

What Relation is It?

Learning Goals

Minds on Math

What might be some ways that you can mathematically distinguish between each these relations?

$$P = 200(0.5)^t$$

$$P = 100t^2$$

$$P = 200(0.5t)$$

Differentiating Types of Relations using Representations

Example

i) Represent the following relation using a table of values, finite differences (1st and 2nd), and ratios between consecutive y-values), and a graph.

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

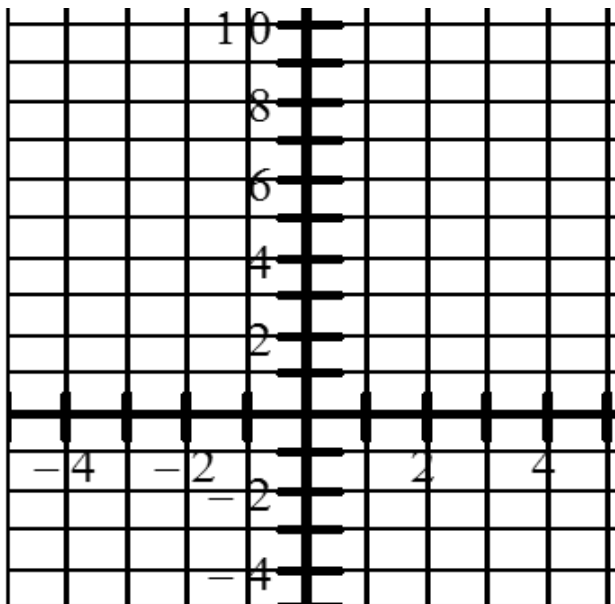
ii) Name the relationship.

| x | y | 1st differences | 2nd differences | Ratio b/w Consecutive y-values |
|----|---|-----------------|-----------------|--------------------------------|
| -2 | | | | |
| -1 | | | | |
| 0 | | | | |
| 1 | | | | |
| 2 | | | | |

Example (contd.)

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

Graph



Pull

Example (contd.)

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-
-

Pull

Take Action

Your Task

Using various representations, clearly distinguish between the following relations:

1) $y = 2(x - 2)$

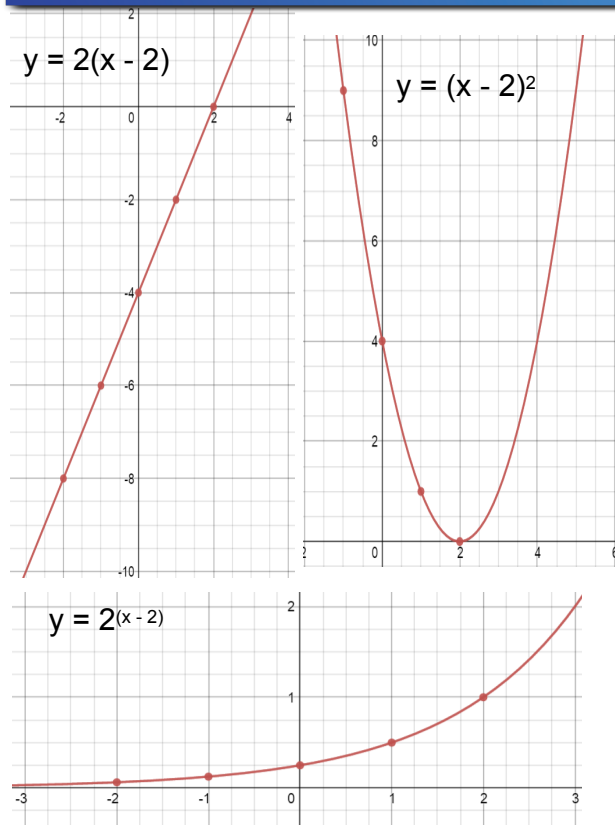
2) $y = (x - 2)^2$

3) $y = 2^{(x - 2)}$

Differentiating Types of Relations using Representations

Consolidate


Representation: Graph



Consolidate

Representation: Tables of Values


$$y = 2(x - 2) = 2x - 4$$

| x |  $2x - 4$ |
|-----|--|
| -2 | -8 |
| -1 | -6 |
| 0 | -4 |
| 1 | -2 |
| 2 | 0 |

Consolidate

Representation: Tables of Values


$$y = (x - 2)^2$$

| x |  $(x - 2)^2$ |
|-----|---|
| -2 | 16 |
| -1 | 9 |
| 0 | 4 |
| 1 | 1 |
| 2 | 0 |

Consolidate

Representation: Tables of Values

$$y = 2^{(x - 2)}$$

| x |  $2^{(x - 2)}$ |
|-----|---|
| -2 | 0.0625 |
| -1 | 0.125 |
| 0 | 0.25 |
| 1 | 0.5 |
| 2 | 1 |

Consolidate

Conclusions

$$y = 2(x - 2) = 2x - 4$$

- Graph is a straight line
 - > y-intercept -4, slope = 2
 - slope is rate of change
- First differences are equal

=> linear relation

$$y = (x - 2)^2 = x^2 - 4x + 4$$

- Second differences are equal
 - > relation is quadratic
 - > graph is a parabola
- Vertex is at (2, 0), y-intercept = 4, graph has a minimum, opens upward

$$y = 2^{(x - 2)}$$

- Ratios in consecutive y-values are equal
 - > relation is exponential
- Graph is increasing
 - > exponential growth
 - > growth factor is 2
 - > no x-intercept
 - > y-intercept 0.25 or 1/4

Independent Practice

i) Answer p392 #9 of the textbook

ii) Answer p391 #7 of the textbook (grid paper req'd)

In addition to #7abc, also do the following for #7:

-name the relation

-discuss how you know (i.e., how you could show)

-use the equation to determine the pressure, in pascals, after 10 seconds

Differentiating Types of Relations using Representations

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ii) Name the relationship.

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| x | y | 1st differences | 2nd differences | Ratio b/w Consecutive y-values |
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| -1 | | | | |
| 0 | | | | |
| 1 | | | | |
| 2 | | | | |