REVIEW Cubic and Cube Root Name: Answer Key

Given: $f(x) = 3(3x-6)^3 - 1$ $g(x) = \frac{1}{5}\sqrt[3]{4-2x}$ $h(x) = \sqrt[3]{4+2(x+1)^3}$

1) Evaluate g(x) = -2

$-2 = \frac{1}{5}\sqrt[3]{4-2x}$

$-10 = \sqrt[3]{4-2x}$

$-1000 = 4-2x$

$-1004 = -2x$

$x = 502$

2) Evaluate h(2)

$\sqrt[3]{4+2(2+1)^3}$

$\sqrt[3]{4+2(3)^3}$

$\sqrt[3]{4+2(27)}$

$\sqrt[3]{4+54}$

$\sqrt[3]{58}$

3.871

3) Evaluate f(2x + 3)

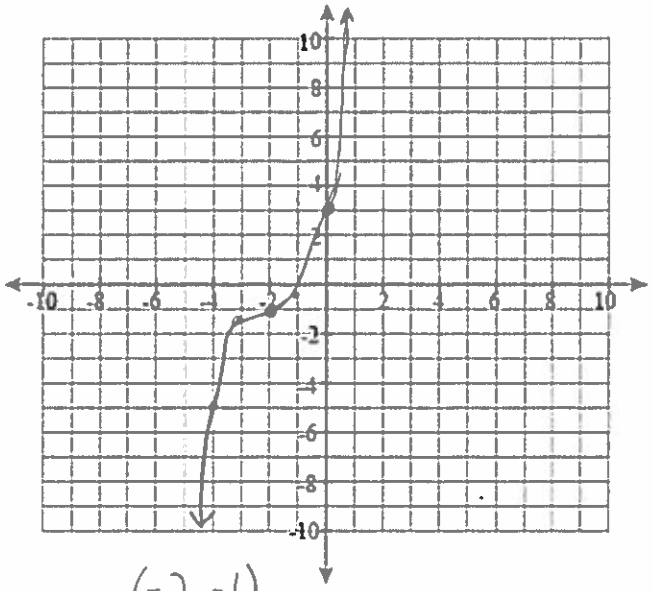
$3(3(2x+3)-6)^3 - 1$

$3(6x+9-6)^3 - 1$

$3(6x+3)^3 - 1$

Graph the following functions and identify their attributes.

4) $f(x) = \frac{1}{2}(x+2)^3 - 1$



Vertex: (-2, -1)

x-intercept: (-.74, 0) y-intercept: (0, 3)

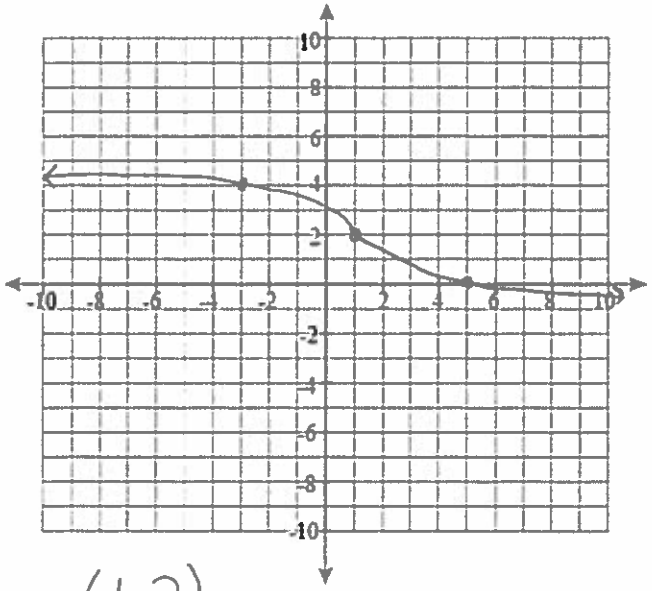
Increasing: $(-\infty, \infty)$ Decreasing: Never

Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$

End behaviors: As $x \to \infty$, $f(x) \to \infty$ As $x \to -\infty$, $f(x) \to -\infty$

Transformations: shift left 2 and down 1, vert. comp by 1/2

5) $g(x) = \sqrt[3]{-2(x-1)} + 2$



Vertex: (1, 2)

x-intercept: (5, 0) y-intercept: (0, 3.26)

Increasing: Never Decreasing: $(-\infty, \infty)$

Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$

End behaviors: As $x \to \infty$, $f(x) \to -\infty$ As $x \to -\infty$, $f(x) \to \infty$

Transformations: shift right 1 and up 2, hor. comp by 1/2, hor. reflection

Find the inverse of each function.

