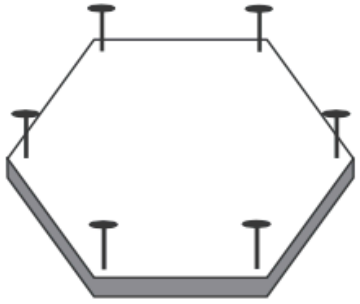
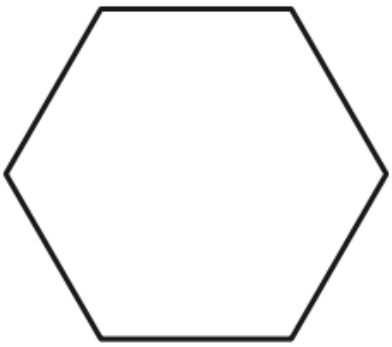
27. Minh cuts a board in the shape of a regular hexagon and pounds in a nail at an equal distance from each vertex, as shown in the figure below. How many rubber bands will she need in order to stretch a different rubber band across every possible pair of nails?



A. 15
B. 14
C. 12
D. 9
E. 6

37. What is the maximum number of distinct diagonals that can be drawn in the hexagon shown below?



A. 4
B. 5
C. 6
D. 9
E. 12

12. In the school cafeteria, students choose their lunch from 3 sandwiches, 3 soups, 4 salads, and 2 drinks. How many different lunches are possible for a student who chooses exactly 1 sandwich, 1 soup, 1 salad, and 1 drink?

F. 2
G. 4
H. 12
J. 36
K. 72

51. How many 3-letter orderings, where no letter is repeated, can be made using the letters of the word GATORS ?

A. 3
B. 6
C. 27
D. 120
E. 216

Danika is modeling a new mix and match clothing line. Her stylist has selected 5 tops, 3 skirts, and 4 jackets for the photo shoot. How ma possible outfits consisting of one top, one skirt, and one jacket can be created?

Possible Answers:

45

30

20

12

60

Correct answer:

60

A candy shop sells Valentine's Day gift baskets that consist of chocolates, a basket, and a card. If there are five different types of chocolate, three types of baskets, and ten options for cards, how many different gift basket combinations are there?

Possible Answers:

150

15

1500

18

180

Correct answer:

150

Explanation:

The correct answer is 150. Since there are five types of chocolate, three types of baskets, and ten card choices, the correct answer can be found by multiplying 3 x 5 x 10, which is 150. If you got 15 or 1500, you may have made a multiplication error. If you got 18, you may have added instead of multiplying.

A locker combination consists of three different numbers from the set of 30 different numbers on the face of the lock. Imagine that you have forgotten the combination. How many times do you have to try to find the right combination?

Possible Answers:

900

90

24360

2876

1765

Correct answer:

24360

Explanation:

It is said that the three numbers are different. So the number of lock combinations is ${}_{30}P_3 = 24\ 360$.

The game of euchre uses the 9s, 10s, jacks, queens, kings, and aces from a standard deck of 52 cards. How many 5-card euchre hands have at least 2 black cards?

Possible Answers:

14000

792

5940

8731

35772

Correct answer:

35772

Explanation:

The hand could have 2, 3, 4, or 5 black cards. There are 12 black cards and 12 red cards, so the numbers of combinations for the four cases are as follows.

2 black cards: $C(12, 2) \times C(12, 3) = 14\,520$

3 black cards: $C(12, 3) \times C(12, 2) = 14\,520$

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4 black cards: $C(12, 4) \times C(12, 1) = 5940$

5 black cards: $C(12, 5) \times C(12, 0) = 792$

The total number of euchre hands that have at least two black cards is the total of these four cases, 35 772.

You work as a health inspector and must visit each of the 15 restaurants in town once each week. In how many different orders can you make these inspections?

Possible Answers:

1.3×10^{12}

225

100875

156900

11×10^{12}

Correct answer:

1.3×10^{12}

Explanation:

${}_{15}P_{15} = 15!$

$= 1.307\,674\,368 \times 10^{12}$

A license plate consists of three letters followed by three numbers (excluding 0). How many license plates can be made if no letters or numbers are repeated?

Possible Answers:

None of the answers are correct

26 + 26 + 26 + 9 + 9 + 9

26 + 25 + 24 + 9 + 8 + 7

26 x 26 x 26 x 9 x 9 x 9

26 x 25 x 24 x 9 x 8 x 7

Correct answer:

26 x 25 x 24 x 9 x 8 x 7

Explanation:

There are 26 letters in the alphabet and 9 digits when you exclude 0. Each selection can go with any other selection, so each number is multiplied together. After the first letter is picked, the sample size (what you can pick from) is reduced by one because there is no repetition. So the answer 26 x 25 x 24 x 9 x 8 x 7 is correct. If repetition were allowed answer 26 x 26 x 26 x 9 x 9 x 9 would be correct.

How many ways can 10 people win a race if ribbons are given for first, second, and third places?

Possible Answers:

120

360

540

None of the answers are correct

720

Correct answer:

720

Explanation:

Independent events are multiplied. Once the first place is chosen, the sample space (what you can pick from) is reduced by one since there is no repetition (you can't win first and second places at the same time). Thus, 10 x 9 x 8 = 720

Sam is getting dressed in the morning and has 6 pairs of pants, 4 shirts, and 5 pairs of socks to choose from. How many distinct combinations consisting of 1 pair of pants, 1 shirt and 1 pair of socks can Sam make?

Possible Answers:

220

26

144

120

16

Correct answer:

120

Explanation:

In order to find the answer, multiply the quantities together:

$(6)(4)(5) = 120$

This is because for each pair of pants, there are 4 options for shirts and 5 options for socks.

