

Square Root Function Practice Questions

Properties of Radicals

1) Write each of the following expressions as a single radical

$$\begin{aligned} \text{a) } & \sqrt{6} \cdot \sqrt{7} \\ & = \sqrt{35} \end{aligned}$$

$$\begin{aligned} \text{b) } & \frac{\sqrt{20}}{\sqrt{2}} \\ & = \sqrt{10} \end{aligned}$$

$$\begin{aligned} \text{c) } & 11^{1/2} \cdot 15^{1/2} \\ & = \sqrt{165} \end{aligned}$$

$$\begin{aligned} \text{d) } & \frac{\sqrt{12} \cdot \sqrt{13}}{\sqrt{26} \cdot \sqrt{6}} \\ & = \sqrt{1} \text{ or } 1 \end{aligned}$$

$$\begin{aligned} \text{e) } & \frac{\sqrt{115}}{\sqrt{5}} \div \frac{\sqrt{92}}{\sqrt{46}} \\ & = \sqrt{\frac{23}{2}} \end{aligned}$$

$$\begin{aligned} \text{f) } & \frac{\sqrt{a} \cdot \sqrt{b} \cdot \sqrt{c}}{\sqrt{2a} \cdot \sqrt{3b} \cdot \sqrt{5c}} \\ & = \sqrt{\frac{1}{30}} \end{aligned}$$

2) Rationalize each of the following expressions

$$\begin{aligned} \text{a) } & \frac{5}{\sqrt{7}} \\ & = \frac{5\sqrt{7}}{7} \end{aligned}$$

$$\begin{aligned} \text{b) } & \frac{1}{\sqrt{13} + \sqrt{2}} \\ & = \frac{\sqrt{13} - \sqrt{2}}{11} \end{aligned}$$

$$\begin{aligned} \text{c) } & \frac{3}{\sqrt{19} - \sqrt{42}} \\ & = \frac{3(\sqrt{19} + \sqrt{42})}{23} \end{aligned}$$

$$\begin{aligned} \text{d) } & \frac{-12}{\sqrt{5} - \sqrt{11}} \\ & = 2\sqrt{5} + \sqrt{11} \end{aligned}$$

$$\begin{aligned} \text{e) } & \frac{\sqrt{ab}}{\sqrt{a} - \sqrt{b}} \\ & = \frac{a\sqrt{b} + b\sqrt{a}}{a - b} \end{aligned}$$

$$\begin{aligned} \text{f) } & \frac{\sqrt{a} - \sqrt{b}}{\sqrt{a} + \sqrt{b}} \\ & = \frac{a - 2\sqrt{ab} + b}{a - b} \end{aligned}$$

3) Reduce the radicand of each of the following expressions

$$\begin{aligned} \text{a) } & \sqrt{48} \\ & = 4\sqrt{3} \end{aligned}$$

$$\begin{aligned} \text{b) } & \sqrt{500} \\ & = 10\sqrt{5} \end{aligned}$$

$$\begin{aligned} \text{c) } & 2\sqrt{7c^2} \\ & = 2c\sqrt{7} \end{aligned}$$

$$\begin{aligned} \text{d) } & 2\sqrt{4a + 8b} \\ & = 4\sqrt{a + 2b} \end{aligned}$$

