Slide 1

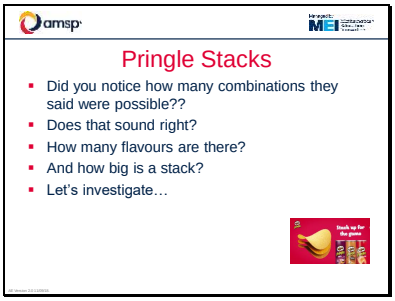
Slide 2

Other crisp-like snacks are available…

Slide 3

The clip takes 3 flavours and states there are 318,000 possible stacks. It is not clear at this point whether they are talking about combinations (where the order doesn't matter) or permutations (where it does). They also don't tell you how many flavours they are choosing from…

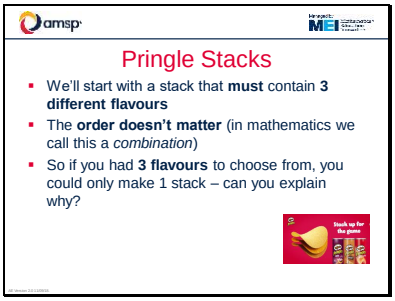
Slide 4



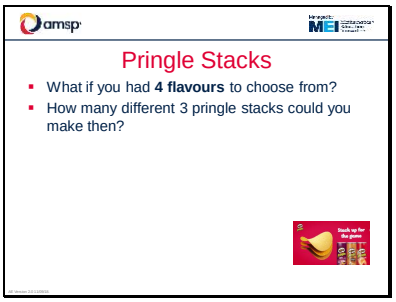
318,000

This sounds like a lot! You might want to gather information from students as to whether they think this is a valid claim, what information they need etc.

Slide 5

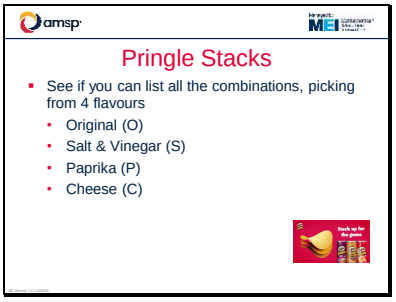


Slide 6



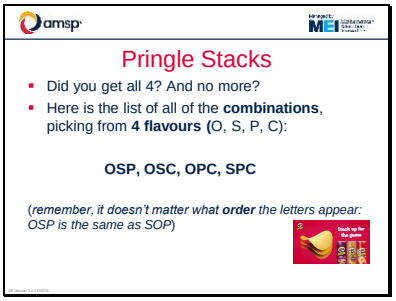
Answer on next page

Slide 7

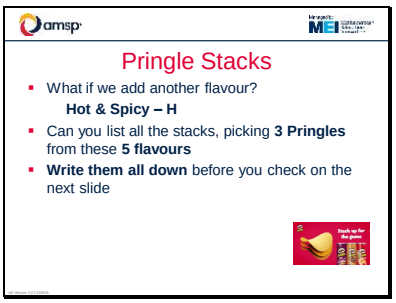


Answer on next page

Slide 8

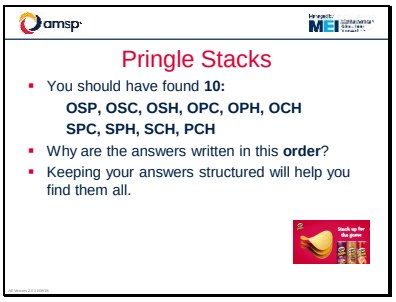


Slide 9



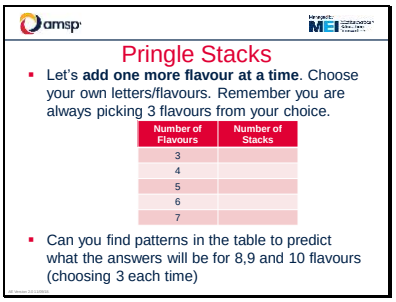
Answer is on next page

Slide 10



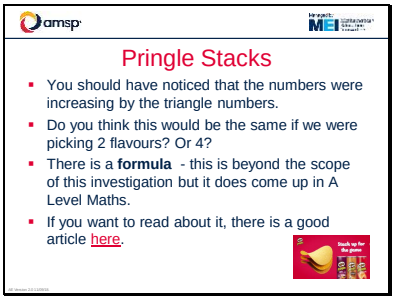
The order is: all stacks beginning with OS then OP then OC;
then all stacks beginning with SP then SC (no O);
then all stacks beginning with P (no O or S)

