

Lesson 8 How Does It Grow?

A Practice Understanding Task



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For each relation given:

- Identify whether or not the relation is a function;
- Determine if the function is linear, exponential, quadratic or neither;
- Describe the type of growth
- Create one more representation for the relation.

1. A plumber charges a base fee of \$55 for a service call plus \$35 per hour for each hour worked during the service call. The relationship between the total price of the service call and the number of hours worked.

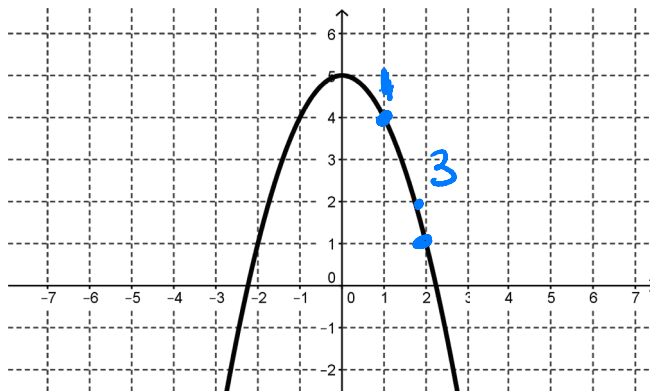
$D: \mathbb{R}; [0, \infty)$

Continuous Linear Function
Constant Rate of Change

h	$T(h)$
0	55
1	90
2	125
3	160

$T(h) = 55 + 35h$

2.

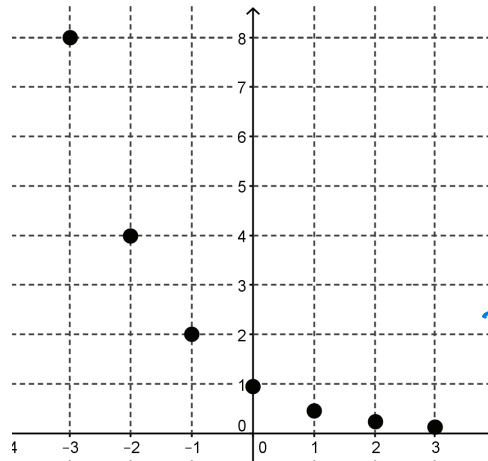


$D: (-\infty, \infty)$

Continuous Quadratic Function
Linear Rate of Change

$f(x) = -x^2 + 5$

3.



Discrete
Exponential Function

E: $f(x) = 1\left(\frac{1}{2}\right)^x$

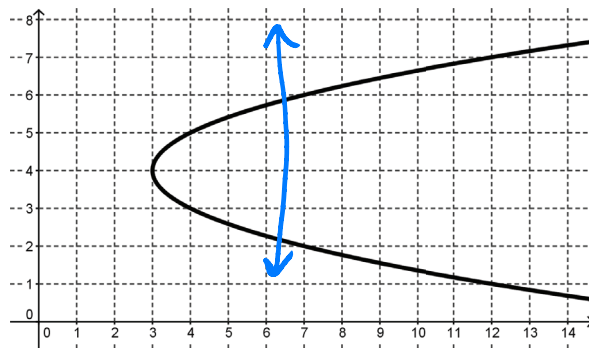
R: $\begin{cases} f(n) = f(n-1) \cdot \frac{1}{2} \\ f(0) = 1 \end{cases}$

4.

$y = \frac{1}{3}(x - 2)^2 + 4$

Continuous, Quadratic, Function

5.



Not a Function

6. $y = \frac{1}{3}(x - 2) + 4$

Continuous Linear Function
Constant Rate of Change

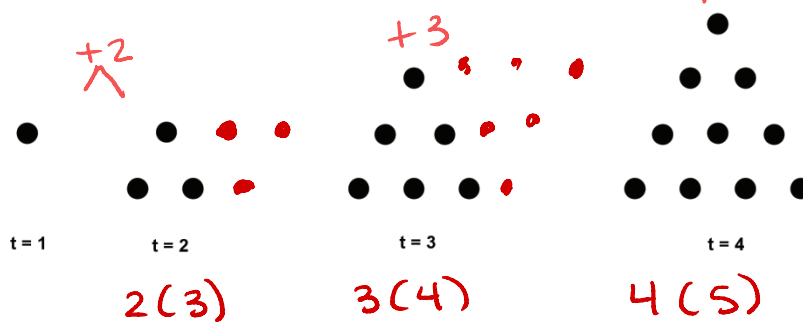
7. The relationship between the speed of a car and the distance it takes to stop when traveling at that speed.