Square Root Function Basics

4) Match each of the rules below with its corresponding function

$$f(x) = 0.8\sqrt{-(x-1)} - 2$$

$$i(x) = \frac{1}{2}\sqrt{x+1} - 2$$

$$l(x) = -3\sqrt{-(x+2)} - 1$$

$$g(x) = -2\sqrt{-(x-2)} - 1$$

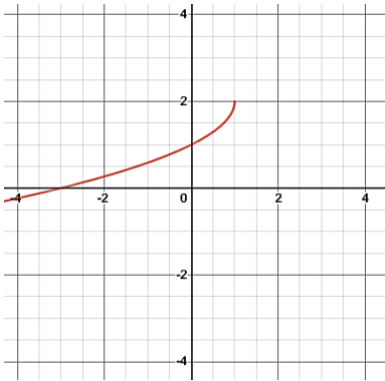
$$j(x) = 2.2\sqrt{-(x+1)} + 2$$

$$m(x) = -2.8\sqrt{x-1} + 2$$

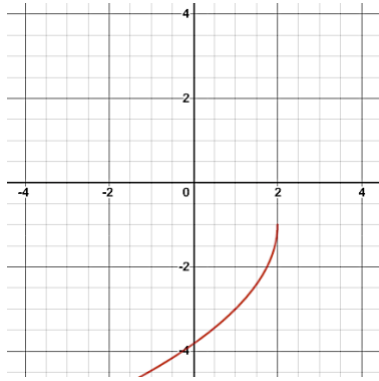
$$h(x) = -\sqrt{-(x-1)} + 2$$

$$k(x) = 1.6\sqrt{x+1} + 2$$

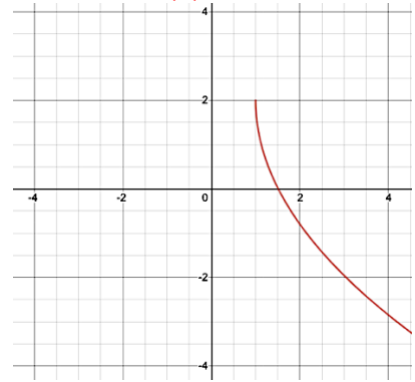
Function: **h(x)**



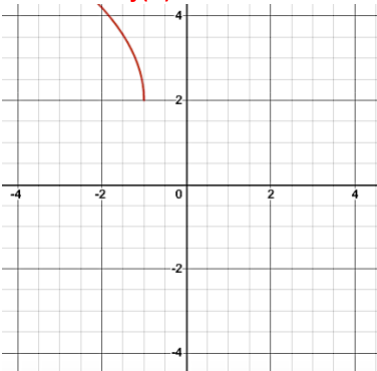
Function: **g(x)**



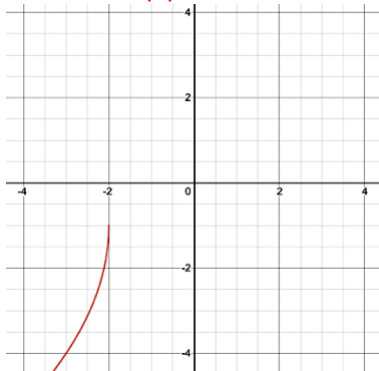
Function: **m(x)**



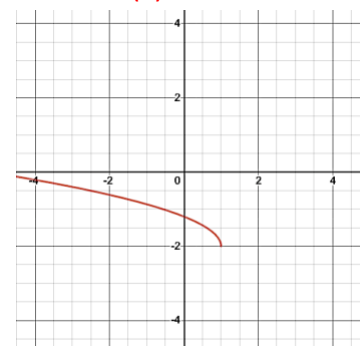
Function: **j(x)**



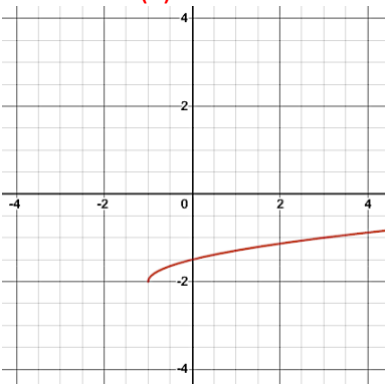
Function: **l(x)**



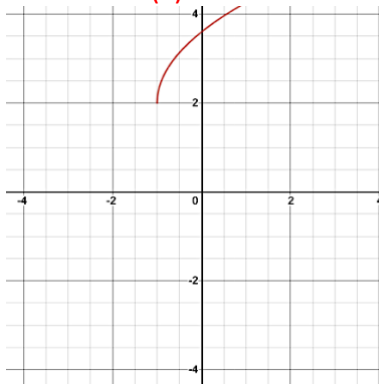
Function: **f(x)**



Function: **i(x)**



Function: **k(x)**



5) Given that h is the x-coordinate of the vertex of the curve of a square root function, among the functions listed, determine the one that is:

- a) increasing and for which the domain is $]-\infty, h]$ **i(x)**
- b) decreasing and for which the domain is $[h, +\infty[$ **g(x)**
- c) increasing and for which the domain is $[h, +\infty[$ **h(x)**
- d) decreasing and for which the domain is $]-\infty, h]$ **f(x)**

$$f(x) = 5\sqrt{-(x-3)} + 2$$

$$g(x) = -2\sqrt{x+7} - 4$$

$$h(x) = 0.4\sqrt{0.1x - 0.4} - 1$$

$$i(x) = -\frac{2}{3}\sqrt{-\left(\frac{x}{3} - 2\right)} + 10$$

6) For each of the functions below, transform the rule such that $b = \pm 1$

a) $f(x) = 2\sqrt{25(x-1)} + 3$ b) $g(x) = -4\sqrt{-9(x+7)} - 6$ c) $h(x) = \sqrt{16x-48}$
 $f(x) = 10\sqrt{(x-1)} + 3$ $g(x) = -12\sqrt{-(x+7)} - 6$ $h(x) = 4\sqrt{(x-3)}$

7) The rule of a square root function is $f(x) = 4\sqrt{x+6} - 5$

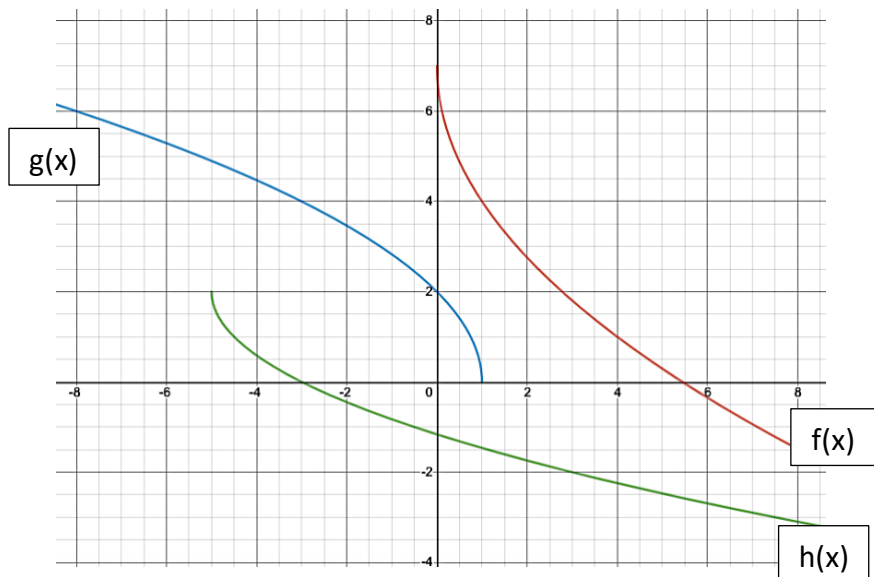
a) What are the coordinates of the vertex of this function? **$(-6, -5)$**

b) Indicate the domain and range of this function. **$D: [-6, +\infty[$ $R: [-5, +\infty[$**

c) Describe the variation of this function. **Increasing over its domain**

8) Sketch the following functions.

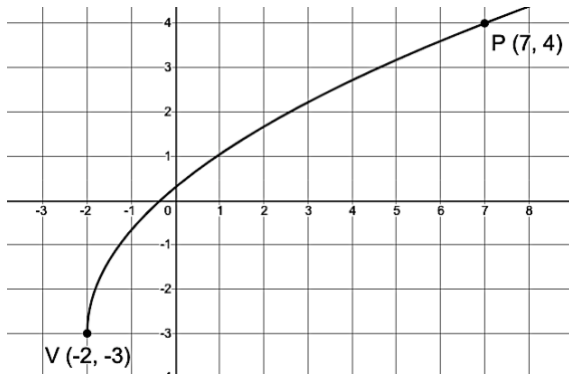
a) $f(x) = -3\sqrt{x} + 7$ b) $g(x) = 2\sqrt{1-x}$ c) $h(x) = -\sqrt{2x+10} + 2$



Finding the Rule

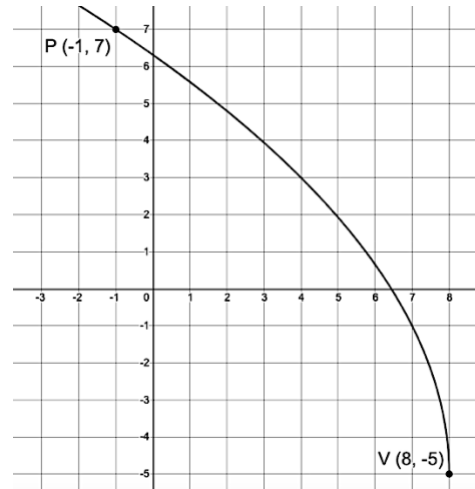
9) Find the rule for each square root function using the coordinates of the vertices, V , and the coordinates of point P .