Slide 11

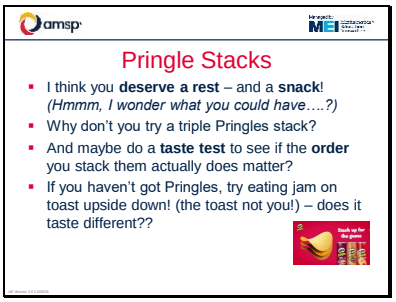


Number of Flavours	Number of Stacks
3	1
4	4
5	10
6	20
7	35
8	56
9	84
10	120

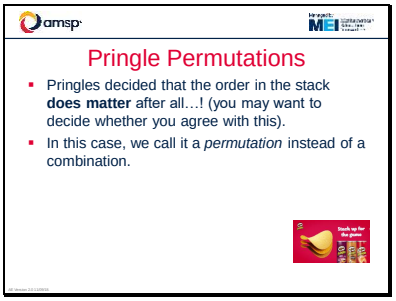
Slide 12



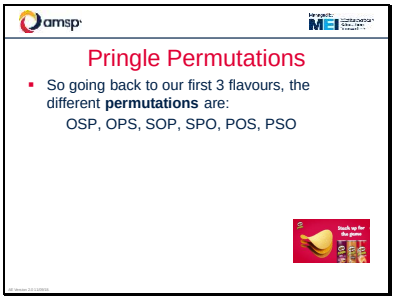
Slide 13



Slide 14



Slide 15



Slide 16

Pringle Permutations

- How many permutations would there be if you had **4 flavours** and wanted to combine all 4?, Can you find them all? (for example OPSH, OHPS, OHPS,…)
- How many ways of choosing 3 Pringles are there with **5 flavours** to choose from?

There are 6 beginning with O, 6 beginning with S, 6 beginning with P, and 6 beginning with C

Slide 17

Pringle Permutation Formula

- Let's start with **3 flavours** for our triple stack.
- The top of the stack can be any of the **3** flavours.
- The middle Pringle can be any of the **2** remaining flavours.
- The bottom Pringle has to be the **final** flavour
- That gives us 3 x 2 x 1 = 6 permutations.

Slide 18

Pringle Permutation Formula

- What about choosing 3 crisps from **4 flavours**?

1st = 4 flavours to choose from

2nd = 3 flavours to choose from

3rd = 2 flavours to choose from

4 x 3 x 2

Slide 19

Pringle Permutation Formula

- Can you predict the calculation for choosing 3 crisps from **5 flavours**? **6 flavours? 7 flavours? 10 flavours?**

5 x 4 x 3 =60

6 x 5 x 4 = 120

7 x 6 x 5 = 210

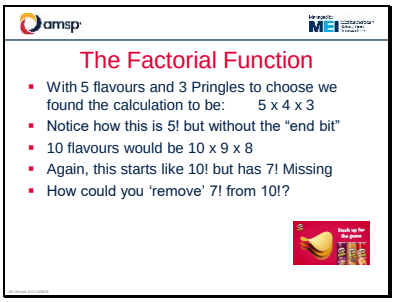
10 x 9 x 8 = 720

Slide 20

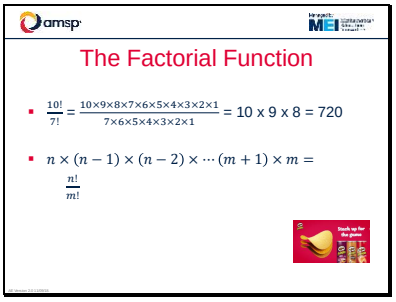
Pringle Permutation Formula

- Here's the answer for **10 flavours** and a triple stack? 10 x 9 x 8 = 720
- For a general formula, we use the **factorial function** (*symbol:* !)
- The **factorial function** means you multiply a the descending integers from the starting number down to 1:
- 3! = 3 x 2 x 1 = 6
- 5! = 5 x 4 x 3 x 2 x 1 = 120

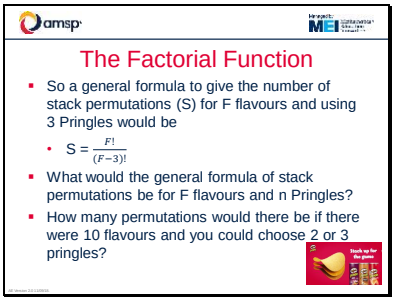
Slide 21



Slide 22



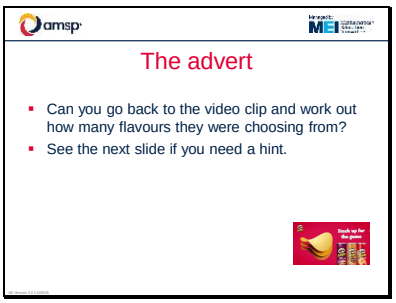
Slide 23



S = $\frac{F!}{(F-n)!}$

1 0 x 9 + 10x9x8 = 810

Slide 24



Slide 25

Students could do this by trial and error, or by solving a quartic n(n-1) + n(n-1)(n-2)+n(n-1)(n-2)(n-3) = 318,000. I wouldn't expect many students to take the algebraic approach (esp not pre Year 12). Those with classwiz calculators could make a quartic and get the calculator to solve.

You may want to guide students with their trial and error until they get the right answer of 25 flavours.

Slide 26

318,000?

- What are your thoughts?
- Does the number seem reasonable now you know how they got it?
- Would COS taste different to SCO?
- Would you ever put 4 different flavours in your mouth?

Slide 27

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Advanced_Maths