Sally is putting on jewelry and has decided to wear one necklace, one pair of earrings, and one ring. Her jewelry collection is listed below. How many different combinations of jewelry can she wear?

Necklace	Earrings	Ring
short	studs	gold
long	hoops	silver
	dangling	

Possible Answers:

7

36

3

12

Correct answer:

12

Explanation:

To find the number of different combinations, we must use the fundamental counting principal to multiply the number of options in each category together:

(2)(3)(2) = 12

Susie wants to make a sandwich for lunch. She has two types of breads, three types of meats, and two types of cheeses to choose from. How many different sandwiches can she make if she chooses only one of each ingredient?

Possible Answers:

7

1

5

12

Correct answer:

12

Explanation:

Each item (bread, meat, and cheese) is chosen independently from the others, so the answer can be found in a tree diagram: Bread x Meat x Cheese or 2 x 3 x 2 or 12.

How many different 5 letter computer passwords are possible, assuming that letters cannot be repeated?

Possible Answers:

5,100,480

11,881,376

7,893,600

12,569,212

Correct answer:

7,893,600

Explanation:

26P5 = 26 x 25 x 24 x 23 x 22 = 7,893,600

At a party with 9 guests, every guest shakes every other guest's hand exactly once. How many handshakes are exchanged during the party?

When two people shake hands with each other, that counts as one handshake.

Possible Answers:

36

48

24

72

60

Correct answer:

36

Explanation:

Each person shakes 8 people's hands, so at first guess that's 9x8=72 handshakes. However, this double counts the number of handshakes since we count the handshake between person A and B once when we count A's 8 handshakes and a second time when we count B's 8 handshakes. Therefore, we divide our estimate by 2 and get 36.

A university can send 3 track athletes and 2 field athletes to an upcoming sports event. The university has 14 track athletes and 10 field athletes who qualify. How many different teams can be chosen to attend the sports event?

Possible Answers:

140

16,380

840

10,080

64,800

Correct answer:

16,380

Explanation:

The number of different teams that could be chosen is $C(14, 3) \times C(10, 2) = 16{,}380$.

Sandwiches	Price
Ham	$4.75
Ham and Cheese	$5.25
Turkey	$4.75
Veggie	$4.50
Salami	$5.00
Pastrami	$5.25
Meatball	$6.00
Meals	**Price**
Spaghetti	$8.00
Spaghetti with Meatballs	$9.50
Ravioli	$10.00
Fettucini	$9.25
Lasagna	$9.00
Salads	**Price**
Caesar	$3.50
House	$3.00
Tomato & Mozzarella	$4.50
Italian Chopped	$5.25

The menu above is from Lena's Italian Kitchen. If you are going there for dinner, how many different combinations of a meal and a salad are there?

Possible Answers:

10

25

5

20

15

Correct answer:

20

Explanation:

Combinations = # first option * # second option

= # meals * # salads

= 5 * 4 = 20

In how many ways can the eight members of a students' council pose in a line for a yearbook photograph if the chair and vice-chair must be side by side?

Possible Answers:

$3,024$

$1,440$

$10,080$

64

$40,320$

Correct answer:

$1,440$

Explanation:

First find the number of arrangements in which the chair and vice-chair are together. Consider the chair and vice-chair as a unit. This pair can be arranged with the remaining six members in ${}_6P_6 = 720$ ways. For each of these ways, the chair could be either on the left or the right of the vice-chair.

Therefore, there is a total of

$$2 \times 720 = 1440$$

ways in which the chair and vice-chair are together.

A student is taking a test consisting of six questions. It is a multiple choice test and each question has four answers labelled A, B, C, and D. How many ways can the student answer all six questions if he does not choose the same answer for any two consecutive questions?

Possible Answers:

324

100

625

30

972

Correct answer:

972

Explanation:

the student has four choices for the first question, but only three choices for each of the remaining questions since he does not choose answers with the same letter twice in a row. From the multiplicative counting principle, there are $4 \times 3 \times 3 \times 3 \times 3 \times 3 = 972$ ways Steve can answer the six questions.

In permutation notation, what does 8P4 represent?

Possible Answers:

1680

336

6720

210

Correct answer:

1680

Explanation:

The expression 8P4 represents the number of permutations of 8 objects arranged 4 at a time. Thus, 8 x 7 x 6 x 5 = 1680

How many different ways can five books be lined up on a shelf?

Possible Answers:

60

150

80

100

120

Correct answer:

120

Explanation:

Order matters, so we use permutations: (5)(4)(3)(2)(1) = 120

There are five possibilities for the first book, four possibilities for the second book, three for the third, and two for the fourth, and one possibility for the last book.

How many different ways can cheese slices be stacked in piles containing 6 unique types if you are presented with a selection of 75 different cheeses? (Presume that the order of the cheese slices does matter.)

Possible Answers:

- 450
- $144,978,876,000$
- $13,348,388,671,875$
- $72,489,438$
- 435

Correct answer:

$144,978,876,000$

Explanation:

Since the order matters, you are dealing with a permutation in this question. A permutation like this could be done with the equation:

$$P(n,r) = \frac{n!}{(n-r)!}$$

For our values, this would be:

$$P(75,6) = \frac{75!}{(75-6)!} = \frac{75!}{69!} = 75 * 74 * 73 * 72 * 71 * 70$$

However, it is easiest just to think of this like it has 6 slots. Into the first, you have 75 choices, into the second 74, and so forth. This generates for you

$75 * 74 * 73 * 72 * 71 * 70$

more easily.

This is $144,978,876,000$. That is a lot of cheese arrangements!