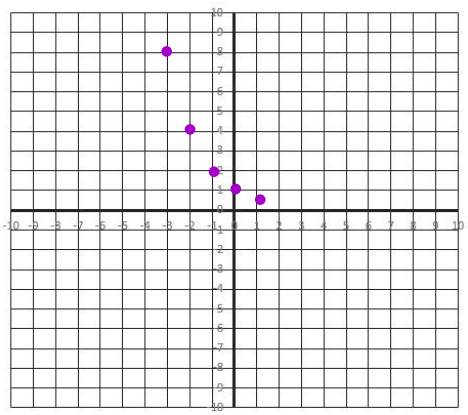
NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

Graph the data in each problem and determine if the graph is showing exponential growth, exponential decay, linear growth, linear decay or a quadratic.

1.

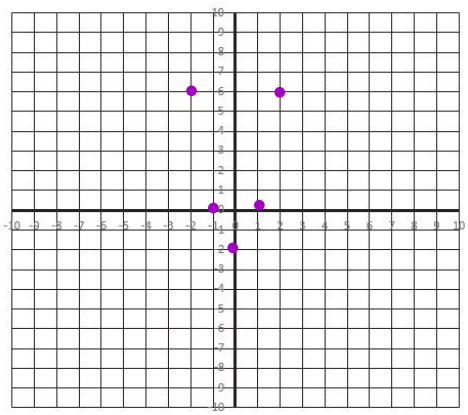
x	y
−3	8
−2	4
−1	2
0	1
1	0.5



This is a Exponential DECAY function.

2.

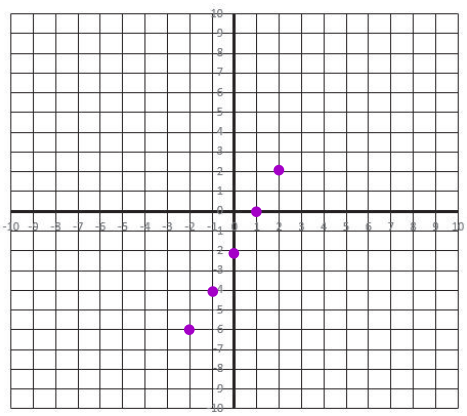
x	y
−2	6
−1	0
0	−2
1	0
2	6



This is a QUADRATIC function.

3.

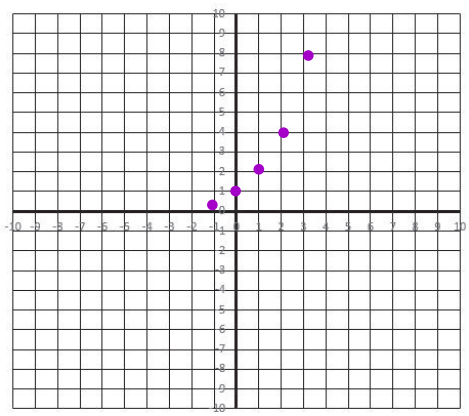
x	y
−2	−6
−1	−4
0	−2
1	0
2	2



This is a LINEAR Growth function.

4.

x	y
−1	0.5
0	1
1	2
2	4
3	8



This is an exponential growth function.

5. How could you use the tables (without the graphs) to tell if a function is exponential, linear or quadratic?

Look at y-values
- constant rate of change (+/-) — Linear
- common ratio (x) — Exponential
- symmetry in table — Quadratic.

6. In a study of the activities of dolphins, a marine biologist made a 24-second video of a dolphin swimming and jumping in the ocean with a specially equipped camera that recorded one dolphin's vertical position with respect to time. This graph represents a piecewise function, $y = f(t)$, that is defined by quadratic functions on each interval. It relates the dolphin's vertical distance from the surface of the water, in feet, to the time from the start of the video, in seconds. Use the graph to answer the questions below.

