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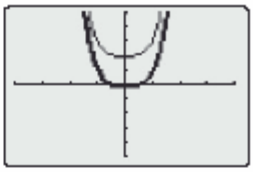
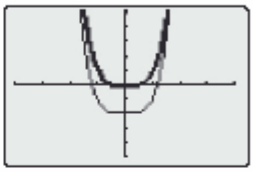
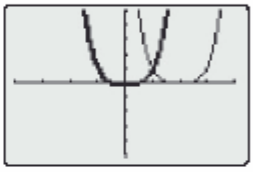
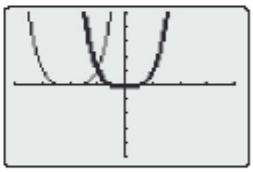
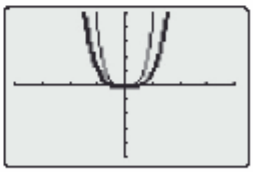
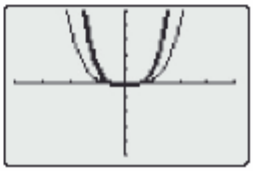
## Section 1.4 Summary

BLM 1–13
(page 1)

| The Roles of the Parameters $a$, $k$, $d$, and $c$ in Polynomial Functions of the Form $y = a[k(x - d)]^n + c$, where $n \in \mathbb{N}$ | | |
|---|---|---|
| **Value of $c$ in $y = a[k(x - d)]^n + c$** | **Transformation of the Graph of $y = x^n$** | **Example Using the Graph of $y = x^4$** |
| $c > 0$ | Translation $c$ units up |  $c = 2$ $y = x^4 + 2$ |
| $c < 0$ | Translation $c$ units down |  $c = -2$ $y = x^4 - 2$ |
| **Value of $d$ in $y = a[k(x - d)]^n + c$** | | |
| $d > 0$ | Translation $d$ units right |  $d = 2$ $y = (x - 2)^4$ |
| $d < 0$ | Translation $d$ units left |  $d = -2$ $y = (x + 2)^4$ |
| **Value of $a$ in $y = a[k(x - d)]^n + c$** | | |
| $a > 1$ | Vertical stretch by a factor of $a$ |  $a = 4$ $y = 4x^4$ |
| $0 < a < 1$ | Vertical compression by a factor of $a$ |  $a = 0.25$ $y = 0.25x^4$ |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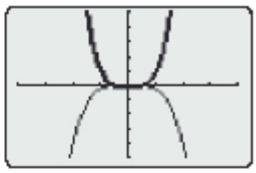
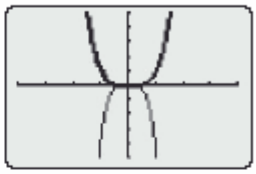
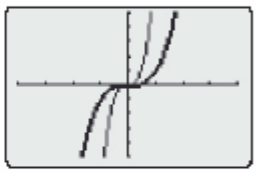
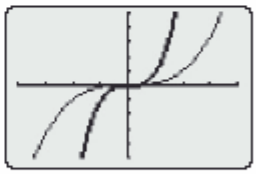
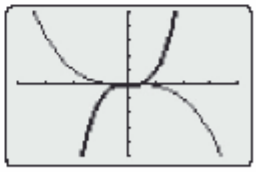
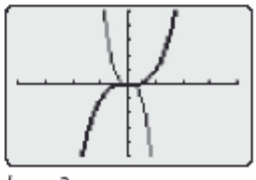
| The Roles of the Parameters $a, k, d$, and $c$ in Polynomial Functions of the Form $y = a[k(x - d)]^n + c$, where $n \in \mathbb{N}$ | | |
|---|---|---|
| **Value of $a$ in $y = a[k(x - d)]^n + c$** | **Transformation of the Graph of $y = x^n$** | **Example Using the Graph of $y = x^4$** |
| $-1 < a < 0$ | Vertical compression by a factor of $\lvert a \rvert$ and a reflection in the $x$-axis |  $a = -0.25$ $y = -0.25x^4$ |
| $a < -1$ | Vertical stretch by a factor of $\lvert a \rvert$ and a reflection in the $x$-axis |  $a = -4$ $y = -4x^4$ |
| **Value of $k$ in $y = a[k(x - d)]^n + c$** | **Transformation of the Graph of $y = x^n$** | **Example Using the Graph of $y = x^3$** |
| $k > 0$ | Horizontal compression by a factor of $\frac{1}{k}$ |  $k = 2$ $y = (2x)^3$ |
| $0 < k < 1$ | Horizontal stretch by a factor of $\frac{1}{k}$ |  $k = 0.5$ $y = (0.5x)^3$ |
| $-1 < k < 0$ | Horizontal stretch by a factor of $\left\lvert \frac{1}{k} \right\rvert$ and a reflection in the $y$-axis |  $k = -0.5$ $y = (-0.5x)^3$ |
| $k < -1$ | Horizontal compression by a factor of $\left\lvert \frac{1}{k} \right\rvert$ and a reflection in the $y$-axis |  $k = -2$ $y = (-2x)^3$ |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