

Factor.

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| 1. $12a^3 - 9a^2 + 4a - 3$ | 2. $3n^3 - 4n^2 + 9n - 12$ | 3. $35xy - 5x - 56y + 8$ |
| 4. $224az + 56ac - 84yz - 21yc$ | 5. $mz^2 - 9mh^2 - 5nz^2 + 45nh^2$ | 6. $12xy - 28x - 15y + 35$ |
| 7. $75a^2c - 45a^2d - 30bc + 18bd$ | 8. $16x^2 + 8xyd - 16x^2d - 8xyc$ | 9. $150m^2nz + 20mn^2c - 120m^2nc - 25mn^2z$ |

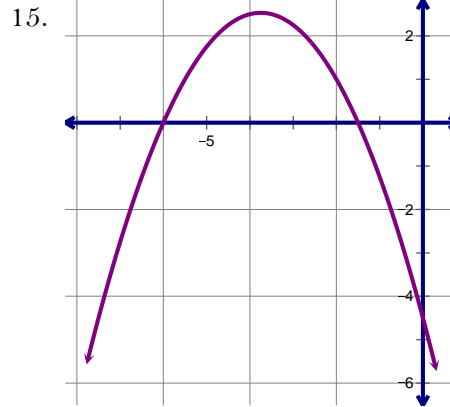
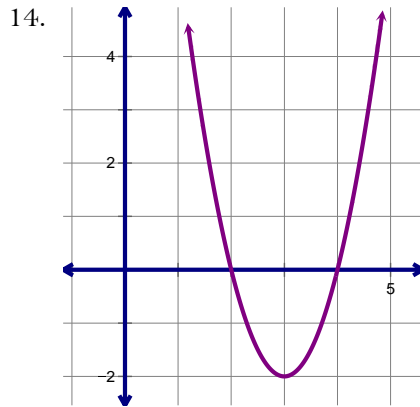
Solve.

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| 10. $2p^3 + 5p^2 + 6p + 15 = 0$ | 11. $12n^3 + 4n^2 + 3n = -1$ | 12. $5n^3 + 6 = 10n^2 + 3n$ |
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13. A hang glider launches from the top of a hill, 500 feet tall. His path is modeled by the equation $h = 2t^2 - 44t + 500$ where h is his height after t seconds have passed.

- What is his minimum height?
- How long does it take him to reach his minimum height?
- After reaching his minimum height, he flies upward and lands at the top of a second hill. If it takes him 25 seconds to go from the top of the first hill to the top of the second hill, how tall is the second hill?

Find the equation of the function in factored form and standard form.



Sketch a graph for each situation, if possible.

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| 16. a quadratic function with only one real zero | 17. a quadratic function with no real zeros |
| 18. a quadratic function with three real zeros | 19. a cubic function with only one real zero |
| 20. a cubic function with two real zeros | 21. a cubic function with no real zeros |

22. Write the equation for a cubic function with roots at $x = -4.5$, $x = -1$ and $x = 2$ that passes through the point $(-4, -2.7)$.

For each function, find the degree and the leading coefficient. Then, sketch the end behavior.

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| 23. $f(x) = 5x^4 + 3x^2 - 9x + 1$ | 24. $g(x) = -4x + 7x^5 - x^7 + 2x^4$ | 25. $h(x) = x(x-4)(2x+1)^2(x+7)$ |
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