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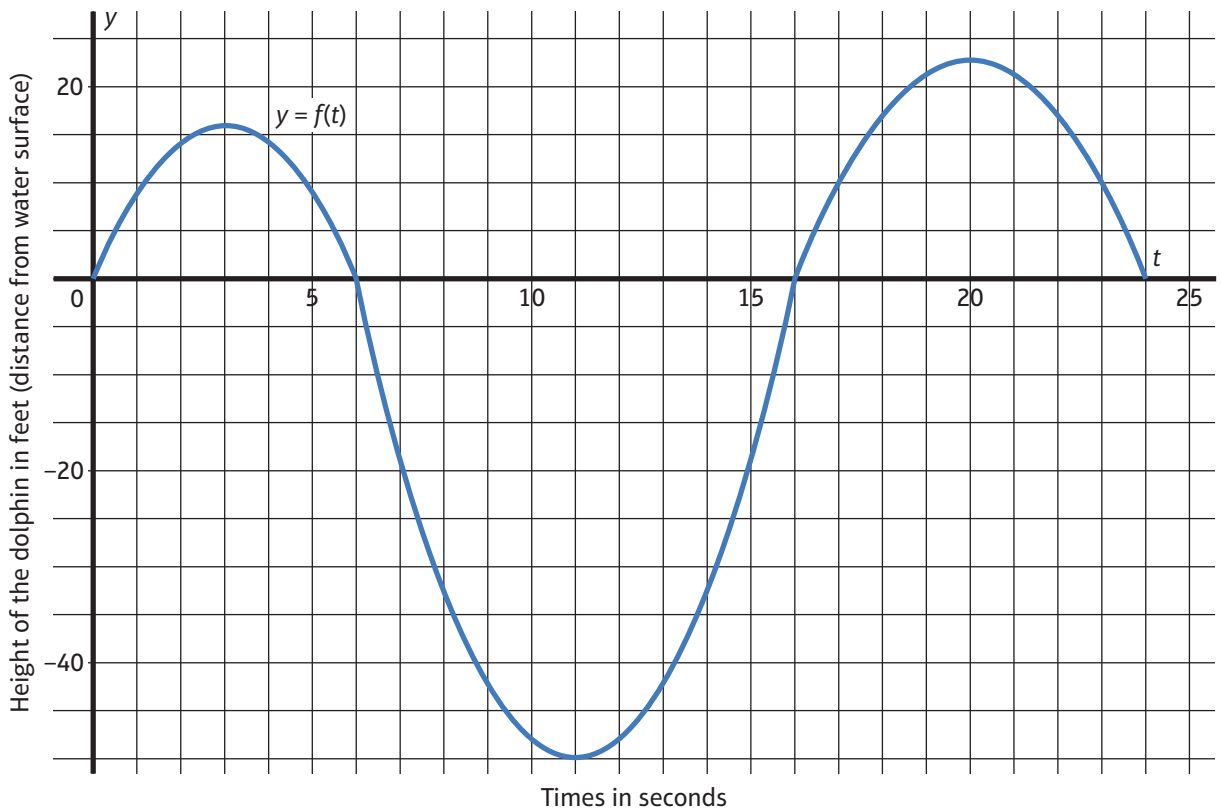


A. Describe what you know for sure about the actions of the dolphin in the time interval from 0–6 sec. Can you determine the horizontal distance the dolphin traveled in that time interval? Explain why or why not.

The Dolphin jumped out of the water at t=0 and back into the water at t=6

The function only models vertical distance to time, not the horizontal distance.

B. For which times does $f(t) = 0$? Explain what they mean in the context of this problem. (Hint: You should have multiple answers.)

0, 6, 16, and 24 seconds

The dolphin enters & exits the surface of the water at these times.

C. How long in seconds was the dolphin swimming under water in the recorded time period? Explain your answer or show your work.

From 6 to 16 seconds = 10 seconds under water.

D. Estimate the maximum height, in feet, that the dolphin jumped in the recorded 24-second time period. Explain how you determined your answer.

About 23 feet

Coordinate: (20, 23)

seconds

feet

E. Locate the point on the graph where $f(t) = -50$, and explain what information the coordinates of that point give you in the context of this problem.

