

## 30-2: Permutations and Combinations Review

Use the following information to answer the next question.

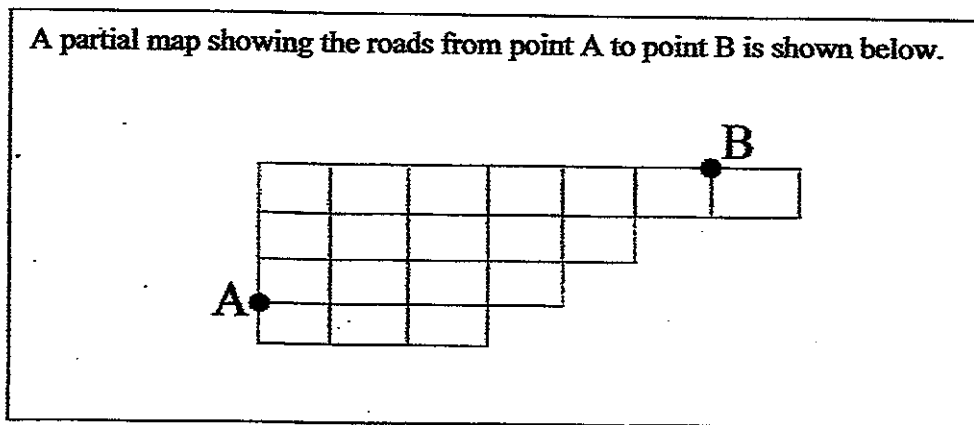
There are 12 teams in a soccer league, and each team must play each other *twice* in a tournament.



- The number of games that will be played in total is
  - ${}_6P_2 \times 2$
  - ${}_{12}C_2$
  - ${}_{12}P_2 \times 2$
  - ${}_{12}C_2 \times 2$
- The number of distinguishable arrangements that can be made from the word **KITCHEN**, if the vowels must stay together, is
  - $2! \times 5! \times 2!$
  - $2! \times 5!$
  - ${}_7P_2 \times {}_5P_5$
  - $2! \times 6!$
- A family is being arranged in a line for a group photograph. If the family consists of a mother, a father, a baby, and five children, the number of arrangements that begin and end with a parent is
  - 720
  - 1440
  - 5040
  - 40320

4. There are ten people available for appointment to a committee consisting of six people. The number of committees that can be formed, if Kirsten and James must be on the committee, is
- A.  ${}_8P_4$   
 B.  ${}_8C_4$   
 C.  ${}_{10}P_6 - {}_2P_2$   
 D.  ${}_{10}C_6 - {}_2C_2$

Use the following information to answer the next question.



5. If the only allowed directions are North and East, the number of pathways from point A to point B is
- A. 30  
 B. 60  
 C. 75  
 D. 90
6. The number of committees consisting of 4 men and 5 women that can be formed from 10 men and 13 women is
- A.  ${}_{10}C_4 \times {}_{13}C_5$   
 B.  ${}_{10}P_4 \times {}_{13}P_5$   
 C.  ${}_{23}C_9$   
 D.  ${}_{23}P_9$

Use the following information to answer the next question.

A used video game store has the following titles available for purchase

Action	RPG	Sports	Classic
Legally Owned Auto	Final Quest MCCXXI	Minor League Baseball 2K6	Dot-Gobbler
Crypt Infiltrator	Old Scrolls IV	Smashdown 2007	Punky the Porcupine
Angelic Circle III	Neverautumn Days		Falling Blocks
Warfield II			

**Numerical Response**

1. If a customer purchases 3 action games, 1 RPG, 2 sports, and 1 classic game, the total number of ways he can select the games is \_\_\_\_\_.

Use the following information to answer the next question.

A grocery store manager is trying to decide how to arrange the following items in the produce aisle

Avacados



Pumpkin



Eggplant



Squash



Watermelon



7. The items can be arranged in any order, but the manager does not want the pumpkins and watermelons together. If this is the only restriction, the number of possible arrangements is

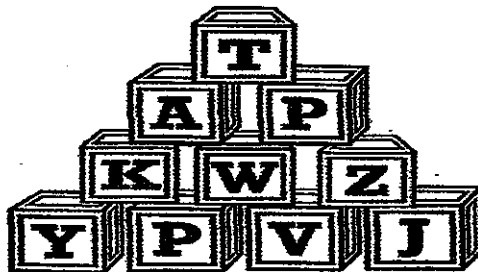
- A. 5
- B. 45
- C. 72
- D. 120

Numerical Response

- 2 If all of the letters in the word **PENCILS** are used, the number of arrangements with all the vowels together is \_\_\_\_\_.
8. The number of three digit or four digit even numbers that can be formed from the numbers 2, 3, 5, 6, 7 is
- A. 72  
 B. 120  
 C. 144  
 D. 5040
9. A committee requires one accountant, two marketing agents, and four board members. If there are four accountants, three marketing agents, and seven board members available for selection in the committee, the number of committees that can be formed is
- A. 42  
 B. 420  
 C. 20160  
 D.  ${}_{14}P_7$

Use the following information to answer the next question.

A child has a set of 26 alphabetized blocks, and stacks 10 of these blocks in the shape of a pyramid.



10. The number of possible 10-block pyramids that can be formed from the entire set of 26 blocks is
- A.  ${}_{26}P_4 \cdot {}_{22}P_3 \cdot {}_{19}P_2 \cdot {}_{17}P_1$   
 B.  ${}_{26}P_4 + {}_{22}P_3 + {}_{19}P_2 + {}_{17}P_1$   
 C.  ${}_{26}C_4 \cdot {}_{22}C_3 \cdot {}_{19}C_2 \cdot {}_{17}C_1$   
 D.  ${}_{26}C_4 + {}_{22}C_3 + {}_{19}C_2 + {}_{17}C_1$

Use the following information to answer the next question.