6) $f(x) = 3(4 + 2x)^3 + 3$

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

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

$\frac{x-3}{3} = (4+2y)^3$

$\sqrt[3]{\frac{x-3}{3}} = 4+2y$

$\sqrt[3]{\frac{x-3}{3}} - 4 = 2y$

$y = \frac{\sqrt[3]{\frac{x-3}{3}} - 4}{2}$

7) $g(x) = 2\sqrt[3]{3-4x} - 1$

$x = 2\sqrt[3]{3-4y} - 1$

$x+1 = 2\sqrt[3]{3-4y}$

$\frac{x+1}{2} = \sqrt[3]{3-4y}$

$\left(\frac{x+1}{2}\right)^3 = 3-4y$

$\left(\frac{x+1}{2}\right)^3 - 3 = -4y$

$y = \frac{\left(\frac{x+1}{2}\right)^3 - 3}{-4}$

Use composition to prove the following functions are inverses.

8) $f(x) = \sqrt[3]{\frac{x+1}{2}} - 2$ and $g(x) = 2(x+2)^3 - 1$

$\sqrt[3]{\frac{2(x+2)^3 - 1 + 1}{2}} - 2 \rightarrow \sqrt[3]{\frac{2(x+2)^3}{2}} - 2 \rightarrow \sqrt[3]{(x+2)^3} - 2 \rightarrow x+2-2 \rightarrow x$ ✓

Solve the following equations.

9) $5x^3 + 25 = 13$

$5x^3 = -12$

$x^3 = -2.4$

$x = -1.339$

10) $-2\sqrt[3]{4x+3} - 12 = 8$

$-2\sqrt[3]{4x+3} = 20$

$\sqrt[3]{4x+3} = -10$

$4x+3 = -1000$

$4x = -1003$

$x = -250.75$

11) $\sqrt[3]{x+23} = 3\sqrt[3]{2x-4}$

$\left(\sqrt[3]{x+23}\right)^3 = \left(3\sqrt[3]{2x-4}\right)^3$

$x+23 = 27(2x-4)$

$x+23 = 54x - 108$

$131 = 53x$

$x = 2.472$

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12) The price of a stock is growing according to the equation $P(t) = \frac{1}{24.6}(t + 2.5)^3 + 500$, where t is measured is weeks and P(t) is the price of the stock.

a) Determine the value of the stock after 10 weeks.

$P(10) = \frac{1}{24.6}(10+2.5)^3 + 500$

$P(10) = 579.40$

b) In which week is the price of the stock valued at $1000?

$1000 = \frac{1}{24.6}(t+2.5)^3 + 500$

$500 = \frac{1}{24.6}(t+2.5)^3$

$12300 = (t+2.5)^3$

$23.084 = t + 2.5$

$20.584 = t$

The stock reaches $1000 in the 20th week

13) The number of searches in Google for an piece of artwork is modeled by the cube root equation $S(m) = 1.93\sqrt[3]{\frac{1}{4.23}m - 1} + 3$, where S(m) is the number of searches in hundreds of thousands and m is the number of months since the beginning of the year.

a) Determine how many searches were made on the first day of November.

$S(11) = 1.93\sqrt[3]{\frac{1}{4.23}(11) - 1} + 3$

$S(11) = 5.258$

There were 525,800 searches on the first of November.

b) In which month did the number of searches first exceed 400,000?

$4 = 1.93\sqrt[3]{\frac{1}{4.23}m - 1} + 3$

$m = 4.818$

The number of searches first exceeded 400,000 in April.