

Study Guide and Intervention

Adding and Subtracting Functions Using Graphs

Example Use the graph of the functions $p(x) = 2x - 3$ and $q(x) = (x + 2)^2 - 4$ to graph and write the equation of the combined function $r(x) = p(x) + q(x)$.

Solution

Step 1 Determine points with the same x-values on both graphs.

Graph both equations and use the table to get the coordinates

X	Y ₁	Y ₅
0	-3	0
1	-1	5
2	1	12
3	3	21
4	5	32
5	7	45
6	9	60
7	11	77
8	13	96
9	15	117
10	17	140

X	Y ₁	Y ₅	Y ₆
0	-3	0	-3
1	-1	5	4
2	1	12	13
3	3	21	24
4	5	32	37
5	7	45	52
6	9	60	69
7	11	77	88
8	13	96	109
9	15	117	132
10	17	140	157

Step 2 Combine the points of the functions

Add the values of $f(x)$ and $g(x)$ to create $h(x)$.

Step 3 Use either the patterns in the table of points for $h(x)$ or the equations of the functions $f(x)$ and $g(x)$ to write a function for $h(x)$.

$$\begin{aligned}
 h(x) &= f(x) + g(x) \\
 h(x) &= (2x - 3) + [(x + 2)^2 - 4] \\
 h(x) &= (2x - 3) + [(x + 2)(x + 2) - 4] \\
 h(x) &= (2x - 3) + [x^2 + 4x + 4 - 4] \\
 h(x) &= x^2 + 2x + 4x - 3 + 4 - 4 \\
 h(x) &= x^2 + 6x - 3
 \end{aligned}$$

Exercises

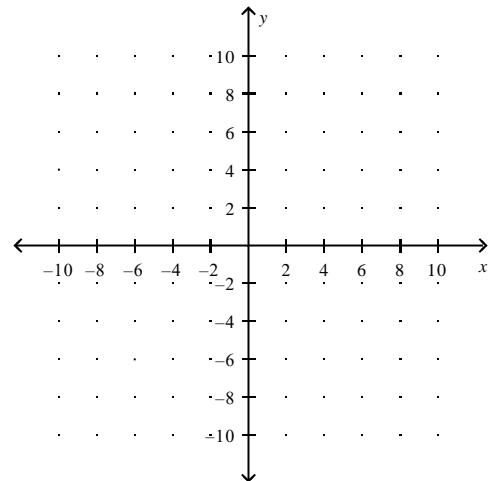
Use the functions to answer the questions.

$$\begin{aligned}
 p(x) &= 3(x + 1) - 6 \\
 q(x) &= -2(x - 3) + 4 \\
 r(x) &= p(x) + q(x) \\
 s(x) &= p(x) - q(x)
 \end{aligned}$$

1. Complete the table shown for specific x values for $p(x)$, $q(x)$, $r(x)$, and $s(x)$.

x	p(x)	q(x)	r(x)	s(x)
-2				
-1				
0				
1				
2				
3				
4				
5				

2. Sketch a graph of the functions $p(x)$, $q(x)$, $r(x)$ and $s(x)$.



3. Write the equation of the combined function $r(x) = p(x) + q(x)$.

4. Write the equation of the separated function $s(x) = p(x) - q(x)$.

Study Guide and Intervention

Adding and Subtracting Functions Using Graphs (cont.)

Exercises

Use the functions to answer the questions.

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

$$g(x) = (x - 2) + 6$$

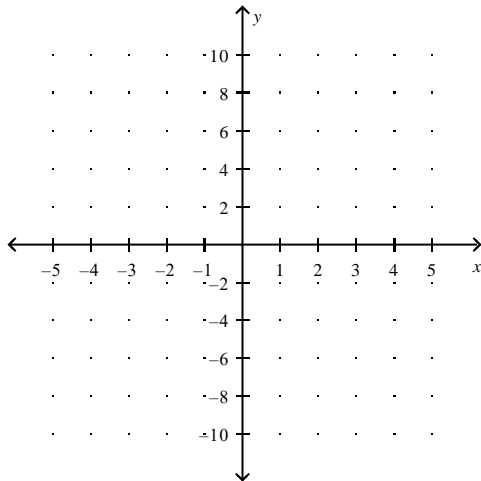
$$h(x) = f(x) + g(x)$$

$$k(x) = f(x) - g(x)$$

5. Complete the table shown for specific x values for f(x), g(x), h(x), and k(x).

x	f(x)	g(x)	h(x)	k(x)
-4				
-3				
-2				
-1				
0				
1				
2				
3				

6. Sketch a graph of the functions f(x), g(x), h(x) and k(x).



7. Write the equation of the combined function $r(x) = p(x) + q(x)$.
8. Write the equation of the separated function $s(x) = p(x) - q(x)$.

Use the functions to answer the questions.

$$p(x) = 8(0.5x + 1)^3 + 1$$

$$q(x) = -7(x - 3)$$

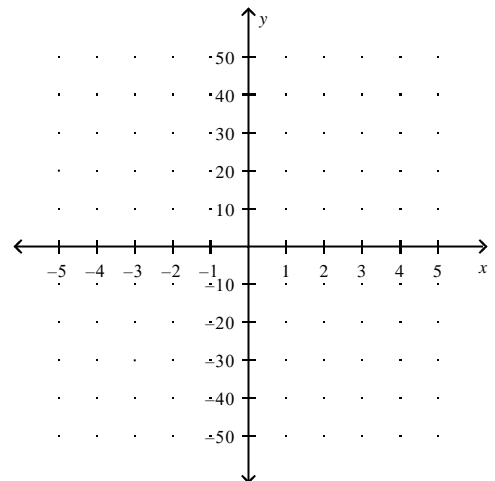
$$r(x) = p(x) + q(x)$$

$$s(x) = p(x) - q(x)$$

9. Complete the table shown for specific x values for p(x), q(x), r(x), and s(x).

x	p(x)	q(x)	r(x)	s(x)
-1				
0				
1				
2				
3				
4				
5				
6				

10. Sketch a graph of the functions p(x), q(x), r(x) and s(x).



11. Write the equation of the combined function $r(x) = p(x) + q(x)$.
12. Write the equation of the separated function $s(x) = p(x) - q(x)$.