A questionnaire asks students what activities they enjoy. It is filled out by shading in the circle beside each activity a person enjoys, and a student may select no activity, one activity, or more than one activity.

- Mountain Climbing
- Canoeing
- Video Games
- Bowling
- Billiards
- Walking
- Hockey

11. The number of ways a student could fill out the questionnaire is
- A. 21
  - B. 42
  - C. 128
  - D. 5040
12. There are 12 people in line for a movie. If Crystal, Steven, and Jason are friends and will always stand together, the total number of possible arrangements for the entire line is
- A.  $3! \times 2! \times 9!$
  - B.  $3! \times 10!$
  - C.  ${}_{12}P_3 \times 9!$
  - D.  ${}_{12}C_3 \times 9!$
13. At a business meeting, every person shakes each others hand once. If there were 91 handshakes in total, the number of people at the meeting is
- A. 14
  - B. 15
  - C. 24
  - D. 46

Numerical Response

**3** A security code used to consist of two odd digits, followed by four even digits. To allow more codes to be generated, a new system uses two even digits, followed by any three digits. If repeated digits are allowed, the increase in the number of possible codes is \_\_\_\_\_.

14. A multiple choice test has 15 questions. Four of these questions have A as an answer, three have B as an answer, six have C as an answer, and two have D as an answer. The number of different answer sheets that can be created is

A.  ${}_{15}C_4 \times {}_{11}C_3 \times {}_8C_6 \times {}_2C_2$

B.  ${}_{15}P_4 \times {}_{11}P_3 \times {}_8P_6 \times {}_2P_2$

C.  $\frac{15!}{4! \times 3! \times 6! \times 2!}$

D. 15!

15. Six points are drawn on a circle. The number of triangles that can be formed from these six points is

A. 10

B. 20

C. 30

D. 720

Use the following information to answer the next question.

The diagram shown below was drawn by a student to answer a question

$$X < \begin{matrix} Y-Z \\ Z-Y \end{matrix}$$

$$Y < \begin{matrix} X-Z \\ Z-X \end{matrix}$$

$$Z < \begin{matrix} X-Y \\ Y-X \end{matrix}$$

16. The above diagram is a solution to the question

A. What is the total number of permutations of three items?

B. What is the total number of combinations of three items?

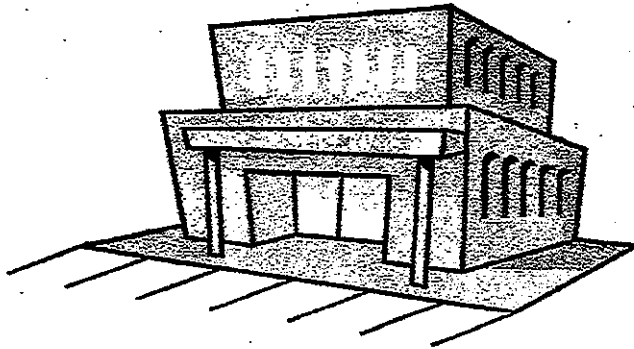
C. What is the total number of permutations of six items?

D. What is the total number of combinations of six items?

17. There are 6 men and 9 women available for selection on a 6-person committee. If the committee must have at least one man, the number of possible committees is
- A. 2264
  - B. 2459
  - C. 3580
  - D. 4921

*Use the following information to answer the next question.*

A building has six parking stalls in front, as shown below.



18. The number of ways five different cars can park in the stalls is
- A. 6
  - B. 56
  - C. 120
  - D. 720
19. One bag contains 4 colored marbles, and another bag contains 4 colored marbles. None of the 8 marbles are the same color. If a person reaches into the first bag and pulls out two marbles, then reaches into the second bag and pulls out two marbles, the number of possible color combinations is
- A. 6
  - B. 36
  - C. 70
  - D. 140

20. A student has 8 tiles that spell the word **COMPUTER**. If the student now wishes to use some of these tiles to make a four-letter word that contains exactly 2 vowels and exactly 2 consonants, the number of possible words is
- A. 335  
 B. 480  
 C. 720  
 D. 1024
21. A child going on a trip is told that out of his 8 favorite toys, he can bring **at most** three toys. The number of ways he could select which toys he brings is
- A.  ${}_8P_0 + {}_8P_1 + {}_8P_2 + {}_8P_3$   
 B.  ${}_8C_0 + {}_8C_1 + {}_8C_2 + {}_8C_3$   
 C.  ${}_8C_3 - ({}_8C_0 + {}_8C_1 + {}_8C_2)$   
 D.  ${}_8C_0 \times {}_8C_1 \times {}_8C_2 \times {}_8C_3$
22. A research team of 6 people is to be formed from 10 chemists, 5 politicians, 8 economists, and 15 biologists. The number of possible teams that can be formed with at least 5 chemists is
- A. 6772  
 B. 6934  
 C. 7266  
 D. 8123



Answer Key:

- |       |          |
|-------|----------|
| 1. D  | NR1 36   |
| 2. D  | NR2 1440 |
| 3. B  | NR3 9375 |
| 4. B  |          |
| 5. C  |          |
| 6. A  |          |
| 7. C  |          |
| 8. A  |          |
| 9. B  |          |
| 10. A |          |
| 11. C |          |
| 12. B |          |
| 13. A |          |
| 14. C |          |
| 15. B |          |
| 16. A |          |
| 17. D |          |
| 18. D |          |
| 19. B |          |
| 20. C |          |
| 21. B |          |
| 22. C |          |