Permutations (11.1)

p524 day 1

ex1a: Sandy's soccer team had 3 jerseys and 2 colours of shorts. How many different combinations could they make for the uniform?

P < W B
O < W O
S < W B

6

3x2 = 6

ex1b: At Dairy Queen, you can choose from 6 sandwiches, 2 sides, 5 drinks, and 7 sundaes. How many different meals can you eat?

6 x 2 x 5 x 7 = 420 meals

The Fundamental Counting Principle

P x S x F x H
5 x 12 x 3 x 2 = 360

If there are *a* ways of doing one thing, and *b* ways of doing another, there are *a*x*b* ways of doing them both.

Permutations (11.1)

p524 day 1

ex2: A luggage lock opens with the correct three-digit code. Each wheel rotates through the digits 0 to 9.

a) How many different three-digit codes are possible?
b) Suppose each digit can be used only once in a code. How many different codes are possible when repetition is not allowed?

a) 10 x 10 x 10 = 1000 codes

b) 10 x 9 x 8 = 720 codes

ex3: P.E.I. license plates have 2 letters and 3 numbers. How many plates are possible?

BK 486 APA

26 x 26 x 10 x 10 x 10 = 676,000

Permutations (11.1)

p524 day 1

how many ways can you line up 3 objects on your desk?

P C E
P E C

6

now try it with 4 things - work in a group of 4

how do you know if you got all the possibilities?

P C E B
P C B E

24

try making a list - use first letters of the objects

Permutations (11.1)

p524 day 1

ex4: When Caroline goes for a 5k run, she listens to a 6-song playlist on her phone. If she hits *shuffle*, how many different lists can she listen to?

6 x 5 x 4 x 3 x 2 x 1 = 720

4	24
5	120
6	720

do you see a pattern here?

Permutations (11.1)

p524 day 1

for a list of *n* objects, there are *n!* permutations or ways of putting them in order.

"n factorial" $n! = n(n-1)(n-2)...(3)(2)(1)$

7! = 7·6·5·4·3·2·1

ex5: evaluate

a) 5! = 120

b) 9! = 362,880

c) $\frac{8!}{4!}$ = 1680

d) $\frac{12!}{9!3!}$ = 220

Permutations (11.1)

p524 day 1

ex6: There were 7 people on Student Council exec one year. How many ways could Mrs. Charlton arrange the 7 members into their various positions?

7! = 5040

6b: Actually, the President was elected, so how many ways could the exec be formed if the President is already picked?

1 x 6 x 5 x 4 x 3 x 2 x 1

1 x 6! = 720

Permutations (11.1)

p524 day 1

ex7: How many anagrams are there for:

a) math

$4! = 24$

b) english $7! = 5040$

c) uncopyrightable $15! = 1.3 \times 10^{12}$ 1.3 trillion

just take the number of letters and use the factorial n!

Permutations (11.1)

p524 day 1

ex8: How many anagrams can you make for:

a) breakfast $\frac{9!}{2!}$

b) colonel $\frac{7!}{2!\,2!}$

c) canada $\frac{6!}{3!}$

d) colonel gray $\frac{12!}{2!2!}$

clearly goon
allergy coon
argyle colon

Permutations (11.1)

p524 day 1

If you are counting permutations and some objects are the same, you have to divide by the number of ways that you can arrange each group of identical objects.

$P = n!$ if all different

$P = \frac{n!}{a!b!...}$ with a of one thing, b of another

Permutations (11.1)

p524 day 1

hw: p328#3,4,5,6,7