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Study Guide and Intervention

Adding Functions Using Tables and Equations

Example **Use a table to write a function rule for n(x) if n(x) = f(x) + g(x) + h(x).**

Solution

Step 1 **Calculate the finite differences for the table**

		30	30	30	30
x	30	60	90	120	150
ROCIO'S SALARY $f(x) = 18.5x$	$555	$1,110	$1,665	$2,220	$2,775
ROCIO'S COMMISSION $g(x) = (0.1)(17250)$	$1,725	$1,725	$1,725	$1,725	$1,725
ROCIO'S BONUS $h(x) = 500$	$500	$500	$500	$500	$500
TOTAL AMOUNT ROCIO EARNED $n(x) = f(x) + g(x) + h(x)$	$2,780	$3,335	$3,890	$4,445	$5000
		$555	$555	$555	$555

Step 2 **Use patterns in the finite differences to write a function rule for n(x).**

Since the first finite difference is constant, this is a linear function.

The slope of the function is found by $\frac{\Delta n(x)}{\Delta x} = \frac{\$555}{30\ hrs}$ = $18.50 per hour

The y-intercept or initial value is found by subtracting the finite difference from the first value: $2780 - $555 = $2225

Step 3: **Combine the slope and the y-intercept to generate the formula.**

N(x) = 18.5x + 2225

Exercises

For questions 1-4, Use a table to write a function rule for h(x) if h(x) = f(x) + g(x).

1.

x	-3	-2	-1	0	1	2	3
$f(x)$	-22	-16	-10	-4	2	8	14
$g(x)$	9	7	5	3	1	-1	-3
$h(x)$	-13	-9	-5	-1	3	7	11

2.

x	1	2	3	4	5	6	7
$f(x)$	3	10	21	36	55	78	105
$g(x)$	-4	-1	4	11	20	31	44
$h(x)$	-1	9	25	47	75	109	149

3.

x	0	1	2	3	4	5	6
$f(x)$	8	11	16	23	32	43	56
$g(x)$	2	1	-2	-7	-14	-23	-34
$h(x)$	10	12	14	16	18	20	22

4.

x	-1	0	1	2	3	4	5
$f(x)$	-2	-6	-2	10	30	58	94
$g(x)$	3	6	9	12	15	18	21
$h(x)$	1	0	7	22	45	76	115

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Study Guide and Intervention

Adding Functions Using Tables and Equations (cont.)

Example **If $h(x) = f(x) + g(x)$, $f(x) = (x - 2)^3 + 7$, and $g(x) = 2(x + 3)^2$, write the most simplified form of $h(x)$.**

Solution

Step 1 **Substitute the equations for f(x) and g(x) into the equation h(x) = f(x) + g(x).**

$$h(x) = f(x) + g(x)$$
$$h(x) = [(x - 2)^3 + 7] + [2(x + 3)^2]$$

Step 2 **Simplify the polynomial expression.**

$$h(x) = (x - 2)^3 + 7 + 2(x + 3)^2$$
$$h(x) = (x - 2)(x - 2)(x - 2) + 7 + 2(x + 3)(x + 3)$$
$$h(x) = (x^2 - 4x + 4)(x - 2) + 7 + 2(x^2 + 6x + 9)$$
$$h(x) = (x^3 - 4x^2 + 4x - 2x^2 + 8x - 8) + 7 + 2x^2 + 12x + 18$$
$$h(x) = (x^3 - 6x^2 + 12x - 8) + 7 + 2x^2 + 12x + 18$$
$$h(x) = x^3 - 6x^2 + 2x^2 + 12x + 12x - 8 + 7 + 18$$
$$h(x) = x^3 - 4x^2 + 24x - 1 + 18$$
$$h(x) = x^3 - 4x^2 + 24x + 17$$

Exercises

For problems 5 – 10, write the simplified form of h(x) if h(x) = f(x) + g(x).

5. $f(x) = 2x^2 + 3x$
$g(x) = x^2 - x + 4$

6. $f(x) = x^3 + 5x^2 - 1$
$g(x) = x^2 + 2x + 7$

7. $f(x) = 3(x - 2)^2$
$g(x) = 2(x + 1)^2 + 6$

8. $f(x) = 7x - 11$
$g(x) = -4x + 9$

9. $f(x) = x^3 + 2x^2 - x - 5$
$g(x) = -(x + 2)^2 + 4$

10. $f(x) = -2x + 7$
$g(x) = 3x^2 + 4x - 5$

Discount City gives a 15% discount on all merchandise on Tuesdays. The sales tax rate is 5%.

11. Write a function, $f(x)$, to represent the discounted price of merchandise, x, on Tuesdays.

12. Write a function, $g(x)$, to represent the amount of sales tax on the discounted merchandise, x.

13. Write a function, $h(x)$, that can be used to calculate the total cost of discounted merchandise, including sales tax, by combining $f(x)$ and $g(x)$.