HA1

Linear, Exponential, Quadratic

Identifying from an equation:

Linear

$y = mx + b$

→ x with degree of 1

Examples:

$y = 5x + 1$

$y = x$

$2x + 3y = 12$

Quadratic

$y = ax^2 + bx + c$

Have x^2 as highest degree

Examples:

$y = 2x^2 + 3x - 5$

$y = x^2 + 9$

$x^2 + 4y = 7$

Exponential

$y = ab^x$

→ variable exponent

Examples:

$y = 3^x + 1$

$y = 5^{2x}$

$4^x + y = 13$

- LINEAR, QUADRATIC or EXPONENTIAL?

a) $y = 6^x + 3$ – Exponential

b) $y = 7x^2 + 5x - 2$ - Quad

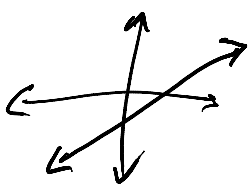
c) $9x + 3 = y$ - Linear

d) $4^{2x} = 8$ - Exponential

Identifying from a graph:

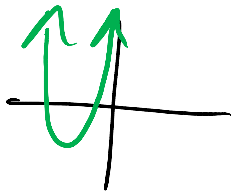
Linear

makes a straight line



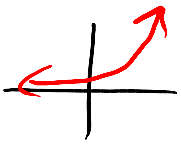
Quadratic

makes a parabola

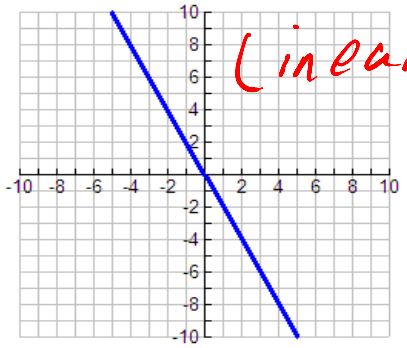


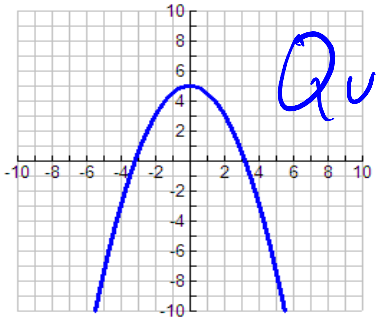
Exponential

Rises or Falls quickly in One Direction

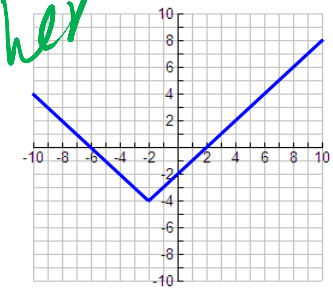


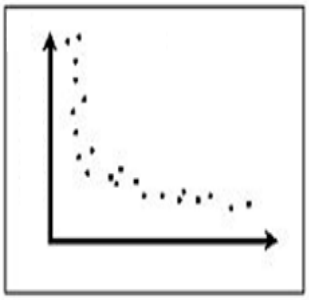
LINEAR, QUADRATIC, EXPONENTIAL, OR NEITHER?





Neither





Exponetical

Is the table linear, quadratic or exponential?

Linear	Quadratic	Exponential
• constant rate of addition - Never see same y-value twice	- Different rates btwn y-values * Same secon difference	• constant rate of multiplication • Never repeated y-values

Identifying functions given a table of values. Write an equation.

x	-2	-1	0	1	2
y	-2	1	4	7	10

+3 +3 +3 +3

Linear: $y = 3x + 4$

x	-2	-1	0	1	2
y	0.25	0.5	1	2	4

×2 ×2 ×2 ×2

Exponential: $1 \cdot 2^x$

x	-2	-1	0	1	2
y	2	0.5	0	0.5	2

-1.5 -.5 +.5 +1.5

same → +1 +1 +1

2nd Diff

Quadratic

x	y
1	0
2	-1
3	0
4	3
5	8

x	y
1	5
2	9
3	13
4	17
5	21

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

Practice:

x	−3	−2	−1	0	1	2	3
y	−14	−9	−4	1	6	11	16

x	−3	−2	−1	0	1	2	3
y	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9	27	81

x	−3	−2	−1	0	1	2	3
y	−18	−6	−2	0	2	6	18

x	−3	−2	−1	0	1	2	3
y	3	0	−1	0	3	8	15

HW: Linear, Quadratic, Exponential or neither

x	−3	−2	−1	0	1	2	3
y	21	12	5	0	−3	−4	−3

−9 −7 −5 −3 −1 +1

Quad +2 +2 +2 +2 +2

x	−3	−2	−1	0	1	2	3
y	1	0	−1	−2	−1	0	1

−1 −1 −1 +1 +1 +1

0 0 +2 0 0 Neither

x	−3	−2	−1	0	1	2	3
y	½	1	2	4	8	16	32

Exp $y = 4 \cdot 2^x$

x	−3	−2	−1	0	1	2	3
y	14	10	6	2	−2	−6	−10

−4 −4 −4 −4

Linear $y = -4x + 2$

x	−3	−2	−1	0	1	2	3
y	4	8	16	32	64	128	256

Exp $y = 32 \cdot 2^x$

x	−3	−2	−1	0	1	2	3
y	30	20	12	6	2	0	0

−10 −8 −6 −4 −2 0

+2 +2 +2 +2 +2

Quad

x	−3	−2	−1	0	1	2	3
y	0	5	8	9	8	5	0

+5 +3 +1 −1 −3 −5

Quad −2 −2 −2 −2 −2

x	−3	−2	−1	0	1	2	3
y	⅛	¼	½	9	18	36	72

Exp $y = 9 \cdot 2^x$

x	−3	−2	−1	0	1	2	3
y	−16	−13	−10	−7	−4	−1	2

Linear $y = 3x - 7$

x	−3	−2	−1	0	1	2	3
y	1/27	1/9	1/3	1	3	9	27

Exp $y = 3^x$

x	−3	−2	−1	0	1	2	3
y	−18	−6	−2	0	2	6	18

+12 +4 +2 +2 +4 +12

−8 −2 0 2 8

Neither