a)



$$f(x) = \frac{7}{3}\sqrt{x+2} - 3$$

b)



$$f(x) = 4\sqrt{-(x-8)} - 5$$

10) Find the rule of a square root function with a vertex of $(4, 6)$ and an initial value of 10.

$$f(x) = 2\sqrt{-(x-4)} + 6$$

Solving Equalities

11) Solve the following equations

a) $\sqrt{x+2} = 9$
 $x = 79$

b) $\sqrt{3x-15} = 12$
 $x = 53$

c) $\sqrt{-(2x-4)} + 7 = 13$
 $x = -16$

d) $3 = \sqrt{-\frac{4x}{3} + 2} - 2$
 $x = -17.25$

e) $\frac{3}{5} = \sqrt{11 - \frac{x}{25}}$
 $x = 266$

f) $2\sqrt{-(7x-8)} = \sqrt{x}$
 $x = 1.1034$

12) For each equation below, determine the value of x when $y = 6$.

a) $y = -10\sqrt{x-4} + 15$
 $x = 4.81$

b) $y = 3\sqrt{-(x+2)} - 6$
 $x = -18$

c) $y = -0.4\sqrt{0.3-x} - 0.16$
Solution does not exist

d) $y = \frac{1}{2}\sqrt{7-9x} - 11$
 $x = -127.6667$

Solving Inequalities

13) Solve each of the following inequalities.

a) $\sqrt{3x - 2} \geq 5$

$\sqrt{3x - 2} \geq 5$ over $[9, +\infty[$

b) $2\sqrt{4 - x} \leq 26$

$2\sqrt{4 - x} \leq 26$ over $[-165, 4]$

c) $-0.5\sqrt{-11(x + 3)} - 7 < 14$

$-0.5\sqrt{-11(x + 3)} - 7 < 14$ over $]-\infty, -3[$

d) $-23 > 0.5\sqrt{-11(x + 3)} - 7$

No solution

e) $10\sqrt{0.1(9 - x)} + 5 \geq -1$

No solution

f) $-\sqrt{-\frac{x}{12} - 1} + \frac{1}{3} \leq \frac{7}{3}$

$-\sqrt{-\frac{x}{12} - 1} + \frac{1}{3} \leq \frac{7}{3}$ over $]-\infty, -12]$

Word Problems

14) The speed, S , (in m/s) of a moving object is represented by the rule $S = -12\sqrt{5t} + 60$, where t represents the time (in s).

a) What is the initial speed of the object?

Initial speed is 60 m/s

b) When does this object come to a stop?

The object comes to a stop after 5 s.

c) Determine the time interval over which the speed of the moving object is less than 30 m/s

The speed is less than 30 m/s from $]1.25, +\infty[$

15) The rule $f(x) = 25\sqrt{16 - x}$ defines the thickness (in cm) of the snow accumulated on the rooftop of a building according to the number of days elapsed since March 21 (x).

a) What is the thickness of the snow on March 21?

The thickness of the snow is 100 cm on March 21

b) At what moment:

1) will the initial amount of snow have decreased by half?

The initial amount of snow will have decreased by half in 12 days.

2) will all the snow be melted?

The snow will have melted in 16 days.

16) Following a furnace breakdown, the temperature inside a house varies according to the rule $T(h) = -2\sqrt{h} + 20$ where $T(h)$ is the temperature in degrees Celcius and h is the number of hours since the start of the breakdown, which lasted four full days.

a) Sketch function T . **see graph**

b) What is the range of T ? **$R:]-\infty, 20]$**

c) Sketch the inverse of T , state its rule and domain. **See graph for sketch.**

$$T^{-1}(h) = \frac{1}{4}(x - 20)^2 \quad D:]-\infty, 20]$$

d) How long would the breakdown have to last for the temperature inside the house to reach the freezing point? **It would take 100 hours for the temperature inside the house to reach the freezing point**

