

Discuss with your partner(s)

1. Norton House of Pizza offers 20 different toppings for their pizzas, including ham, pineapple, and broccoli.
 - (a) How many different five topping pizzas are there?
 - (b) How many different five topping pizzas are there that include broccoli?
 - (c) How many different five topping pizzas are there that do not include broccoli?
 - (d) Geralt believes that a pizza must include both pineapple and ham or include neither. How many different five topping pizzas can Geralt order?

2. Ten points, labeled A, B, C, \dots, J , are placed in the plane so that no three line on the same straight line.
 - (a) How many straight lines are determined by the ten points?
 - (b) How many of these do not pass through A ?
 - (c) How many triangles have three of the points as vertices?
 - (d) How many of these triangles do not have A as a vertex?
 - (e) How many of these triangles have A as a vertex?

Epp Exercise 9.5.17

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3. Prove that if A is a subset of \mathbb{Z} with 6 elements, then at least two elements of A are equivalent mod 5.
4. If $|A| = 43$ and $|B| = 8$, what does the Generalize Pigeonhole Principle say?
5. Show that in a group of 140 students, at least six must have the same first initial (assume everyone has expressed their name using the 26 letters of the Latin alphabet).
6. (a) Pick a subset of six integers from the set $\{1, 2, \dots, 10\}$. Verify that one of the integers you picked divides another one that you picked. Repeat with a different subset of size 6.
(b) Pick a subset of 8 integers from the set $\{1, 2, \dots, 14\}$. Verify that one of the integers you picked divides another one that you picked. Repeat with a different subset of size 7.
7. Prove the general statement of #6: If $n + 1$ integers are selected from $\{1, 2, \dots, 2n\}$, then one of the selected integers divides another of the selected integers.