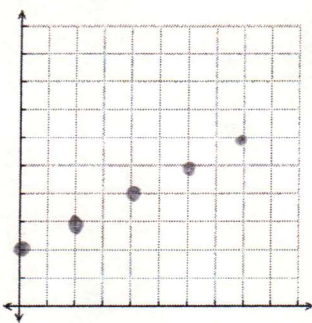
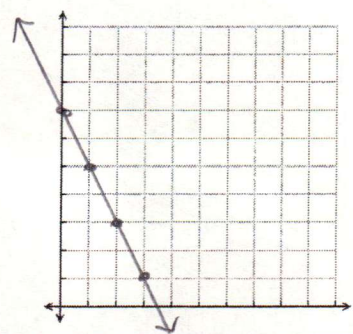
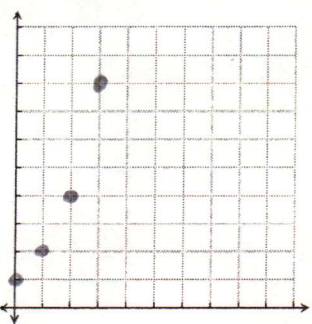
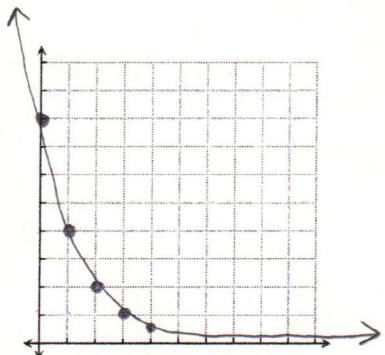


LINEAR AND EXPONENTIAL FUNCTIONS

	Discrete	Continuous
<p>Arithmetic straight line</p>	<p>not connected</p> 	<p>connected</p> 
<p>Geometric curved line</p>		

LINEAR	EXPONENTIAL
<p>y-intercept: where the graph crosses the y-axis (0, y)</p> <p>Slope/Common Difference: $m = \frac{y_2 - y_1}{x_2 - x_1}$</p> <p>$m = \frac{\text{rise}}{\text{run}}$</p>	<p>y-intercept: same as linear</p> <p>Common Ratio: the amount repeatedly multiplied</p>
<p>Slope-Intercept Form $y = mx + b$</p> <p style="margin-left: 40px;"> \uparrow slope \uparrow y-intercept </p>	<p>Exponential Growth vs Decay</p> <p style="margin-left: 40px;"> \swarrow growth \nwarrow decay common ratio > 1 $0 < \text{common ratio} < 1$ </p>
<p>Point-Slope Form $y = m(x - x_1) + y_1$</p> <p style="margin-left: 40px;"> \uparrow slope $\underbrace{\hspace{2cm}}$ (x₁, y₁) point </p>	<p>Exponential Growth vs Decay (Percentage %)</p> <p style="margin-left: 40px;"> Growth Decay 1 + % 1 - % % must be a decimal </p>

1. Write an equation in slope-intercept form and in point-slope form, then graph.

$m = -\frac{1}{2}$ $b = 3$

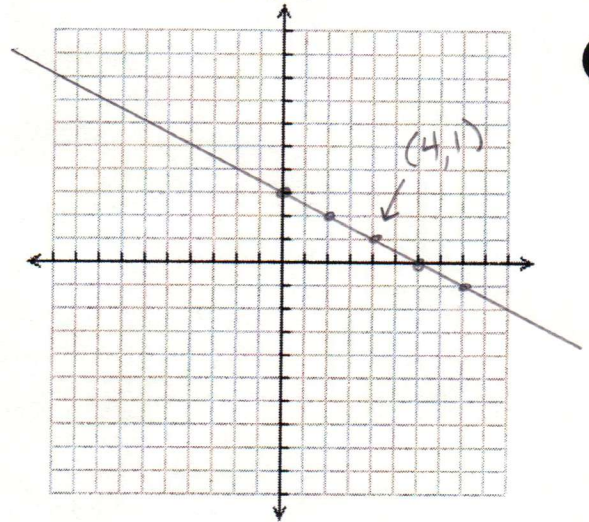
Slope-intercept:

$y = -\frac{1}{2}x + 3$

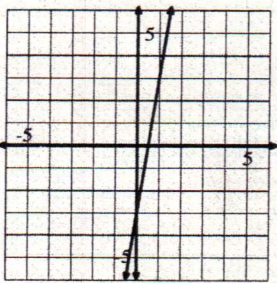
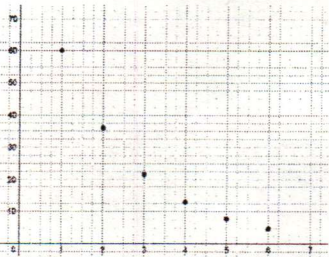
Point-slope form: using point (4,1)

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

one possible correct answer



Label each of these as **discrete or continuous** and as **linear or exponential**, then explain how you know.

