Harder Patterns #3 (Mixed)

Write the equations for these patterns:

1

x	y
1	4
2	16
3	36
4	64
5	100

2

n	p
1	3
2	9
3	27
4	81
5	243

3

x	y
1	14
2	24
3	30
4	32
5	30

4

x	y
1	12
2	18
3	28
4	42
5	60

5

a	b
1	3
2	7
3	12
4	18
5	25

6

x	y
1	9
2	27
3	81
4	243
5	729

7

a	b
1	6
2	12
3	24
4	48
5	96

8

a	b
1	159
2	156
3	151
4	144
5	135

9

x	y
1	0.25
2	1
3	4
4	16
5	64

10. For the pattern: 2, 11, 26, 47, 74 …

    What is the 30th term in the pattern?

11. What is the largest value reached by the pattern 52, 100, 144, 184, 220, … ?

12. Give the 40th term in the pattern: 0.25, 0.5, 1, 2, 4 …

Harder Patterns #3 – Answers

1 $y = 4x^2$

2 $p = 3^n$

3 $y = -2x^2 + 16x$

4 $y = 2x^2 + 10$

5 $b = 0.5a^2 + 2.5a$

6 $y = 3^{x+1}$ (technically also $y = 3 \times 3^x$)

7 $y = 3 \times 2^x$

8 $b = -a^2 + 160$

9 $y = 4^{x-1}$ (technically also $y = 0.25 \times 4^x$)

10 Formula is $3x^2 - 1$, so $3 \times 30^2 - 1 = 2\,699$

11 52, 100, 144, 184, 220 is $t_n = 54n - 2n^2 = 2n(27 - n)$

That will be zero when $n = 0$ and 27

Maximum will be in the middle, so $n = 13.5$

Put in $n = 13$ and we get $54 \times 13 - 2 \times 13^2 = 364$, same as when $n = 14$

So maximum value reached is 364

12 Formula is 2^{x-4}, so $2^{30-4} = 67\,108\,864$