READY, SET, GO! Name Period Date

READY

Topic: Solving Systems by Substitution

In prior work the meaning of $f(x) = g(x)$ was discussed. This means to find the point where the two equations are <u>equal</u> and where the two graphs intersect. It is possible to find the point of intersection algebraically instead of graphing the two lines. Since $f(x) = g(x)$, it's possible to set each equation equal to the other and solve for x.

Example: Find the point of intersection of function $f(x) = 3x + 4$ and function $g(x) = 4x + 1$.

Since, $f(x) = g(x)$, *let* $3x + 4 = 4x + 1$. Then solve for x.

$3x + 4 = 4x + 1$ Subtract $3x$ and 1 from both sides of the equation.
$\underline{-3x - 1 = -3x - 1}$
$0x + 3 = 1x + 0$
$3 = 1x$ Now let x = 3 in each equation to find $f(x)$ *and* $g(x)$ *when* $x = 3$.
$f(3) = 3(3) + 4 \to 9 + 4 = 13$ *and* $g(3) = 4(3) + 1 \to 12 + 1 = 13$

When $x = 3, f(3)$ *and* $g(3)$ *both equal* 13. *The point of intersection is* $(3, 13)$.

Find the point of intersection for $f(x)$ and $g(x)$ using the algebraic method in the example above.

1. $f(x) = -5x + 12$ and $g(x) = -2x - 3$

$-5x + 12 = -2x - 3$
$+5x \quad +5x$
$12 = 3x - 3$
$+3 \quad +3$
$15 = 3x$
$\frac{15}{3} = \frac{3x}{3}$
$5 = x$

$f(5) = -5(5) + 12 = -25 + 12 = -13$

$g(5) = -2(5) - 3 = -10 - 3 = -13$

$(5, -13)$

2. $f(x) = \frac{1}{2}x + 2$ and $g(x) = 2x - 7$

$\frac{1}{2}x + 2 = 2x - 7$
$-\frac{1}{2}x \quad -\frac{1}{2}x$
$2 = 1\frac{1}{2}x - 7$
$+7 \quad +7$
$9 = 1\frac{1}{2}x$
$\left(\frac{2}{3}\right)9 = \frac{3}{2}x\left(\frac{2}{3}\right)$
$6 = x$

$f(6) = \frac{1}{2}(6) + 2$
$3 + 2 = 5$

$g(6) = 2(6) - 7$
$12 - 7 = 5$

$(6, 5)$

3. $f(x) = -\frac{2}{3}x + 5$ and $g(x) = -x + 7$

$-\frac{2}{3}x + 5 = -x + 7$
$+x \quad +x$
$\frac{1}{3}x + 5 = 7$
$-5 \quad -5$
$\left(\frac{3}{1}\right)\frac{1}{3}x = 2(3)$
$x = 6$

$f(6) = -\frac{2}{3}(6) + 5$
$= -4 + 5$
$f(6) = 1$

$g(6) = -6 + 7$
$= 1$

$(6, 1)$

4. $f(x) = x - 6$ and $g(x) = -x - 6$

$x - 6 = -x - 6$
$+x \quad +x$
$2x - 6 = -6$
$+6 \quad +6$
$\frac{2x}{2} = \frac{0}{2}$
$x = 0$

$f(0) = 0 - 6 = -6$
$g(0) = -0 - 6 = -6$

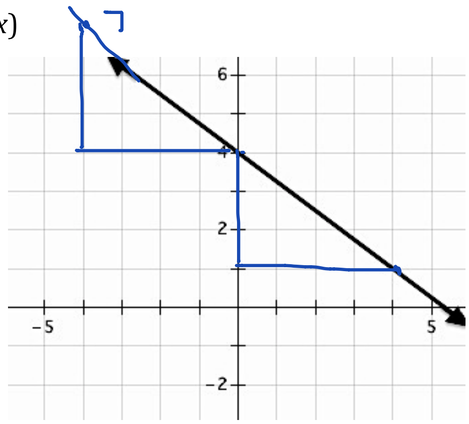
$(0, -6)$

SET

Topic: Describing attributes of a functions based on graphical representation

Use the graph of each function provided to find the indicated values.