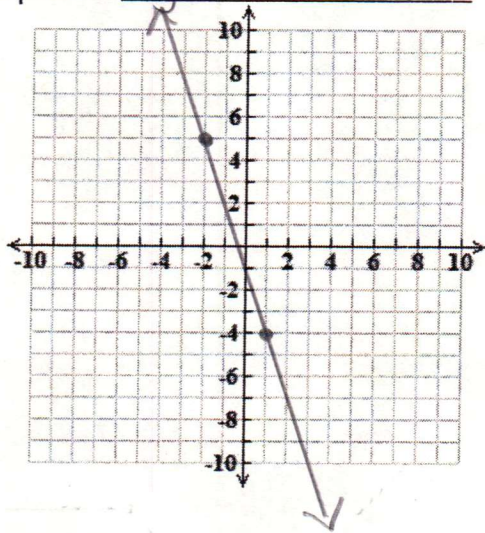
Given	Discrete or Continuous	Linear or Exponential	Explain:
2. $f(x) = 3 \cdot 2^x$	cont.	exp.	explicit equations with no context are continuous has an exponent
3. $f(1) = 7,$ $f(x) = f(x-1) - 2$	discrete	Linear	recursive equations with no context are discrete has common difference
4. 	cont.	linear	connected points straight line
5. 	discrete	exp.	just points curved graph

Write an equation from the given information and then graph.

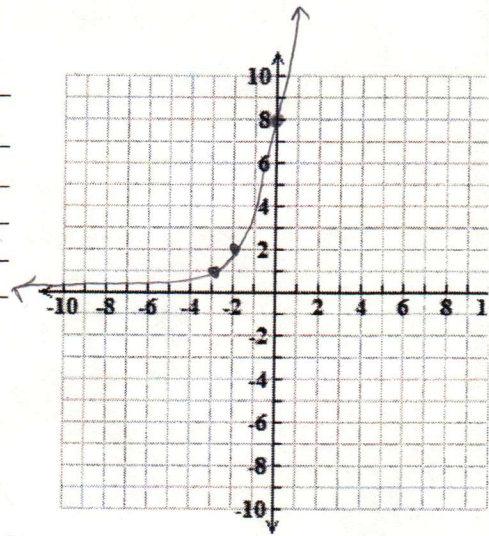
6. A linear graph goes through $(-2, 5)$ and $(1, -4)$.

$$m = \frac{5 - (-4)}{-2 - 1} = \frac{9}{-3} = -3$$

Equation: $y = -3(x - 1) - 4$ or $y = -3x - 1$



x	$f(x)$
-3	1
-2	2
-1	4
0	8
1	16
2	32



Equation: $y = 8(2)^x$

8. What is the slope and the point found in the following equation?

$$y = 2(x + 4) + 5$$

slope: $m = 2$ point: $(-4, 5)$

9. Identify the following information based from the graph below.

(a) Domain: $[0, 110]$

(b) Range: $[-3, 15]$

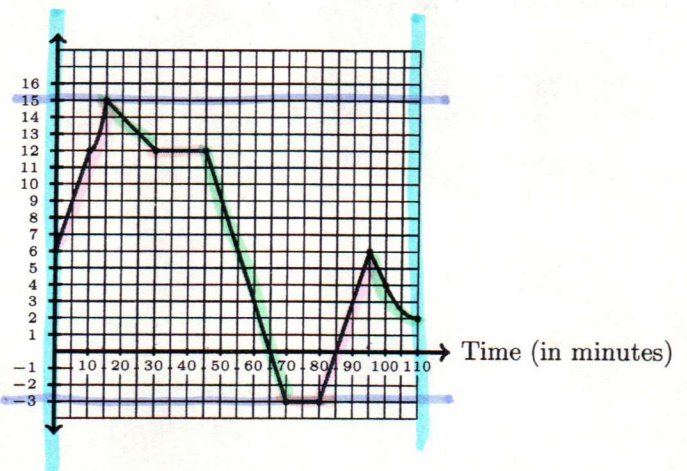
(c) Intervals of increase: $(0, 15) \cup (80, 95)$

