
  c) there are at most 2 grade 12 students on the committee.

17. Consider the expansion of $(x + y)^6$.
  a) State the coefficients in the expansion of $(x + y)^6$ using Pascal's triangle.
  b) State the coefficients in the expansion of $(x + y)^6$ using combinations.
  c) Use the answer from part a) or part b) to expand $(2x - 3y^2)^6$. Simplify the result.