

## Permutations

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Name: \_\_\_\_\_

Period: \_\_\_\_\_

Solve these problems.

- How many ways can a president, vice president and treasurer be chosen from a class of 30 students?
- How many ways can runners get 1<sup>st</sup> place, 2<sup>nd</sup> place, and 3<sup>rd</sup> place if 30 contestants compete?
- Use the formula to calculate  $P(12, 3)$ .
$$P(n, r) = \frac{n!}{(n - r)!}$$
- Use the formula to calculate  $P(15, 9)$ .
$$P(n, r) = \frac{n!}{(n - r)!}$$
- Twenty-four students go on a field trip. Two students need to be chosen to take on leadership roles: temporary president and vice president. How many ways are there to choose two these students?
- If eight horses compete in a race, how many ways can they finish?

- 7) Gina's Italian Ice in Berwyn had these toppings on May 6<sup>th</sup>, 2013:

Toppings	
Lemon	Lime
Watermelon	Banana
Cherry	Cantaloupe
Strawberry	Coconut
Piña Colada	Red Raspberry

Calculate the number of two-scoop sundaes that could be ordered from this restaurant if two flavors are chosen.

- 9) Maria, Simone, Frank, and Jill have to be arranged in seats that are placed in a line. If Jill must sit in the first seat, how many ways can these students be arranged?

- 8) Al's Restaurant in Cicero allows these toppings for its pizzas:

Toppings	
Fresh Garlic	Sausage
Black Olives	Pepperoni
Green Olives	Ground Beef
Spinach	Italian Beef
Artichoke	Bacon
Broccoli	Ham
Cauliflower	Anchovies
Pineapple	Chicken
Jalapeños	Shrimp
Hot Peppers	Sliced Tomato
Ricotta Cheese	Green Pepper
Sliced Beef	Mushrooms
Eggplant	Onion

Calculate the number of three-topping pizzas that could be ordered from this restaurant.

- 10) Maria, Simone, Frank, and Jill have to be arranged in seats that are placed in a line. If Jill must sit in the second seat, how many ways can these students be arranged?