5. $f(x)$



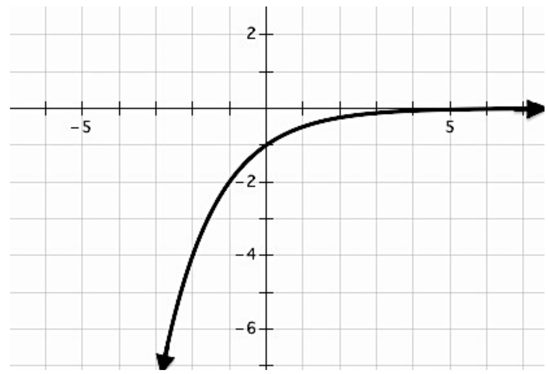
a. $f(4)$ = 1

b. $f(-4)$ = 7

c. $f(x) = 4$, x = 0

d. $f(x) = 7$, x = -4

6. $g(x)$



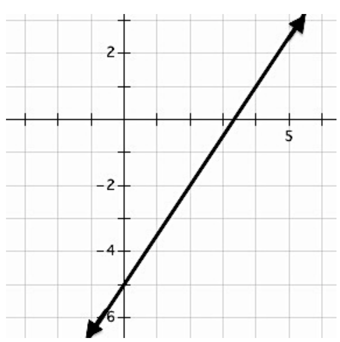
a. $g(-1)$= -2

b. $g(-3)$ = -8

c. $g(x) = -4$ x = -2

d. $g(x) = -1$, x = 0

7. $h(x)$



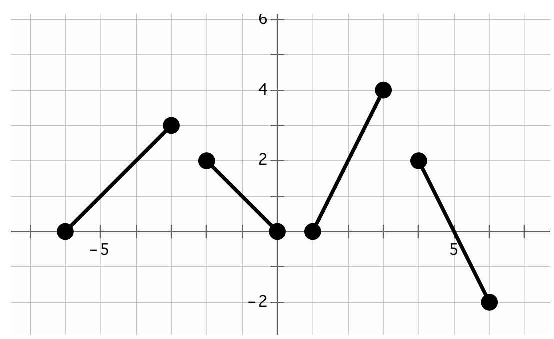
a. $h(0)$ = -5

b. $h(3)$ = 0.5

c. $h(x) = 1$, x = 4

d. $h(x) = -2$, x = 2

8. $d(x)$



a. $d(-5)$ = 1

b. $d(4)$ = 2

c. $d(x) = 4$, x = 3

d. $d(x) = 0$, x = -6, 0, 1, 5

For each situation either create a function or use the given function to find and interpret solutions.

9. Fran collected data on the number of feet she could walk each second and wrote the following rule to model her walking rate $d(t) = 4t$.

a. What is Fran looking for if she writes $d(12) =$ 48 ?

How far she walked in 12 seconds.

b. In this situation what does $d(t) = 100$ tell you?

In t seconds Fran walked 100 ft.

$t=25$

c. How can the function rule be used to indicate a time of 16 seconds was walked?

$d(16) = 64$ ft.

d. How can the function rule be used to indicate that a distance of 200 feet was walked?

$d(t)=200$ $t=50$

10. Mr. Multbank has developed a population growth model for the rodents in the field by his house. He believes that starting each spring the population can be modeled based on the number of weeks with the function $p(t) = 8(2^t)$.

Find $p(t) = 128$.

$\frac{128}{8} = \frac{\cancel{8}(2^t)}{\cancel{8}}$

$16 = 2^t$ $16 = 2\cdot2\cdot2\cdot2$ $t=4$

Find $p(4)$.

$p(4) = 8(2)^4$
$= 8\cdot16$
$= 128$

Find $p(10)$.

