LESSON 3.5 Skills Practice

Name _____ Date _____

That Graph Looks a Little Sketchy
Building Cubic and Quartic Functions

Problem Set

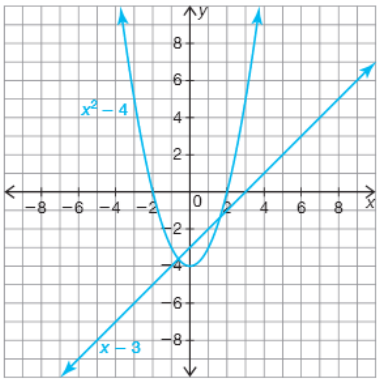
Sketch a set of functions whose product builds a cubic function with the given characteristics. Explain your reasoning.

1. zeros: $x = -2$, $x = 2$, and $x = 3$

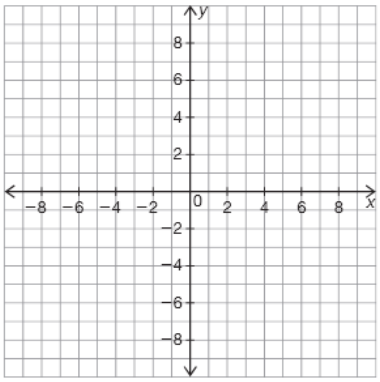
The graphs can be three linear functions or a linear function and a quadratic function. The following functions representing one possible solution are shown.

$f(x) = x - 3$

$g(x) = x^2 - 4$



2. zeros: $x = 1$ (multiplicity 2) and $x = -4$



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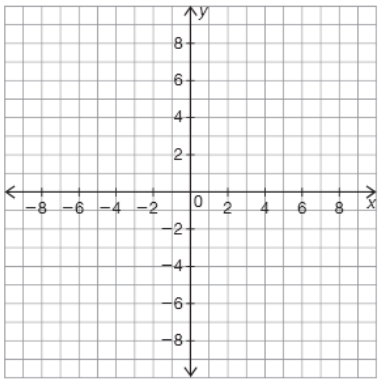
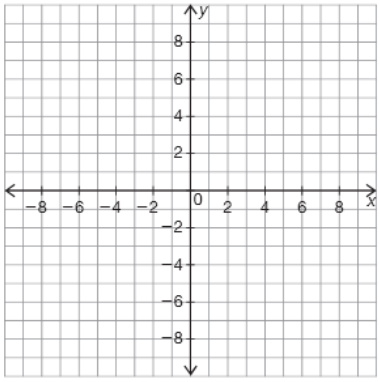
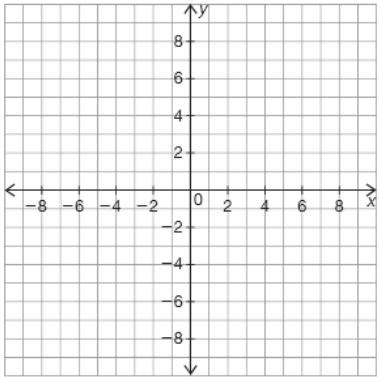
3. The cubic function is in Quadrants I and III only



4. zero: $x = 2$ (multiplicity 3)



5. two imaginary zeros and a real zero $x = 0$



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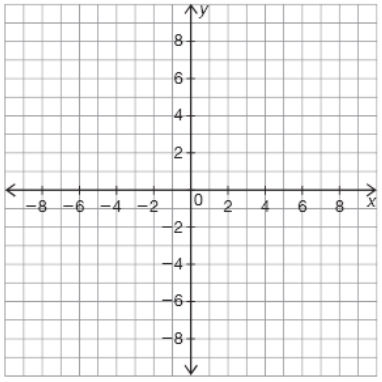
6. *y*-intercept of (0, 8)



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Write two different cubic functions (as a product of functions) with the given characteristics.

7. zeros: $x = -3, x = 0, x = 1$

Two possible correct answers: $f(x) = x(x + 3)(x - 1)$ and $g(x) = 3x(2x + 6)(4x - 4)$

8. zeros: $x = 0, x = -3i, x = 3i$

9. zeros: $x = 4$ (multiplicity 2) and $x = -2$

10. for an input value of 2, an output of 24

11. zeros: $x = -5, x = -1, x = 2$ and a *y*-intercept of (0, −20)

12. zero: $x = 2$ (multiplicity 3)

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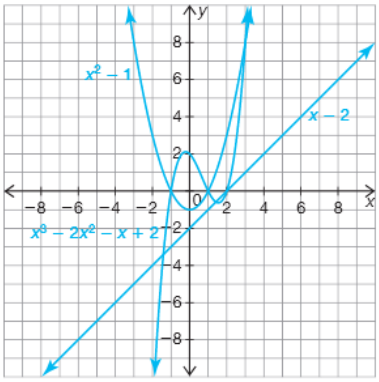
Sketch the graph of the cubic function that is the product of the functions shown. Then, determine the product of the functions algebraically. Verify your sketch by graphing the product on a graphing calculator.

