Word Problems!

1) A framing store uses the function $c(a) = .5\sqrt{a} + 2$ to determine the cost c in dollars of glass for a picture with an area a in square inches. The store charges an addition \$6.00 in labor to install the glass. Write the function d for the total cost of a piece of glass, including installation, and use it to estimate the total cost of glass for a picture with an area of 192 in^2.

Cost = $c(a) = .5\sqrt{a} + 2$

Installation = \$6.00

d = cost + installation

$d(a) = .5\sqrt{a} + 2 + 6$

$d(a) = .5\sqrt{a} + 8$

$a = 192 \Rightarrow .5\sqrt{192} + 8$

$d(192) = \$14.92$

2) Special airbags are used to protect scientific equipment when a rover lands on the surface of Mars. On Earth, the function $f(x) = \sqrt{64x}$ approximates an object's downward velocity in feet per second as the object hits the ground after bouncing x ft in height.

The downward velocity function for the Moon is a horizontal stretch of f by a factor of about $\frac{25}{4}$. Write the velocity function h for the Moon, and use it to estimate the downward velocity of a landing craft at the end of a bounce 50 ft in height.

$f(x) = \sqrt{64x}$

Moon = hori stretch by $\frac{25}{4}$

$g(x) = \sqrt{(64)(\frac{4}{25})(x)} = \sqrt{\frac{256}{25}x} = \frac{16}{5}\sqrt{x}$

$g(50) = \frac{16}{5}\sqrt{50} = 22.63$ ft/sec

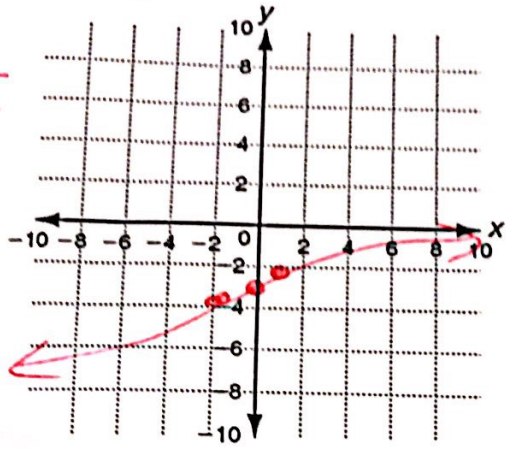
Practice C

Radical Functions

Graph each function or inequality.

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

x	y
0	-3
1	-2.5
-1	-3.5



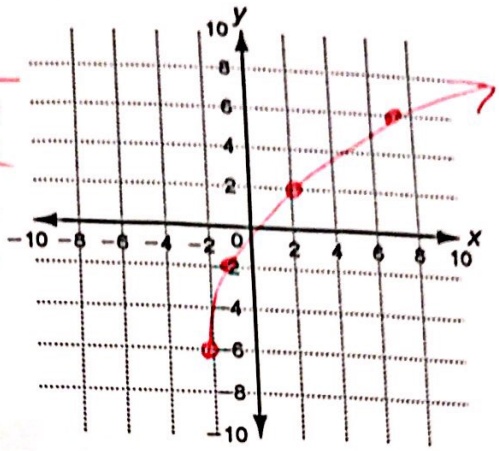
a. Identify the domain and range.

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

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

2. $y=4\sqrt{x+2}-6$

x	y
-2	-6
-1	-2
2	2
7	6



a. Describe the solution region.

Domain: $[-2, \infty)$

Range: $[-6, \infty)$

Use the description to write the square root function *g*.

3. The parent function $f(x)=\sqrt{x}$ is compressed vertically by a factor of $\frac{1}{4}$, reflected across the *x*-axis, and translated 6 units up.

Vert comp $\frac{1}{4} = \frac{1}{4}\sqrt{x}$
Reflect x-axis $= -\frac{1}{4}\sqrt{x}$
6 units up $= -\frac{1}{4}\sqrt{x} + 6$

$g(x) = -\frac{1}{4}\sqrt{x} + 6$

4. The parent function $f(x)=\sqrt{x}$ is translated 8 units left, reflected across the *y*-axis, and stretched horizontally by a factor of 3.

8 units left $\sqrt{x+8}$, reflect across y-axis $\sqrt{-(}$
stretch horizontally $\sqrt{-\frac{1}{3}(x+8)}$

$g(x) = \sqrt{-\frac{1}{3}(x+8)}$

Solve.

5. The frequency, *f*, in Hz, at which a simple pendulum rocks back and forth is given by $f=\frac{1}{2\pi}\sqrt{\frac{g}{l}}$, where *g* is the strength of the gravitational field at the location of the pendulum, and *l* is the length of the pendulum.

   a. Find the frequency of a pendulum whose length is 1 foot and where the gravitational field is approximately 32 ft/s^2.

$l=1 \quad g=32$

$f=\frac{1}{2\pi}\sqrt{\frac{32}{1}} = .9003$ Hz

   b. The strength of the gravitational field on the moon is about $\frac{1}{6}$ as strong as on Earth. Find the frequency of the same pendulum on the moon.

$\frac{1}{2\pi}\sqrt{\frac{6g}{l}} = \frac{1}{2\pi}\sqrt{\frac{6(32)}{1}} = 2.205$