Speed (mph)	Stopping Distance (ft)
10	12.5
20	50
30	112.5
40	200
50	312.5
60	450
70	612.5

+47.5
+62.5 +15
+87.5 +15
+112.5 +
+137.5
+162.5
-450.0
162.5

8. The relationship between the number of dots in the figure and the time, t .

Discrete Quadratic Function



n	$f(n)$	Δ
0	0	+0
1	1	+1
2	3	+2
3	6	+3
4	10	+4
5	15	+5

R: $\begin{cases} f(0) = 1 \\ f(n) = f(n+1) + n \end{cases}$

$t = n$
E: $f(n) = n(n+1)$

Linear Rate of Change

or $f(n) = n^2 + n$

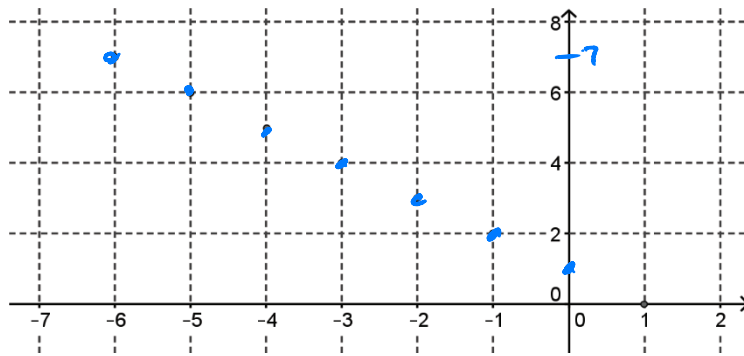


9. The rate at which caffeine is eliminated from the bloodstream of an adult is about 15% per hour. The relationship between the amount of caffeine in the bloodstream and the number of hours from the time the adult drinks the caffeinated beverage if the initial amount of caffeine in the bloodstream is 500 mg.

Continuous
Exponential
Function

$$f(x) = 500 (.85)^x$$

- 10.



Discrete
Linear
Function

$$R: \begin{cases} f(-6) = 7 \\ f(n) = f(n-1) - 1 \end{cases}$$

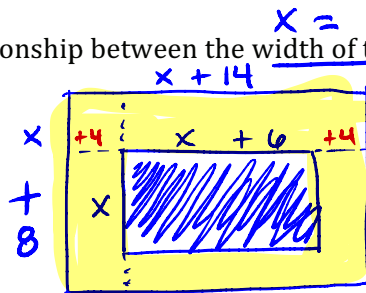
$$E: f(x) = -x + 1$$

11. $y = (4x + 3)(x - 6)$

Continuous Quadratic Function
Linear Rate of Change

12. Mary Contrary wants to build a rectangular flower garden surrounded by a walkway 4 meters wide. The flower garden will be 6 meters longer than it is wide.

a. The relationship between the width of the garden and the perimeter of the walkway.



$$P = 2(x+8) + 2(x+14)$$

$$P = 2x + 16 + 2x + 28$$

$$P = 4x + 44$$

b. The relationship between the width of the garden and area of the walkway.

$$A = (x+8)(x+14) - x(x+6)$$

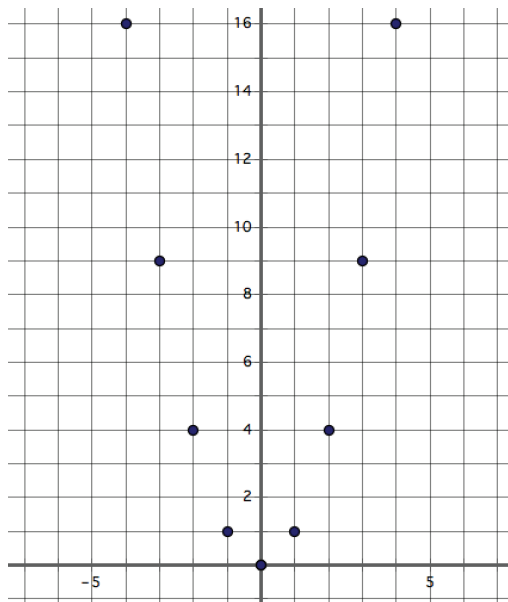
$$= x^2 + 22x + 112 - x^2 - 6x$$

$$= 16x + 112 \leftarrow \text{Area of just the walkway}$$

13. $y = \left(\frac{1}{3}\right)^{x-2} + 4$

Continuous Exponential Function

14.



Discrete Quadratic Function

Explicit
 $f(x) = x^2$

Recursive
 $f(0) = 0$
 $f(x) = f(x-1) + 2x - 1$

x	f(x)	1st
0	0	
1	1	+1
2	4	+3
3	9	+5
4	16	+7
5	25	+9