# Counting/Combinatorics Stretch

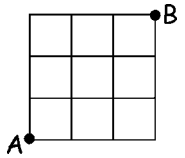
1. _____ Bob has stencils to paint the digits 2, 5 and 8. How many distinct three-digit house numbers can he paint, using only the stencils?

2. _____ At the end of a game, each of the five members of a basketball team shake hands with each of the five members of the other team, and all of the players shake hands with the two referees. How many handshakes occur?

3. _____ Six points are drawn on a circle. How many distinct convex pentagons can be drawn using only these points as vertices?

4. _____ A nursery employee wishes to plant six Golden Delicious apple trees and two Bartlett pear trees in one row. How many distinct arrangements are possible?

5. _____ Each small square has sides of length 1 unit. How many distinct paths of length six units are there from A to B?




6. _____ A state with ten million cars plans to issue license plates which consist of any four letters followed by an $n$-digit number. If the state wants to have enough distinct license plates for all of the cars, what is the minimum possible value for $n$?

7. _____ There are six tags numbered 1, 2, 2, 3, 3 and 4. Using these tags, how many distinct three-digit numbers can be formed such that two of the digits are the same?

8. _____ A teacher has made ten statements for a True-False test. Four statements are true and six are false. How many distinct answer keys could there be for the test?

9. _____ How many perfect square factors does the number 46,656 have?

10. _____ There are eight boys and six girls who are members of the trumpet section in the band. From the members of the trumpet section, a quintet is being formed. If the quintet must consist of three boys and two girls, how many quintets are possible?

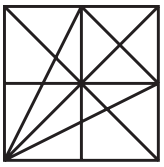
# Counting/Combinatorics Stretch

**Answers**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. | 27 | (*C*, T, F) | 5. | 20 | (F, P, M) | 8. | 210 | (F, *C*, M) |
| 2. | 45 | (F, *C*, T, M) | 6. | 2 | (*C*, T, F, *G*) | 9. | 16 | (S, *C*, E, T) |
| 3. | 6 | (M, S, P, F, *C*) | 7. | 18 | (T, S , *C*, E) | 10. | 840 | (F, *C*, M) |
| 4. | 28 | (P, F, *C*, M) | | | | | | |

# Counting Stretch

1. _____ Hazel wrote the integers 1 through 321 on the board. How many total digits did she write?

2. _____ triangles  How many triangles of any size are in this figure?

3. _____ ways In how many ways can one knife, one fork and one spoon be distributed, in any order, to three people, if each person is given 0, 1, 2 or 3 utensils?

4. _____ ways Using pennies, nickels, dimes and quarters, how many ways can you make 67 cents?

5. _____ scores In the game Fortrix, a player can earn 3, 7 or 11 points on a turn. How many different scores are possible for a single player after six turns?

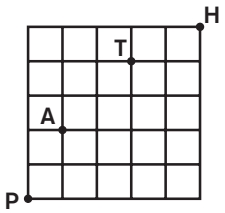
6. _____ integers How many 3-digit integers are divisible by both 5 and 17?

7. _____ integers How many positive integers less than 40 are relatively prime to both 7 and 10?

8. _____ palin-dromes How many palindromes are between 9 and 1009?

9. _____ paths In the 3 × 3 grid shown, a path can begin in any cell and can pass through a cell more than once. How many such paths spell ROTOR?

| | | |
|---|---|---|
| R | O | R |
| O | T | O |
| R | O | R |

10. _____ paths 

Moving only up and right, how many paths from P to H pass through A and T?

# Counting Stretch

| | Answer | Difficulty | | | |
|---|---|---|---|---|---|
| 1. | 855 | (2) | 6. | 10 | (3) |
| 2. | 56 | (3) | 7. | 14 | (3) |
| 3. | 27 | (3) | 8. | 100 | (3) |
| 4. | 87 | (3) | 9. | 64 | (4) |
| 5. | 13 | (4) | 10. | 54 | (4) |