

Counting gets
tricky!!

Permutations with repeats

F R E E Z E R

Consider the word:

COW

How many permutations are there of the letters?
Write all of them out.

C O W

O W C

C W O

W O C

O C W

W C O

Consider the word:

M O O

How many permutations are there of the letters?
Write all of them out.

Just
these.



How many permutations of the word BARRAYAR exist?

How many permutations of the word BARRAYAR exist?

$$= \frac{\textit{Letters!}}{A! * R!}$$

If you are using all letters,
divide out the repeated letters.

How many permutations of the word BARRAYAR exist?

$$\begin{aligned} \textit{Number of Permutations} &= \frac{8!}{3! * 3!} &= \frac{\textit{Letters!}}{\textit{A! * R!}} \\ &= 1120 \end{aligned}$$

If you are using all letters,
divide out the repeated letters.

Why just these?

M O O

O M O

O O M

Number of Permutations

$$= \frac{3!}{2!}$$

$$= \frac{6}{2}$$

$$= 3$$

Consider the word:

F R E E E Z E R

1. How many unique letters are present?
2. How many letters are repeated? How many times?
3. How many permutations of all the letters?

$$= \frac{\text{Letters!}}{E! * R!}$$

Take your 6 letters (3 same, 3 different):

Z Z Z Y X W

Using only three letters,
how many ways can you
get them all the same?

Take your 6 letters (3 same, 3 different):

Z Z Z Y X W

Using only three letters,
how many ways can you
get them all the same?

Z Z Z

One way.

Take your 6 letters (3 same, 3 different):

Z Z Z Y X W

Using only three letters,
how many ways can you
arrange them with two
the same?

Take your 6 letters (3 same, 3 different):

Z Z Z Y X W

Using only three letters, how many ways can you arrange them with two the same?

Z Z Y Z Z X Z Z W
Z Y Z Z X Z Z W Z
Y Z Z X Z Z W Z Z

Take your 6 letters (3 same, 3 different):

Z Z Z Y X W

Using only three letters,
how many ways can you
arrange them with none
the same?

Take your 6 letters (3 same, 3 different):

Z Z Z Y X W

Using only three letters,
how many ways can you
arrange them with none
the same?

Z Y X W

4	3	2
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24 ways

How many 3 letter permutations of ZZZYWX?

How many 3 letter permutations of ZZZYWX?

(a) All the same

Z Z Z

= 1 way

How many 3 letter permutations of ZZZYWX?

(a) All the same

Z Z Z

= 1 way

(b) Two same, one different

Z Z 3

= 3 other letters x 3 places

= 9 ways

How many 3 letter permutations of ZZZYWX?

(a) All the same

Z Z Z

= 1 way

(b) Two same, one different

Z Z 3

= 3 other letters x 3 places

= 9 ways

(c) All different

4 3 2

= 4 x 3 x 2

= 24 ways

Z, Y, W, Z = 4 things

How many 3 letter permutations of ZZZYWX?

(a) All the same

Z Z Z

= 1 way

(b) Two same, one different

Z Z 3

= 3 other letters x 3 places

= 9 ways

(c) All different

4 3 2

= 4 x 3 x 2

= 24 ways

Z, Y, W, X = 4 things

= 34 ways

Consider the word:

F R E E E Z E R

4. How many three letter permutations?

(a) All the same



(b) Two same,
one different



(c) All different



Permutations with Repeats – Oct 3

- Form Groups (up to 3).
- Write the title (see above) and your names on the top of a sheet of paper.

Answer the following (write the questions):

1. How many permutations of all the letters in CABBAGE?
2. How many permutations of all the letters in BEGINNING?
3. How many permutations of 3 of the letters in INNKEEPER?
4. How many permutations of 2 of the letters in GEESE?

- Hand in when complete.