(d) Intervals of decrease: $(15, 30) \cup (45, 70)$

(e) Intervals of constant: $(30, 45) \cup (70, 80)$

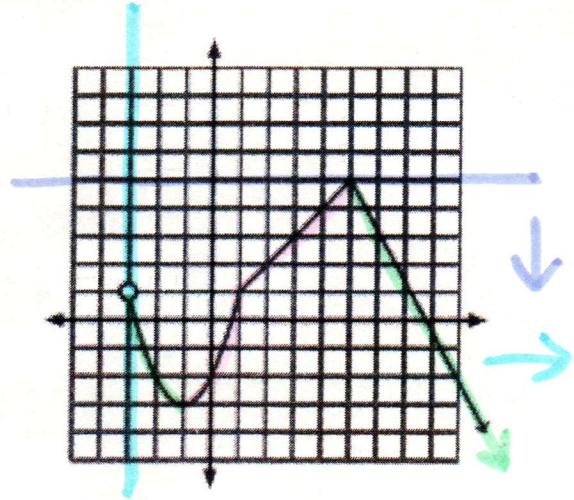
(f) x-intercepts:
 $(65, 0)$
 $(85, 0)$

Water Level (in feet)



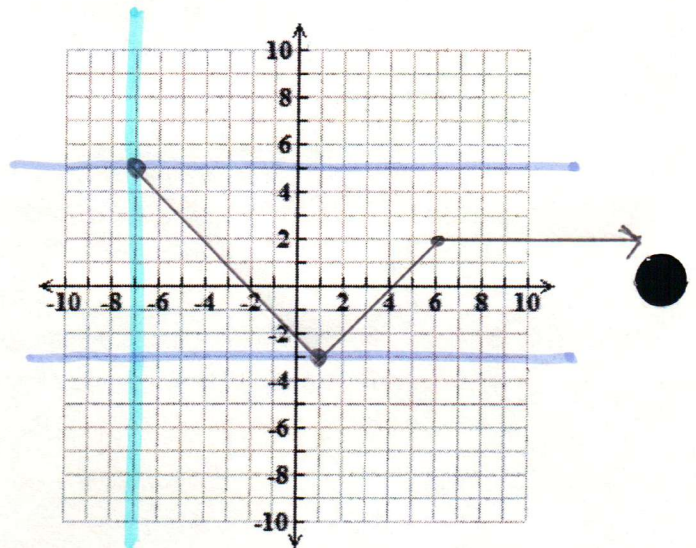
10. Use the graph below to determine each of the following:

- (a) Domain: $(-3, \infty)$
- (b) Range: $(-\infty, 5]$
- (c) Intervals of increase: $(-1, 5)$
- (d) Intervals of decrease: $(-3, -1) \cup (5, \infty)$
- (e) Intervals of constant: none
- (f) Maximum: $(5, 5)$
- (g) Minimum: $(-1, -3)$



11. Sketch a graph using the given key features.

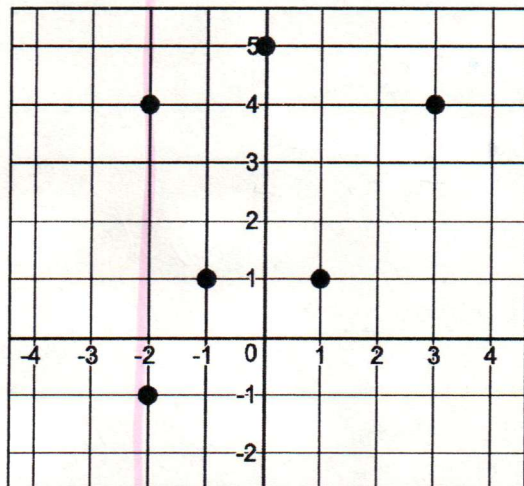
- Domain: $[-7, \infty)$
- Range: $[-3, 5]$
- Interval of Increase: $(1, 6)$ ✓
- Interval of Decrease: $(-7, 1)$ ✓
- Constant Interval: $(6, \infty)$ ✓
- Maximum: $(-7, 5)$
- Minimum: $(1, -3)$



12. Identify the following information based from the graph below.

- (a) Domain: $x = -2, -1, 0, 1, 3$
- (b) Range: $y = -1, 1, 4, 5$
- (c) Function or no?

