

Solving Radical Equations

Lesson 5.4

Bell Work

Answers:

3. B

4. D

5. F

6. A

7. E

8. C

In Exercises 3–8, match the function with its graph.

3. $f(x) = \sqrt{x + 3}$

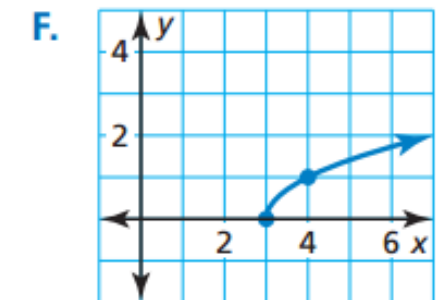
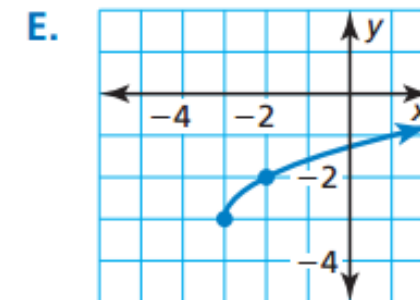
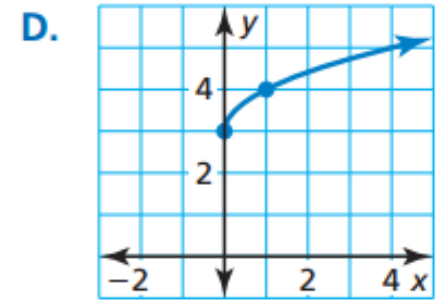
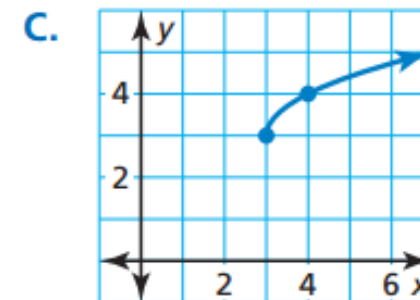
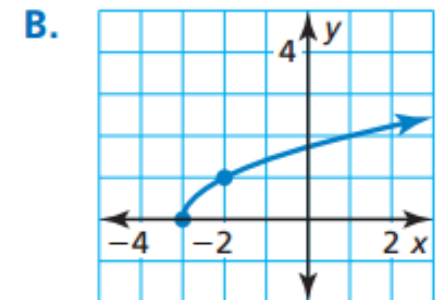
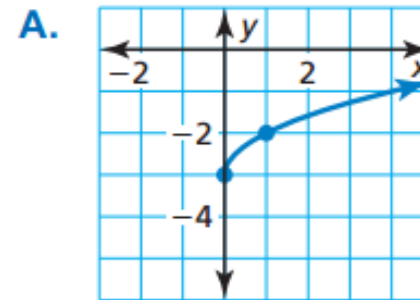
4. $h(x) = \sqrt{x} + 3$

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

6. $g(x) = \sqrt{x} - 3$

7. $h(x) = \sqrt{x + 3} - 3$

8. $f(x) = \sqrt{x - 3} + 3$



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

$$\frac{2}{2}(\sqrt[3]{x-3})^3 = \frac{4}{2}^3$$

$$\begin{array}{r} x-3 = 8 \\ +3 \quad +3 \\ \hline x = 11 \end{array}$$

$$2\sqrt[3]{11-3} \stackrel{?}{=} 4$$
$$2\sqrt[3]{8} \stackrel{?}{=} 4 \quad \checkmark$$

isolate the radical
raise radical to inverse power

Extraneous Roots

$$\text{Solve } \sqrt[3]{2x - 5} - 2 = 3$$

isolate the radical

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

$$\frac{2x - 5 = 125}{2x = 130}$$

$$\frac{2x}{2} = \frac{130}{2}$$

$$x = 65$$

$$\sqrt[3]{2(65) - 5} - 2 = 3$$

$$\sqrt[3]{125} - 2 = 3 \quad \checkmark$$

$$5 - 2 = 3$$

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

$$\begin{array}{r} 2x+7 = x^2-8x+16 \\ -2x-7 \quad -2x-7 \end{array}$$

$$0 = x^2 - 10x + 9$$

$$0 = (x-9)(x-1)$$

$$x-9=0 \text{ or } x-1=0$$

$$x=9$$

$$~~x=1~~$$

$$\sqrt{2(9)+7} = 9-4$$

$$\sqrt{25} = 5$$

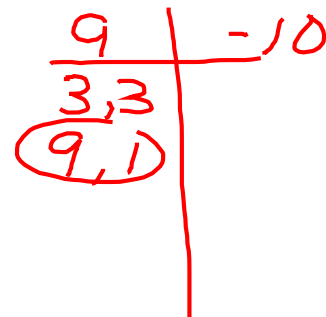
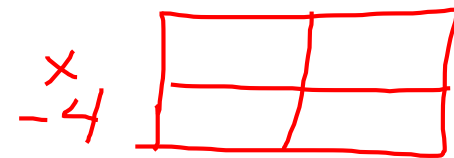
$$\sqrt{2(1)+7} = 1-4$$

$$\sqrt{9} = -3$$

$$(x-4)(x-4)$$

$$x^2 - 8x + 16$$

$$x-4$$



$$\text{Solve } (x + 12)^{1/2} = (x)^2$$

$$\begin{array}{r} x+12 = x^2 \\ -x-12 \quad -x-12 \\ \hline \end{array}$$

$$0 = x^2 - x - 12$$

$$0 = (x+3)(x-4)$$

$$x = \cancel{-3} \text{ or } 4$$

mult	add/subst
12	-1
3x4	
6x2	
12x1	

$$\begin{array}{l} (-3+12)^{1/2} = -3 \\ 3 = -3 \end{array}$$

$$\begin{array}{l} (4+12)^{1/2} = 4 \\ \sqrt{16} \\ 4 = 4 \end{array}$$

$$\text{Solve } (3x)^{3/4} - 2 = 25$$

$$\begin{aligned} (\sqrt[4]{3x})^3 - 2 &= 25 \\ +2 \quad +2 & \end{aligned}$$

$$\begin{aligned} \sqrt[3]{(\sqrt[4]{3x})^3} &= \sqrt[3]{27} \\ (\sqrt[4]{3x})^4 &= (3)^4 \end{aligned}$$

$$\frac{3x}{3} = \frac{81}{3}$$

$$x = 27$$

Isolate the radical

$$(\sqrt[4]{3 \cdot 27})^3 - 2 = 25$$

$$(\sqrt[4]{81})^3 - 2 = 25$$

$$3^3 - 2 = 25$$

$$27 - 2 = 25 \checkmark$$

To win a basketball slam-dunk contest, players try to maximize their hang time. A player's hang time is given by the equation $t = 0.5\sqrt{h}$, where t is the time (in seconds) and h is the height (in feet) of the jump. The second-place finisher of a slam-dunk contest had a hang time of 1 second, and the winner had a hang time of 1.2 seconds. How many feet higher did the winner jump than the second-place finisher?