

Math 30-1 Combinatorics Practice Test

1. A meal combo consists of a choice of 5 beverages, 6 main dishes, and 4 side orders. The number of different meals that are available if you have one of each is
 - A. 15
 - B. 120
 - C. 17 280
 - D. 2 073 500
2. How many even 4 digit numbers can be made using 0, 2, 3, 5, 6, 9 if no repeats are allowed?
 - A. 180
 - B. 156
 - C. 144
 - D. 18
3. Students at an all girls private school are required to wear uniforms. They have the choice of selecting their daily uniforms from each one of seven pairs of shoes, nine different skirts, eight pairs of socks, a purse and two vests. The maximum number of unique uniforms the students can choose is
 - A. 6!
 - B. ${}_{33}C_6$
 - C. ${}_{33}P_6$
 - D. $\left(\frac{9!}{5!}\right) \times 2$
4. The number of 4 letter arrangements that can be made from the word **THANKS** is
 - A. 4!
 - B. 7!
 - C. ${}_6P_4$
 - D. ${}_6C_4$
5. If all the letters in the word **DIPLOMA** are used, then the number of different 7-letter arrangements that can be made beginning with 3 vowels is
 - A. 24
 - B. 144
 - C. 720
 - D. 5040

6. The tune of "Row, Row, Row Your Boat" has 5 notes in its first line:

CCCDE

Assume that all 5 notes are held for the same length of time. If the notes are rearranged at random, how many different melodies could be composed?

- A. 6
B. 20
C. 40
D. 120
7. Find the number of distinguishable arrangements in the word **STATEMENT** if the consonants must be together.

A. $\frac{6!}{3!} \times \frac{4!}{2!}$

B. $\frac{6!}{3!} \times \frac{3!}{2!}$

C. $\frac{9!}{3!2!}$

D. $6! \times 3!$

8. Seven students are asked to line up for a photo. If the students Jack and Jill are both in the photo but do not want to stand together, then the number of different line-ups possible are

- A. 720
B. 3600
C. 4320
D. 5040

9. In a six-team ringette league, each team competes against every other team 4 times, twice at home and twice away. How many games are scheduled in this league?

- A. 15
B. 30
C. 60
D. 120

Use the following information to answer the next question.

At a particular hotel, the following items are available for the continental breakfast:

Beverage	Pastry	Fruit
coffee	muffin	apple
tea	toast	orange
juice	doughnut	grapefruit
		banana

10. If the continental breakfast consists of 1 beverage, 1 pastry, and 2 different types of fruit, then the number of possible breakfasts that can be ordered is
- A. ${}_3C_1 \times {}_3C_1 \times {}_4C_2$
B. ${}_3P_1 \times {}_3P_1 \times {}_4P_2$
C. ${}_{10}C_4$
D. ${}_{10}P_4$
11. A school committee consists of 1 vice-principal, 2 teachers, and 3 students. The number of different committees that can be selected from 2 vice-principals, 5 teachers, and 9 students is
- A. 20 160
B. 8 008
C. 1 680
D. 90
12. A basketball team consists of some guards and 5 forwards. If there are 560 ways to randomly select 3 guards and 2 forwards for the starting line-up, then the number of guards on the team is
- A. 6
B. 7
C. 8
D. 9

Use the following information to answer the next question.

A committee of 7 people is to be chosen from a city council that consists of a mayor, a deputy mayor, and 13 councillors. The mayor and deputy mayor must be on the committee, and because of a conflict of interest, three councillors cannot be on the committee.

