Inv. 3.4

$y = 2x(x + 3)$

	x	y	First Differences	Second Differences
-10 · -2	-5	20	12	4
-8 · -1	-4	8	8	4
-6 · 0	-3	0	4	4
-4 · 1	-2	-4	0	4
-2 · 2	-1	-4	-4	4
	0	0	-8	4
2 · 4	1	8	-12	4
4 · 5	2	20	-16	4
6 · 6	3	36	-20	4
8 · 7	4	56	-24	
10 · 8	5	80		

$y = 3x - x^2$

	x	y	First Differences	Second Differences
-15 - 25	-5	-40	-12	-2
-12 - 16	-4	-28	-10	-2
-9 - 9	-3	-18	-8	-2
-6 - 4	-2	-10	-6	-2
-3 - 1	-1	-4	-4	-2
	0	0	-2	-2
3 - 1	1	2	0	-2
6 - 4	2	2	2	-2
9 - 9	3	0	4	-2
12 - 16	4	-4	6	-2
15 - 25	5	-10		

$y = (x - 2)^2$

	x	y	First Differences	Second Differences
	-5	49	13	2
	-4	36	11	2
	-3	25	9	2
	-2	16	7	2
	-1	9	5	2
	0	4	3	2
	1	1	1	2
	2	0	-1	2
	3	1	-3	2
	4	4	-5	
	5	9		

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$y = x^2 + 5x + 6$

	x	y	First Differences	Second Differences
	-5	6	4	2
	-4	2	2	2
	-3	0	0	2
	-2	0	-2	2
	-1	2	-4	2
	0	6	-6	2
	1	12	-8	2
	2	20	-10	2
	3	30	-12	2
	4	42	-14	
	5	56		

Observations:

Second differences are the same #

$y = x + 2$

x	y	First Differences	Second Differences
0	2		
		-1	
1	3		0
		-1	
2	4		0
		-1	
3	5		0
		-1	
4	6		0
		-1	
5	7		

$y = 2x$

x	y	First Differences	Second Differences
0	0		
		-2	
1	2		0
		-2	
2	4		0
		-2	
3	6		0
		-2	
4	8		0
		-2	
5	10		

$y = 2^x$

x	y	First Differences	Second Differences
0	1		
		-1	
1	2		1
		-2	
2	4		2
		-4	
3	8		4
		-8	
4	16		8
		-16	
5	32		

$y = x^2$

x	y	First Differences	Second Differences
0	0		
		-1	
1	1		2
		-3	
2	4		2
		-5	
3	9		2
		-7	
4	16		2
		-9	
5	25		

Identify the function from the table:

Linear:

y-values go up or down by same amount
2nd differences are 0

Exponential:

y-values are multiplied by the same number
2nd differences are NOT the same

Inverse Variation:

$x \cdot y$ is always same number

Quadratic:

Look for symmetry
2nd differences are the same # (not 0)
3rd differences are 0