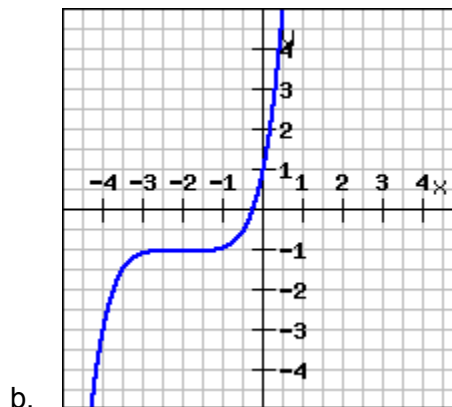
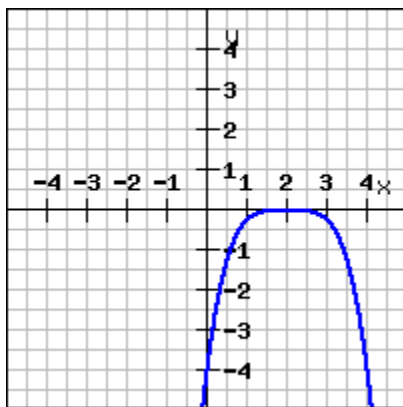


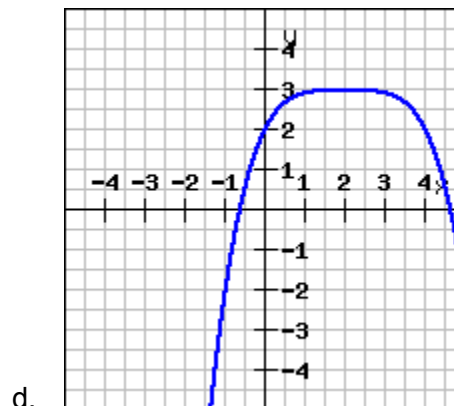
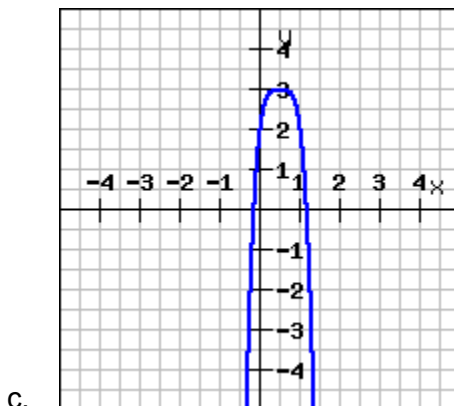
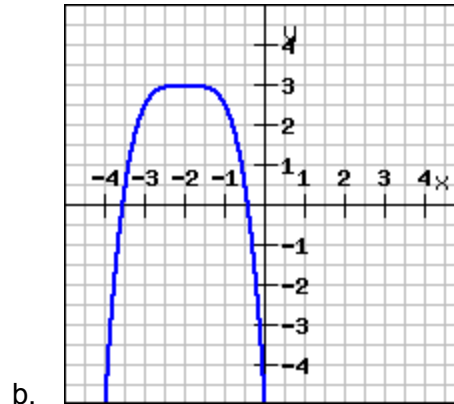
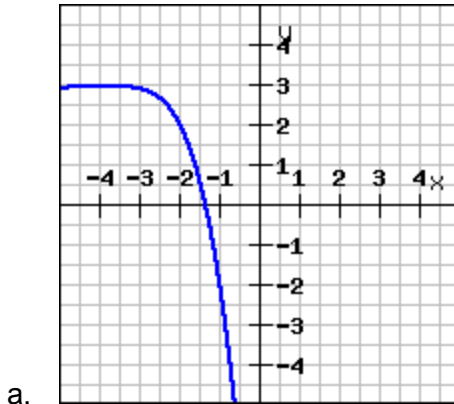
MHF4U: Transformations of Power Functions