13. The number of committees, given these restrictions, that can be chosen from this city council is
- A. ${}_{10}C_5$
B. ${}_{12}C_4$
C. ${}_{13}C_2$
D. ${}_{15}C_7$

14. A child must select eight toys from her toy box, containing ten toys, to bring into the car for a long distance trip. One hour into the trip she throws one of the toys out the left window and another toy out of the right window. How many different ways can these events occur?
- A. 56
B. 90
C. 1260
D. 2520
15. A poker hand consists of 5 cards drawn from a standard deck of 52 cards. The number of different hands that consist of at most 1 king is
- A. 3 681 860
B. 2 490 624
C. 778 320
D. 194 584
16. A piece of graph paper has 7 vertical lines and 6 horizontal lines. Find the number of different paths Brad can draw from the top-left corner to the bottom-left corner if each time he must move closer to the bottom-left corner.
- A. 42
B. 462
C. 1716
D. 889 574 400

Use the following information to answer the next two questions.

The first 4 rows of Pascal's triangle are given below

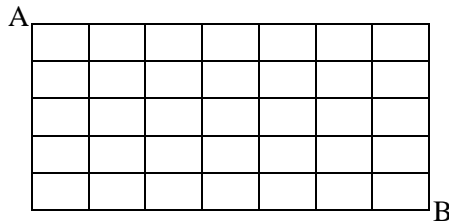
			1	←	Row 1
		1	1	←	Row 2
		1	2	1	
1 st term in the fourth row →		1	3	3	1

17. The 6th term in the 18th row of Pascal's triangle is
- A. ${}_{18}C_6$
B. ${}_{18}C_5$
C. ${}_{17}C_6$
D. ${}_{17}C_5$
18. The sum of the numbers in the 13th row of Pascal's triangle is
- A. 2^{11}
B. 2^{12}
C. 2^{13}
D. 2^{14}

Numerical Response

- Jonas misplaced a 7-digit phone number. She knows that the phone number begins with 4 and the last six digits are 1, 2, 3, 5, 7, and 8, in some order. The number of phone numbers that satisfy these conditions is _____.
- The number of arrangements of the letters of the word **WINNIPEG** if it must start with exactly one **N** is _____.
- A 6-player volleyball team stands in a straight line for a picture. If two particular players, Joan and Emily, must be together, then the number of arrangements that can be made for the picture is _____.
- A car manager wants to line up 10 cars of identical model except for the colour. There are 3 red cars, 2 blue cars, and 5 green cars. The number of possible arrangements of the 10 cars if they are lined up in a row along one side of a parking lot, and a blue car is parked on each end of the row, is _____.
- If the digits are not repeated, the number of odd 3-digit numbers greater than 900 can be calculated by
$$({}_1P_1)({}_nP_r)({}_4P_1)$$
 The values for n and r , respectively are _____ .
- In a group of 9 people, there are 4 females and 5 males. The number of 3 – member committees that can be formed consisting of at least 1 male is _____.
- The number of different arrangements of the letters **TOFIELD**, that can be formed using exactly 2 vowels and exactly 2 consonants, is _____.
- The vertices of an octagon are marked on a circle. The number of triangles that can be formed using any 3 vertices is _____.
- The value for n in the equation $\frac{{}_nP_3}{{}_nC_2} = n + 1$ is _____.

10. Given the diagram below, the number of pathways starting from A and moving to B along the gridlines if a pathway must always move close to B is _____.



11. In the expansion of $(2x + y)^7$, one of the terms is Ax^2y^5 . The value of A is _____.

12. A term of the binomial expansion $(ax - 2y)^8$, where $a > 0$, is $28672x^2y^6$. The value of a , correct to the nearest whole number, is _____.

13. In the expansion of $\left(2x^2 - \frac{1}{x}\right)^6$, the constant term is _____.

Combinatorics Practice Test Answers

Multiple Choice:

1. B
2. B
3. D
4. C
5. B
6. B
7. A
8. B
9. C
10. A
11. C
12. C
13. A
14. D
15. B
16. B
17. D
18. B

Numerical Response:

1. 720
2. 2160
3. 240
4. 56
5. 81
6. 80
7. 432
8. 56
9. 5
10. 792
11. 84
12. 4
13. 60