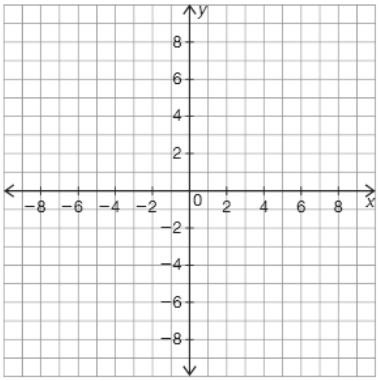
13. $(x - 2)(x^2 - 1)$

$(x - 2)(x^2 - 1) = x^3 - x - 2x^2 + 2$

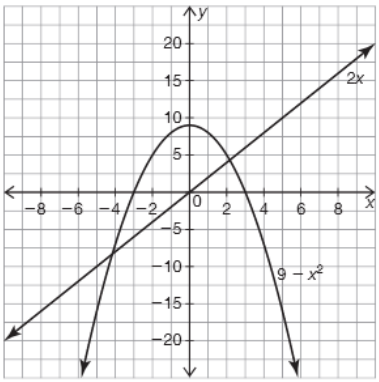
$= x^3 - 2x^2 - x + 2$



14. $(x + 2)(x - 1)(x - 3)$



15. $2x(9 - x^2)$



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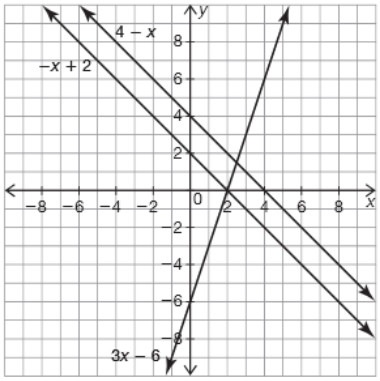
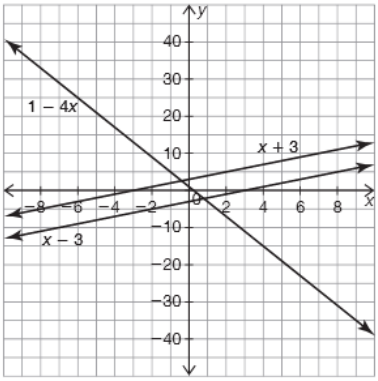
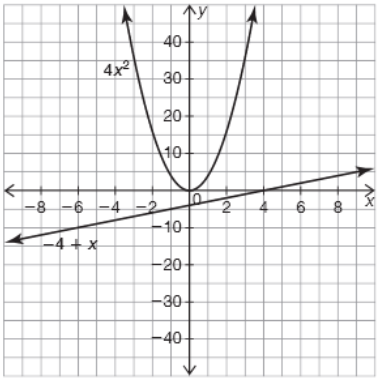
16. $(4 - x)(-x + 2)(3x - 6)$



17. $(x + 3)(1 - 4x)(x - 3)$



18. $(-4 + x)(4x^2)$



LESSON 3.5 Skills Practice

Sketch a set of functions whose product builds a quartic function with the given characteristics. Explain your reasoning.

19. four distinct roots and y-intercept of (0, 6)

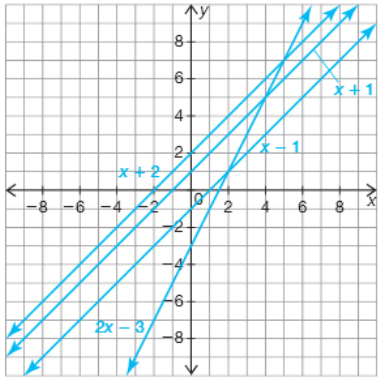
The graphs can be any functions as long as the product of the constant terms is 6. The following functions representing one possible solution are shown.

$f(x) = x + 1$

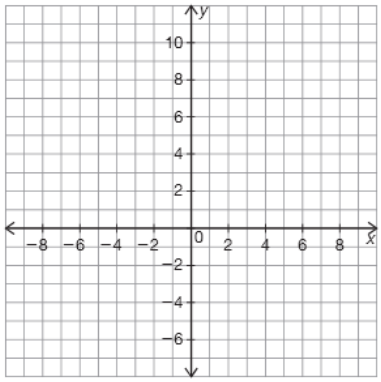
$g(x) = x + 2$

$h(x) = 2x - 3$

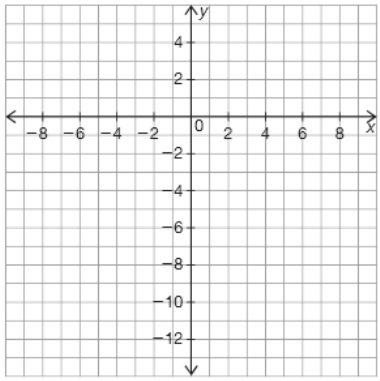
$j(x) = x - 1$



20. two imaginary roots and zeros $x = 2$ and $x = -3$



21. located in Quadrants I and II only



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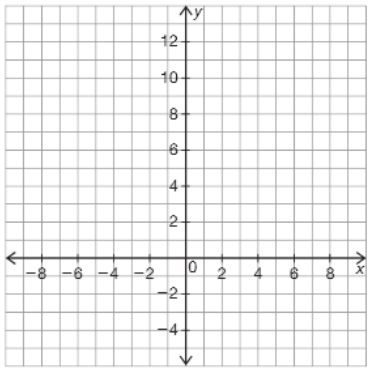
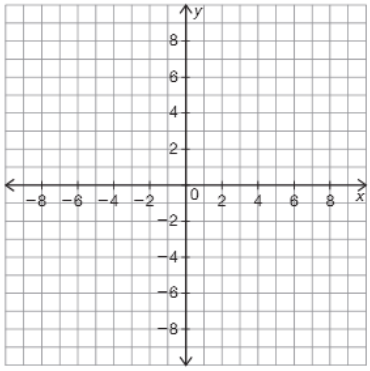
22. zeros: $x = -1$, $x = 2$ (multiplicity 2), and $x = 1$



23. zeros: $x = -3$ and $x = 1$ (multiplicity 3)



24. four imaginary roots