LESSON 3.1 Skills Practice

Name _____ Date _____

Planting the Seeds
Exploring Cubic Functions

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Vocabulary

Provide an example of each key term. Sketch a graph, if necessary.

1. relative minimum:

2. relative maximum:

3. cubic function:

4. multiplicity:

Problem Set

Complete the table. Include an expression for the volume. Circle the relative maximum or minimum, if there is one.

1.

Height of Box (in.)	Width of Box (in.)	Length of Box (in.)	Volume of Box (cu. in.)
0	8	10	0
1	6	8	48
1.5	5	7	52.5
2	4	6	48
3	2	4	24
4	0	2	0
h	$8 - 2h$	$10 - 2h$	$h(8 - 2h)(10 - 2h)$

2.

Radius of Cylinder (in.)	Height of Cylinder (in.)	Base Area of Cylinder (sq. in.)	Volume of Cylinder (cu. in.)
0	0	0	0
−1			
1			
2			
3			
4			
r	$3r$	$3.14r^2$	

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3.

Height of Cube (cm)	Width of Cube (cm)	Length of Cube (cm)	Volume of Cube (cu. in.)
−2			
0			
1			
3			
5			
			1000
s			

4.

Width of Tank (m)	Height of Tank (m)	Length of Tank (m)	Volume of Tank (cu. m)
10			
20			
30			
			58,682
40			
50			
w	$100 - 2w$	$3w - 50$	

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5.

Height of Square Pyramid (ft)	Side of Base Length (ft)	Area of Base (sq. ft)	Volume of Square Pyramid (cu. ft)
−4			
0			
3			
6			
9			
12			
p	$\frac{1}{2}p$	$\frac{1}{4}p^2$	

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6.

Length of Base (dm)	Height of Base (dm)	Length of Triangular Prism (sq. dm)	Volume of Triangular Prism (cu. dm)
−0.5			
0			
0.3			
0.5			
			5
2	4		
b		$10b - 5$	

Determine the product of three linear factors. Verify graphically that the expressions are equivalent.

7. $3x(x + 3)(x - 2)$

$3x(x + 3)(x - 2) = 3x(x^2 - 2x + 3x - 6)$

$= 3x(x^2 + x - 6)$

$= 3x^3 + 3x^2 - 18x$

The graph of the original expression and the graph of the final expression are the same. So the expressions are equivalent.

8. $(2x - 1)(2x + 1)(x + 4)$

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9. $(4x - 7)^3$

10. $(10 - 3x)(7 + x)(8 + 6x)$

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11. $\left(\frac{1}{2}x\right)\left(\frac{2}{3}x\right)\left(\frac{1}{4}x - 1\right)$

12. $0.25x(12x - 1)(8 - 3x)$

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Determine the product of linear and quadratic factors. Verify graphically that the expressions are equivalent.

13. $x(x^2 + 3x - 4)$

$x(x^2 + 3x - 4) = x^3 + 3x^2 - 4x$

The graph of the original expression and the graph of the final expression are the same. So the expressions are equivalent.

14. $(2x - 9)(4x^2 - 5x - 12)$

15. $7x(x + 5)^2$

16. $(x^2 + 1)(8 - x)$

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17. $(-2.3 + 1.1x + 0.9x^2)(4.5x - 3.8)$

18. $\left(-\frac{3}{4}x^2 + \frac{1}{8}\right)\left(\frac{1}{4} - \frac{7}{8}x\right)$