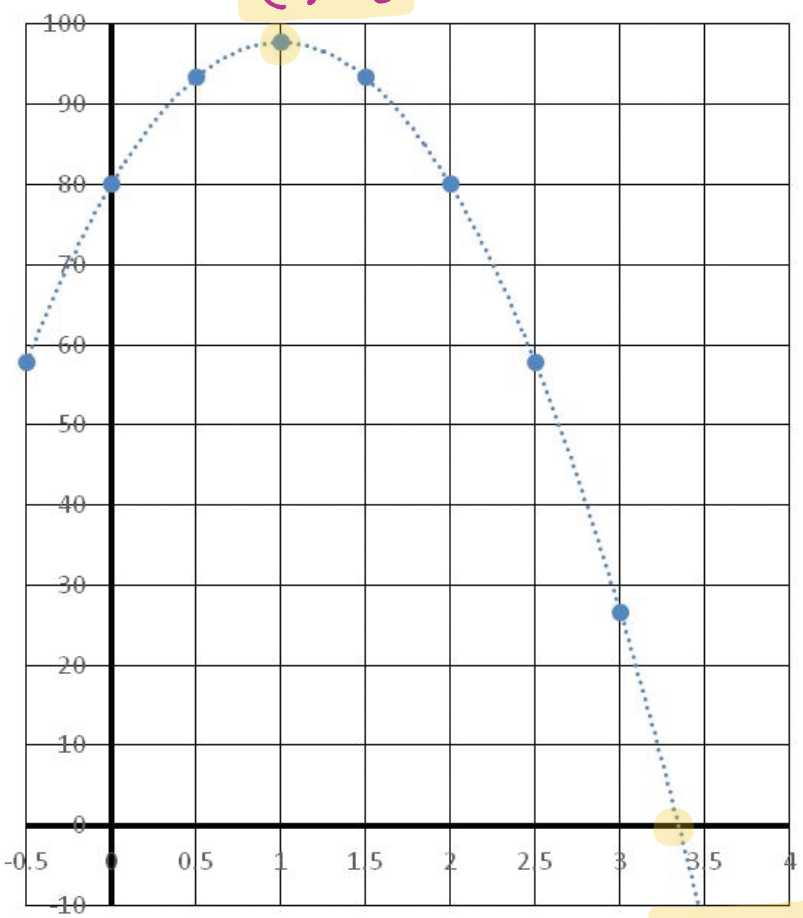
$t = 11$ seconds

$f(11) = -50$

After 11 seconds, the dolphin is 50 feet below the water's surface.

7. Pettitte and Ryu each threw a baseball into the air.

The vertical height of Pettitte's baseball is represented by the graph $y = P(t)$ below. P represents the vertical distance of the baseball from the ground in feet, and t represents time in seconds.



The vertical height of Ryu's baseball is represented by the table values $R(t)$ below. R represents the vertical distance of the baseball from the ground in feet, and represents time in seconds.

t	$R(t)$
0	86
0.5	98
1	102
1.5	98
2	86
2.5	66
3	38
3.3	0

Ryu

A. Whose baseball reached the greatest height? Explain your answer.

Ryu (102 feet)

B. Whose ball reached the ground fastest? Explain your answer.

Both balls hit the ground at 3.3 seconds

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C. Pettitte claims that his ball reached its maximum height faster than Ryu's. Is his claim correct or incorrect? Explain your answer.

No, they both took 1 second to reach max height.

D. Find $P(0)$ and $R(0)$ values and explain what they mean in the problem. What conclusion can you make based on these values? Did Ryu and Pettitte throw their baseballs from the same height? Explain your answer.

P(0) & R(0) are the y-intercepts.
This is the initial height before ball is thrown.

E. Ryu claims that he can throw the ball higher than Pettitte. Is his claim correct or incorrect? Explain your answer.

max height − starting height

PETTITE: 98 − 80 = 18ft
Ryu: 102 − 86 = 16 ft
No, PETTITE can throw higher

Spiral REVIEW—Average Rate of Change

In previous modules, you calculated the average rate of change using the formula $\frac{f(x_1) - f(x_2)}{x_1 - x_2}$.

8. What other common name do we call this formula?

SLOPE FORMULA

Determine the average rate of change for each function and given points in Problems 9–16.

9. $f(x) = 3x + 2$ for $x_1 = 3$ and $x_2 = -1$.

$f(3) = 11$
$f(-1) = -1$

$\frac{11-(-1)}{3-(-1)} = \frac{12}{4} = 3$

10. $f(x) = -x - 3$ for $x_1 = 0$ and $x_2 = -4$.

$f(0) = -3$
$f(-4) = 1$

$\frac{-3-1}{0-(-4)} = \frac{-4}{4} = -1$

11. $f(x) = 3x^2 + 2$ for $x_1 = 0$ and $x_2 = 2$.