- Given a power function $f(x) = a(b(x - c))^n + d$, which parameters affect the shape of the graph, which affect its position, and which affect its orientation?
- State the parent function, and any transformations applied to it, to produce each polynomial function.
 - $f(x) = 2x^3 - 5$
 - $g(x) = -(x + 3)^4 + 2$
 - $h(x) = -\frac{2}{3}(2x - 7)^5 - 1$
- State the end behaviour, the domain, and the range for each function in Q2.
- Write a possible equation for a polynomial function given the parent function and the following transformations:
 - $y = x^4$; vert. stretch by a factor of 5, horz. translation left 3 units
 - $y = x^3$; horz. reflection, horz. stretch by a factor of 4, vert. translation down 2 units
 - $y = x^5$; vert. reflection, horz. compression by a factor of 6, horz. translation right 2 units
- Sketch a graph of each function.
 - $f(x) = (x - 3)^3 - 1$
 - $g(x) = 2(x + 1)^4 - 3$
 - $h(x) = -\frac{1}{2}(x - 1)^5 + 2$
- For each graph, state a possible equation.



- Match each graph with its equation.

- $f(x) = -\left(\frac{1}{2}x - 1\right)^4 + 3$
- $g(x) = -\left(\frac{1}{2}x + 2\right)^4 + 3$
- $j(x) = -\frac{1}{2}(x + 2)^4 + 3$
- $k(x) = -(2x - 1)^4 + 3$

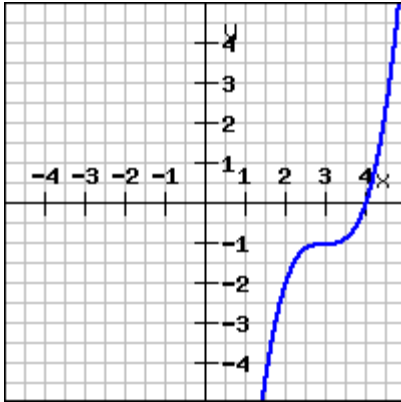


8. A quartic power function is transformed such that its vertex is at $(-2, -7)$. Determine an equation if it passes through the point $(3, 8)$.

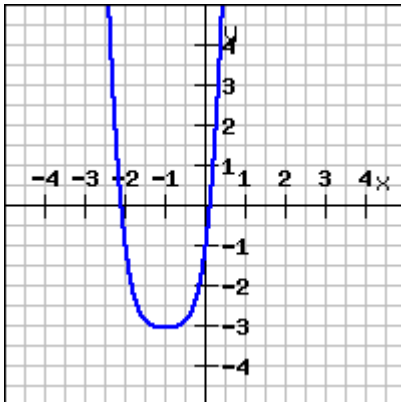
Solutions

V = vertical, H = horizontal, S = stretch, C = compression, R = reflection, T = translation

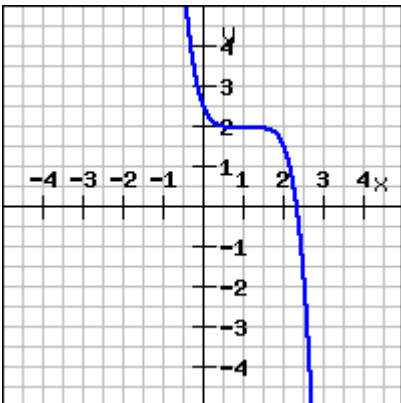
- Shape: a and b ; position: c and d ; orientation: a and b
- $y = x^3$; VS $\times 2$, VT $\downarrow 5$
 - $y = x^4$; VR, HT $\leftarrow 3$, VT $\uparrow 2$
 - $y = x^5$; VR, VC $\times \frac{2}{3}$, HC $\times \frac{1}{2}$, HT $\rightarrow \frac{7}{2}$, VT $\downarrow 1$
- Q3 - Q1; $(-\infty, \infty)$; $(-\infty, \infty)$
 - Q3 - Q4; $(-\infty, \infty)$; $(-\infty, 2]$
 - Q2 - Q4; $(-\infty, \infty)$; $(-\infty, \infty)$
- $f(x) = 5(x + 3)^4$
 - $g(x) = \left(-\frac{1}{4}x\right)^3 - 2$
 - $h(x) = -(6(x - 2))^5$



5. a.



b.



c.

6. a. $f(x) = -\frac{1}{4}(x - 2)^4$

b. $g(x) = \frac{1}{16}(x + 2)^5 - 1$

7. a. $g(x)$ b. $j(x)$ c. $k(x)$ d. $f(x)$

8. $f(x) = \frac{3}{125}(x + 2)^4 - 7$