



Problem of the Week

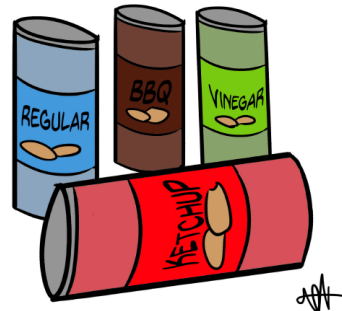
Problem B and Solution

Three-Chip Stacks

Problem

Chip's favourite snack food is Dingles potato chips. He enjoys layering 3 chips together to make a stack of interesting flavours. If he only has Regular flavoured Dingles, there is only one way to stack the three chips. That is Regular, Regular and Regular which can be written as rrr. The order in which the chips are layered does not matter. For example, if we have Regular and BBQ Dingles then the stack BBQ, BBQ and Regular (bbr) is the same as BBQ, Regular and BBQ (brb).

- a) If he has Regular and BBQ flavoured Dingles, list all the different stacks of 3 chips he can make.
- b) If he has three flavours of chips, Regular, BBQ, and Vinegar, list all the different stacks of 3 chips he can make.
- c) If he adds a fourth flavour, Ketchup, list all the different stacks of 3 chips he can make.



SUGGESTION: You may use the following boxes to help you organize the possible stacks. You may also want to use r to represent Regular, b for BBQ, v for Vinegar, and k for Ketchup.

rrr	rrb
rbb	bbb

Part a)

rrr	rrb	rrv	rbb	rvv
rbv	bbb	bbv	bvv	vvv

Part b)

rrr	rrb	rrv	rrk	rbb
rvv	rkk	rbv	rbk	rvk
bbb	bbv	bbk	bvv	bkk
bvk	vvv	vvk	vkk	kkk

Part c)

Solution

The list for parts a), b), and c) are shown above. A solution using an exhaustive process is shown on the next page.



a)

Number of Regular	Number of BBQ	Possible Stack
3	0	rrr
2	1	rrb
1	2	rbb
0	3	bbb

b)

Number of Regular	Number of BBQ	Number of Vinegar	Possible Stack
3	0	0	rrr
2	1	0	rrb
2	0	1	rrv
1	2	0	rbb
1	0	2	rvv
1	1	1	rbv
0	3	0	bbb
0	2	1	bbv
0	1	2	bvv
0	0	3	vvv

c)

Number of Regular	Number of BBQ	Number of Vinegar	Number of Ketchup	Possible Stack
3	0	0	0	rrr
2	1	0	0	rrb
2	0	1	0	rrv
2	0	0	1	rrk
1	2	0	0	rbb
1	0	2	0	rvv
1	0	0	2	rkk
1	1	1	0	rbv
1	1	0	1	rbk
1	0	1	1	rvk
0	3	0	0	bbb
0	2	1	0	bbv
0	2	0	1	bbk
0	1	2	0	bvv
0	1	0	2	bkk
0	1	1	1	bvk
0	0	3	0	vvv
0	0	2	1	vvk
0	0	1	2	vkk
0	0	0	3	kkk