

Lesson: Identical Objects Problem Solving with Combination

Definitions:

Set- group of elements

Subsets – a set whose elements are also elements of another set, also known as 2^n

Example #1

A student has a pencil, eraser, calculator and highlighter. In how many ways can the student choose one or more supplies to put in her pencil case?

Pencil case:

- ① pencil
- ② eraser
- ③ calculator
- ④ highlighter
- ⑤ pencil & eraser
-
-
-

~~nCr~~

null set
↓ = choose nothing

$$\frac{2}{\text{pencil}} \times \frac{2}{\text{eraser}} \times \frac{2}{\text{calculator}} \times \frac{2}{\text{highlighter}} - 1$$

$$= 16 - 1$$

$$= 15 \text{ ways}$$

Example #2:

1. Yinger finds 11 pairs of pants in her size at a clearance sale. How many different purchases could she make?

$$2^{11} - 1 = 2047 \text{ ways}$$

Example #3:

In how many ways can a committee of at least one member be appointed from a board of 7 members?

$$2^7 - 1 = 127 \text{ ways}$$

Example #4:
3 pencils, 4 erasers, 1 calculator, 2 highlighters

In how many ways can the student choose 1 or more supplies?

identical objects

3 pencils → (3+1) no pencil

$$\frac{4}{\text{pencils}} \times \frac{5}{\text{erasers}} \times \frac{2}{\text{calculator}} \times \frac{3}{\text{highlighters}} - 1$$

$$= 119 \text{ ways}$$

In general: $\frac{(m+1)(n+1)(p+1)(q+1) - 1}{\text{null set}}$

Example #5: identical objects

choosing specific # of objects

There are 5 apples, 2 oranges, 3 pears. In how many ways can the chef choose 3 fruits for the dessert if the dessert must include at least 1 pear?

P P P
P P A
P P O
P A O
P A A
P O O

∴ 6 ways ✓