$f(0) = 2$
$f(2) = 14$

$\frac{2-14}{0-2} = \frac{-12}{-2} = 6$

12. $f(x) = -x^2 - 3$ for $x_1 = -1$ and $x_2 = 1$.

$f(-1) = -4$
$f(1) = -4$

$\frac{-4-(-4)}{-1-1} = \frac{0}{-2} = 0$

13. $f(x) = 3(x - 1)^2 + 2$ for $x_1 = 0$ and $x_2 = 2$.

$f(0) = 5$
$f(2) = 5$

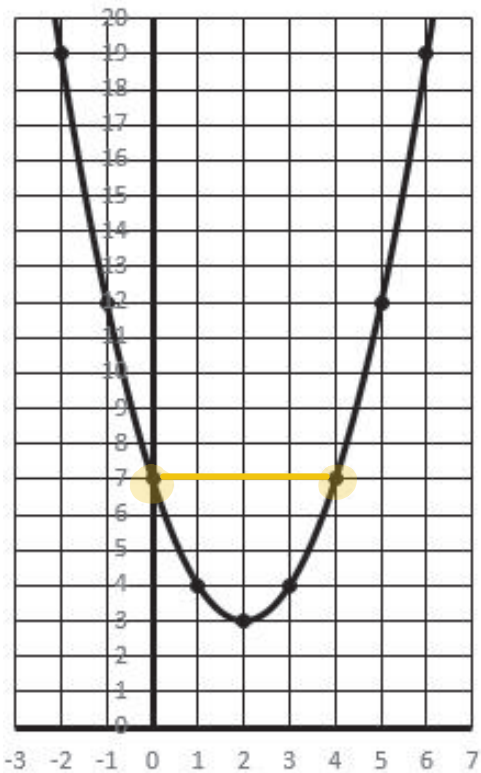
$\frac{5-5}{0-2} = \frac{0}{-2} = 0$

14. $f(x) = -(x + 2)^2 - 3$ for $x_1 = -1$ and $x_2 = 1$.

$f(-1) = -4$
$f(1) = -12$

$\frac{-4-(-12)}{-1-1} = \frac{8}{-2} = -4$

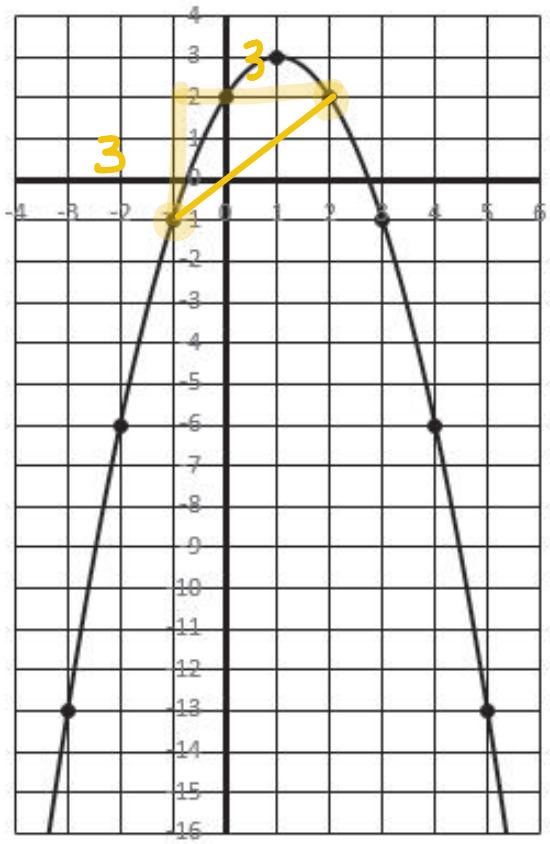
15. Use the graph for $x_1 = 0$ and $x_2 = 4$.



$f(0)=7$
$f(4)=7$

$\frac{7-7}{0-4} = \frac{0}{-4} = 0$

16. Use the graph for $x_1 = -1$ and $x_2 = 2$.



$f(-1)=-1$
$f(2)=2$

$\frac{2-(-1)}{2-(-1)} = \frac{3}{3} = 1$