$p(10) = 8(2)^{10}$
$= 8(1024)$
$= 8192$

d. Find the number of weeks it will take for the population to be over 20,000.

10 weeks $\rightarrow$ 8192
11 $\rightarrow$ 16,384
12 $\rightarrow$ 32,768

Between weeks 11 + 12 there will be a population of over 20,000.

e. In a year with 16 weeks of summer, how many rodents would he expect by the end of the summer using Mr. Multbank's model?

$p(16) = 8(2)^{16} = 524,288$

What are some factors that could change the actual result from your estimate?

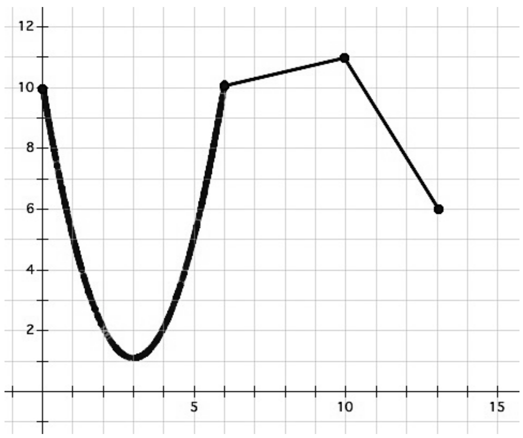
Predators, lack of food, disease could all affect the population.

GO

Topic: Describe features of functions from the graphical representation.

For each graph given provide a description of the function. Be sure to consider the following: decreasing/increasing, min/max, domain/range, etc.

9.



Description of function:

Continuous

Domain - [0,13]
Range [1,11]
Increasing [3,10]
Decreasing [0,3] [10,13]

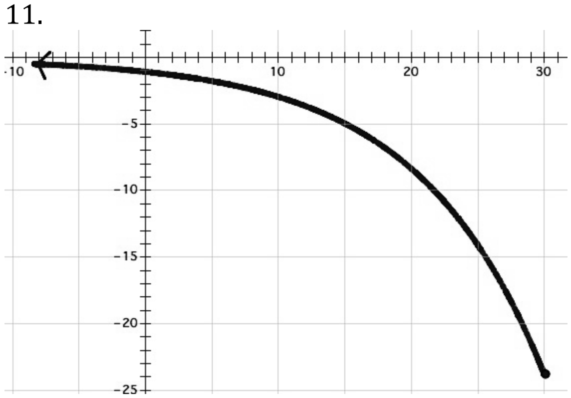
Intervals

Constant rates of change
[6, 10] [10,13]

min - (3,1)
max - (10,11)
x-int - none
y-int - (0,10)

Points

11.

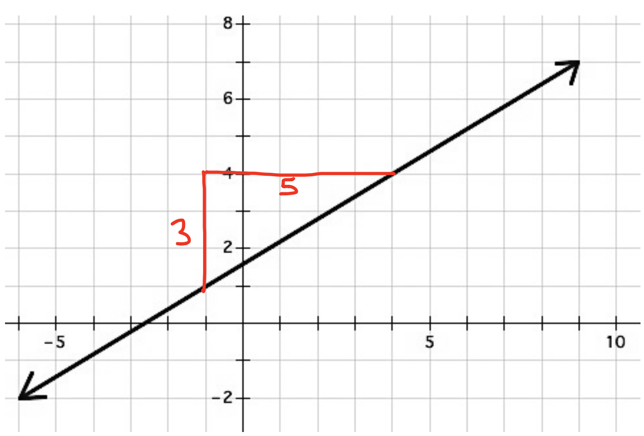


Description of function:

Continuous
Domain (-∞,30]
Range [-24,0)
Decreasing (-∞,30]

min - (30,-24)
max - none
x int - none
y int - (0,-1)

12.



Description of function:

Continuous
Domain (-∞,∞)
Range (-∞,∞)
Increasing - (-∞,∞)
min - none
max - none
x-int. (-2.6,0)
y-int. (0,1.6)

constant rate of change
(-∞,∞)