No, because $x = -2$
goes to two
different y values

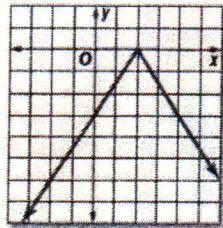


13. For each of the following, state if the given relation is a function or not. Explain your answer.

Domain	Range
2	6
5	7
6	9
6	10

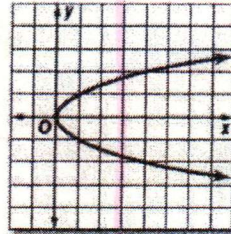
Function? *no*

Explain $x=6$
goes to
9 and 10



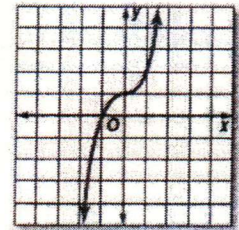
Function? *yes*

Explain
passes
vertical
line test



Function? *no*

Explain fails
vertical
line test



Function? *yes*

Explain passes
vertical line
test

14. Make two tables below. On the left, make one that is a function, and on the right one that is not a function. Then describe why the right table is not a function.

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

function

x	y
0	3
1	4
1	5
2	6
3	7

not a
function

$\leftarrow x=1$ goes to
 $y=4$ and $y=5$

15. Use the following functions to calculate the following:

$$f(x) = 2x + 1 \quad g(x) = -x + 7$$

(a) Evaluate $f(-3) = 2(-3) + 1$
 $= -6 + 1$

$$f(-3) = -5$$

(b) Evaluate $g(5) = -(5) + 7$

$$g(5) = 2$$

(c) When $f(x) = 15$, determine the value of x .

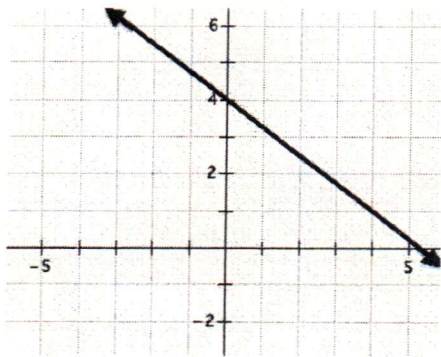
$$15 = 2x + 1$$

$$\frac{14}{2} = \frac{2x}{2}$$

$$x = 7$$

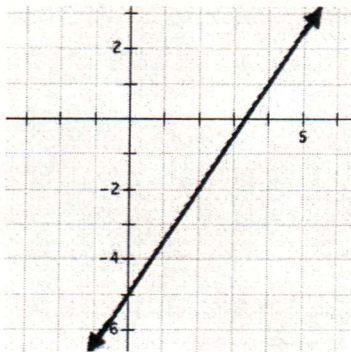
16. Use the graph of each function provide to find the indicated values

$f(x)$



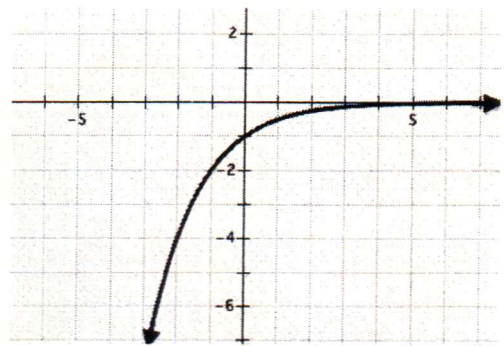
a. $f(4) = \underline{1}$ b. $f(-4) = \underline{7}$
 c. $f(x) = 4, x = \underline{0}$ d. $f(x) = 7, x = \underline{-4}$
 ↑
 y

$h(x)$



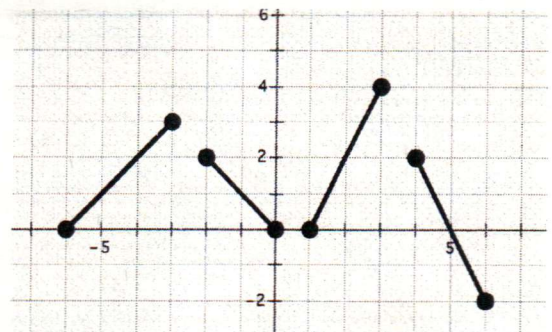
a. $h(0) = \underline{-5}$ b. $h(3) = \underline{-\frac{1}{2}}$
 c. $h(x) = 1, x = \underline{4}$ d. $h(x) = -2, x = \underline{2}$

6. $x)$



a. $g(-1) = \underline{-2}$ b. $g(-3) = \underline{-7}$
 c. $g(x) = -4, x = \underline{-2}$ d. $g(x) = -1, x = \underline{0}$

8. (x)



a. $d(-5) = \underline{1}$ b. $d(4) = \underline{2}$
 c. $d(x) = 4, x = \underline{3}$ d. $d(x) = 0, x = \underline{-6}$
 $x = 0$
 $x = 1$
 $x = 5$