DAY 1 – Using Differences & Different Forms

1. Determine what type of relation is each table. Linear, Quadratic or Neither?

a.

x	y
0	-9
2	-10
4	-7
6	0
8	11
10	26

Δx: +2, +2

Δy: -1, +3, +7, +11, +15

$\Delta\Delta y$: +4, +4, +4, +4

∴ quad

b.

n	P
1	-8
7	2
13	12
19	22
22	27
25	32

Δn: +6, +6, +6, +6

ΔP: +10, +10, +10, +10

∴ Linear

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c.

Time (years)	Radiation level
1	17
2	9
3	5
4	3
5	2
6	1.5

Δx: +1, +1

Δy: -8, -4, -2, -1, -0.5

$\Delta\Delta y$: +4, +2, +1, +0.5

∴ Neither

d.

Length	Area of figure
1	2
2	5
3	10
4	17
5	26
6	37

Δx: +1, +1

Δy: +3, +5, +7, +9, +11

$\Delta\Delta y$: +2, +2, +2, +2

∴ Quad

e.

# of items	Cost
10	7
12	9
14	11
16	13
18	15
20	17

Δx: +2, +2, +2

Δy: +2, +2, +2, +2, +2

∴ Linear

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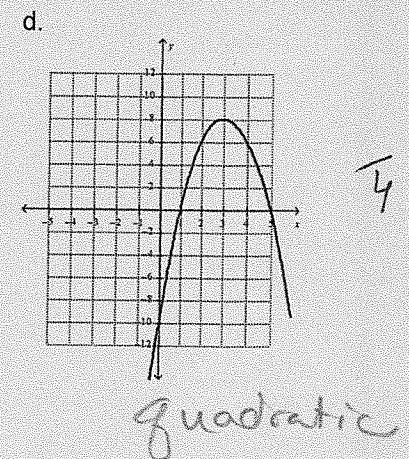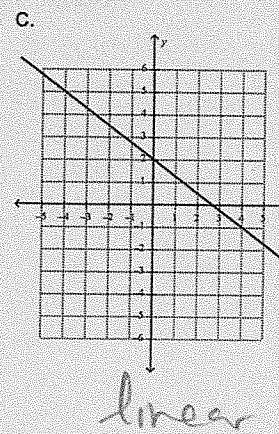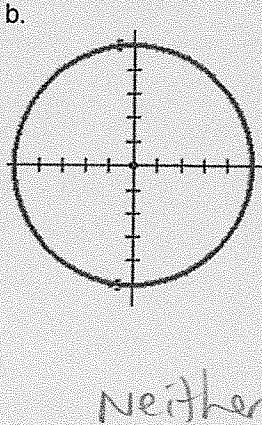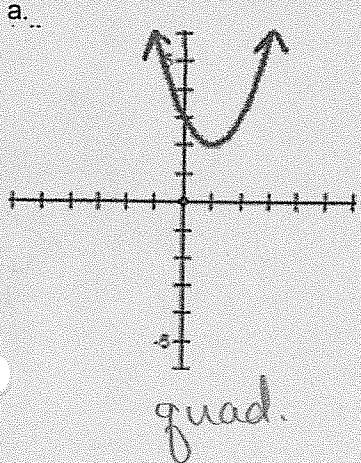2. Decide what type of relation is given by expanding and simplifying. Linear or Quadratic?

a.
$$y = (2-x)(x+3)$$
$$y = 2x + 6 - x^2 - 3x$$
$$y = -x^2 - 1x + 6$$
∴ quad

b.
$$y = 5 + 4(x-2) - 8x$$
$$y = 5 + 4x - 8 - 8x$$
$$y = -4x - 3$$
∴ Linear

c.
$$y = 2x - (x-2)^2(x-2)$$
$$y = 2x - (x^2 - 2x - 2x + 4)$$
$$y = 2x - x^2 + 2x + 2x - 4$$
$$y = -x^2 + 6x - 4$$
∴ quad.

d.
$$y = 3 + x - 5(x - 7(x+1))$$
$$y = 3 + x - 5(x - 7x - 7)$$
$$y = 3 + x - 5(-6x - 7)$$
$$y = 3 + x + 30x + 35$$
$$y = 31x + 38$$
∴ Linear

3. Decide what type of relation is given. Linear or Quadratic or Neither?

a.

quad.

b.

Neither

c.

linear

d.

quadratic

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4. For each of the following identify what form each quadratic is written in. Standard or Vertex or Factored?

(a) $y = (2x + 4)(x + 1)$ (b) $y = -2x^2 + 4x$ (c) $y = 2(x - 3)(4x + 8)$

   F   S   F

(d) $y = 2(x - 3)^2 - 1$ (e) $y = -3(x - 2)(x + 3)$ (f) $y = x^2 - 4$

   V   F   S + V

(g) $y = -3x^2 - 4x + 6$ (h) $y = (x - 3)^2 - 3$ (i) $y = -3(x + 1)^2$

   S   V   V + F $\overset{\diagup}{12}$

(j) $y = -(x - 6)^2 + 12$ (k) $y = 2x(x + 4)$ (l) $y = -(x + 2)^2 - 7$

   V   F   V

5. Expand each of these to get the quadratic into standard form

a.   b.   c.   d.
$y = 2x(x + 4)$ $y = (2x + 4)(x + 1)$ $y = -3(x + 1)^2 (x+1)$ $y = 2(x - 3)^2 - 1$

$y = 2x^2 + 8x + 0$ $y = 2x^2 + 2x + 4x + 4$ $y = -3(x^2 + 1x + 1x + 1)$ $y = 2(x-3)(x-3) - 1$

                           $y = 2x^2 + 6x + 4$ $y = -3x^2 - 3x - 3x - 3$ $y = 2(x^2 - 3x - 3x + 9) - 1$

                                                        $y = -3x^2 - 6x - 3$ $y = 2x^2 - 6x - 6x + 18 - 1$

                                                                                        $y = 2x^2 - 12x + 17$
                                                                                               $\overset{\diagup}{8}$

6. Factor each of these to get the quadratic into factored form

a.   b.   c.   d.
$y = 4x^2 - 9$ $y = x^2 - x - 72$ $y = 2\left(\dfrac{2x^2}{2} - \dfrac{22x}{2} + \dfrac{60}{2}\right)$ $y = 27x^2 - 3$ $3\left(\dfrac{}{3}\quad\dfrac{}{3}\right)$

$y = (2x + 3)(2x - 3)$ $\begin{matrix} x \\ x \end{matrix}$ $\begin{matrix} -1 & -2 & -3 & -4 \\ 72 & 36 & 24 & 18 \end{matrix}$ $y = 2(x^2 - 11x + 30)$ $y = 3(9x^2 - 1)$

                           $\begin{matrix} -6 & -8 & 1 & 2 & 3 \\ 12 & 9 & -72 & -36 & -24 \end{matrix}$ $\begin{matrix} x \\ x \end{matrix}$ $\begin{matrix} -1 & -2 & -3 & 5 \\ -30 & 15 & 10 & 6 \end{matrix}$

                           $\begin{matrix} 4 & 6 & 8 \\ -18 & -12 & -9 \end{matrix}$ $y = 2(x - 5)(x - 6)$ $y = 3(3x + 1)(3x - 1$

                           $(x + 8)(x - 9)$ $\overset{\diagup}{4}$

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