

Unit 4a: Radical Relationships Review

Graph on separate sheet. Find the domain and range.

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

D: $[1, \infty)$
 R: $(-\infty, 2]$

- reflect over x-axis
- Vertical stretch of 3
- right 1, up 2

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

D: $(-\infty, \infty)$
 R: $(-\infty, \infty)$

- right 1
- VP 2

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

D: $[1, \infty)$
 R: $[-3, \infty)$

- Horizontal stretch of 2
- Right 2
- Down 3

4. $f(x) = \frac{1}{2}\sqrt{x-1}$

D: $[0, \infty)$
 R: $[-1, \infty)$

- Vertical compression of $\frac{1}{2}$
- down 1

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

D: $(-\infty, \infty)$
 R: $(-\infty, \infty)$

- Vertical stretch of 2
- Left 1
- VP 1

6. $f(x) = \sqrt[3]{x-1} + 1$

D: $(-\infty, \infty)$
 R: $(-\infty, \infty)$

- right 1
- VP 1

Solve the following radical equations.

7. $\frac{1}{3}\sqrt{x-5} = \frac{20}{3}$

$(\sqrt{x-5})^2 = (\frac{20}{3})^2$

$\frac{x-5}{9} = \frac{400}{9} + \frac{45}{9}$ $x = \frac{445}{9}$

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

$(\sqrt[3]{x-4})^3 = 5^3$

$\frac{x-4}{1} = \frac{125}{1} + \frac{4}{1}$

$x = 129$

8. $x + x\sqrt{2} = 5$

$\frac{x(1+\sqrt{2})}{(1+\sqrt{2})} = \frac{5}{(1+\sqrt{2})}$

$x = \frac{5}{(1+\sqrt{2})} \cdot \frac{(1-\sqrt{2})}{(1-\sqrt{2})} = \frac{5-5\sqrt{2}}{1-2}$

$= \frac{5-5\sqrt{2}}{-1}$

$x = -5+5\sqrt{2}$

10. $(\sqrt{2x-3})^2 = (x-3)^2$

$2x-3 = x^2-6x+9$

$x^2-8x+12 = 0$

$(x-6)(x-2) = 0$

$x = 6$ ~~$x = 2$~~

↓ works doesn't work

$$11. \sqrt[3]{x-4} + \frac{x}{-2} = -1$$

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

$$\frac{x-4}{+4} = \frac{-27}{+4}$$

$$\boxed{x = -23}$$

$$12. \sqrt[4]{x+\frac{1}{2}} + 1 = -1$$

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

Not possible \emptyset

Solve the radical inequalities.

$$13. (\sqrt{2x-3})^2 > (\sqrt{4x-1})^2$$

$$2x-3 \geq 0$$

$$2x-3 > 4x-1$$

$$\frac{-2x}{-2} > \frac{2}{-2}$$

$$\boxed{x < -1}$$

$$2x \geq 3$$

$$\boxed{x \geq \frac{3}{2}}$$

$$4x-1 \geq 0$$

$$4x \geq 1$$

$$\boxed{x \geq \frac{1}{4}}$$



\emptyset

$$14. \frac{-4\sqrt{3x+1}}{-4} \geq \frac{-12}{-4}$$

$$(\sqrt{3x+1})^2 \leq 3^2$$

$$3x+1 \leq 9$$

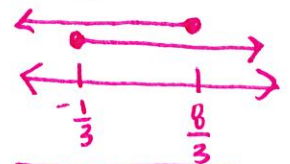
$$\frac{3x}{3} \leq \frac{8}{3}$$

$$x \leq \frac{8}{3}$$

$$3x+1 \geq 0$$

$$3x \geq -1$$

$$x \geq -\frac{1}{3}$$



$$\boxed{[-\frac{1}{3}, \frac{8}{3}]}$$

$$15. \frac{-4\sqrt{3x-1}}{-4} \geq \frac{3}{-4}$$

$$\sqrt{3x-1} \leq -\frac{3}{4}$$

\emptyset

$$16. (\sqrt{2x-4})^2 > 2^2$$

$$2x-4 \geq 0$$

$$2x \geq 4$$

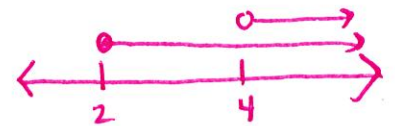
$$\boxed{(4, \infty)}$$

$$2x-4 > 4$$

$$2x > 8$$

$$\boxed{x > 4}$$

$$x \geq 2$$



$$17. \frac{1}{2}\sqrt{2x-3} > \frac{4}{2}$$

$$(\sqrt{2x-3})^2 > 2^2$$

$$2x-3 > 4$$

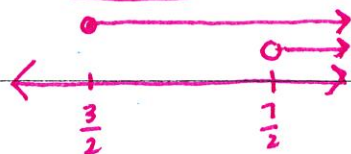
$$2x > 7$$

$$\boxed{x > \frac{7}{2}}$$

$$2x-3 \geq 0$$

$$2x \geq 3$$

$$\boxed{x \geq \frac{3}{2}}$$



Answers:

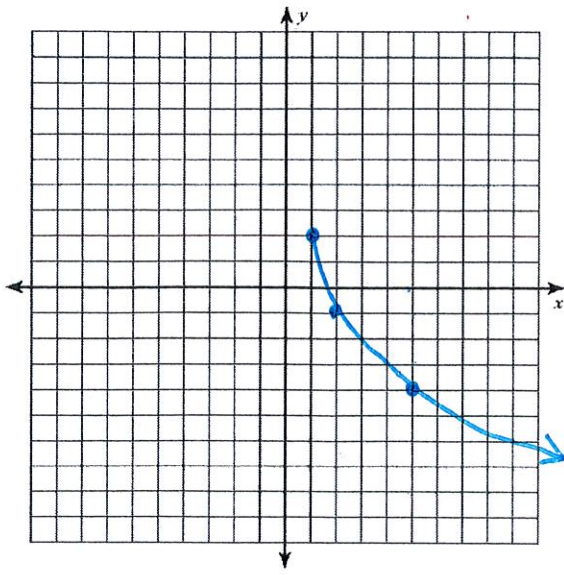
1) $D[1, \infty)$; $R(-\infty, 2]$ 2) $D(-\infty, \infty)$; $R(-\infty, \infty)$ 3) $D[1, \infty)$; $R[-3, \infty)$ 4) $D[0, \infty)$; $R[-1, \infty)$

5) $D(-\infty, \infty)$; $R(-\infty, \infty)$ 6) $D(-\infty, \infty)$; $R(-\infty, \infty)$ 7) $x = \frac{445}{9}$ 8) $x = -5 + 5\sqrt{2}$ 9) $x = 129$

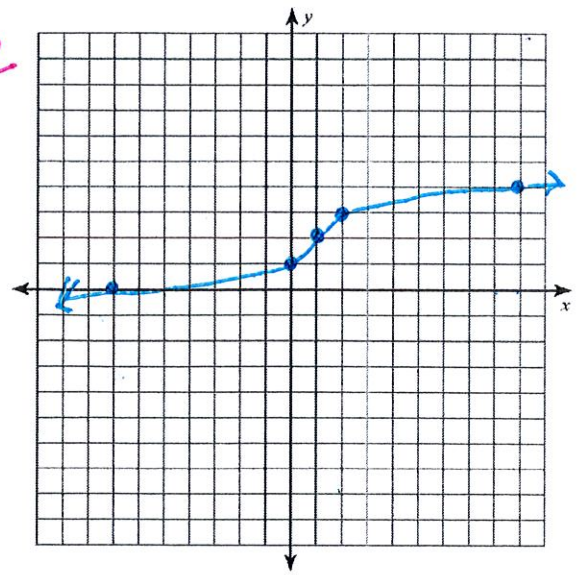
10) $x = 6$ 11) $x = -23$ 12) \emptyset 13) \emptyset 14) $[-\frac{1}{3}, \frac{8}{3}]$ 15) \emptyset 16) $(4, \infty)$ 17) $(\frac{7}{2}, \infty)$

18) $(3, \infty)$

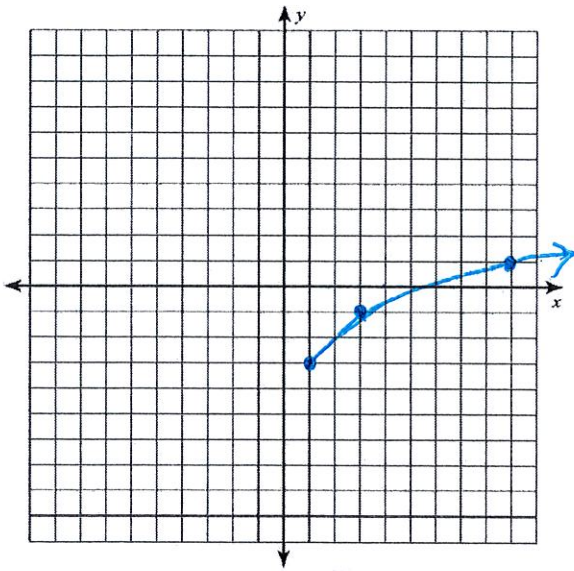
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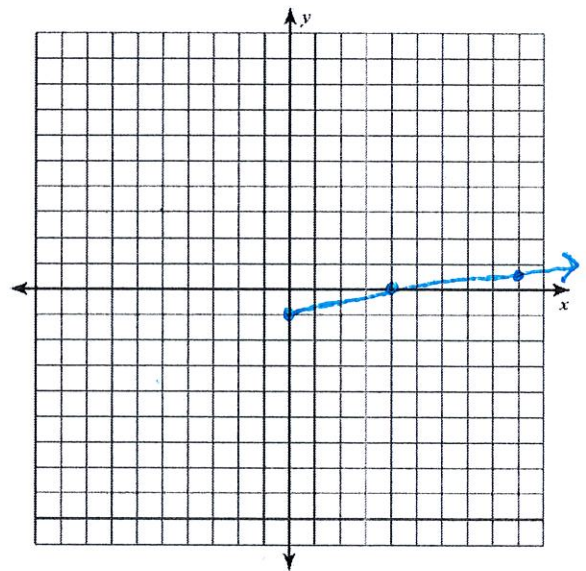
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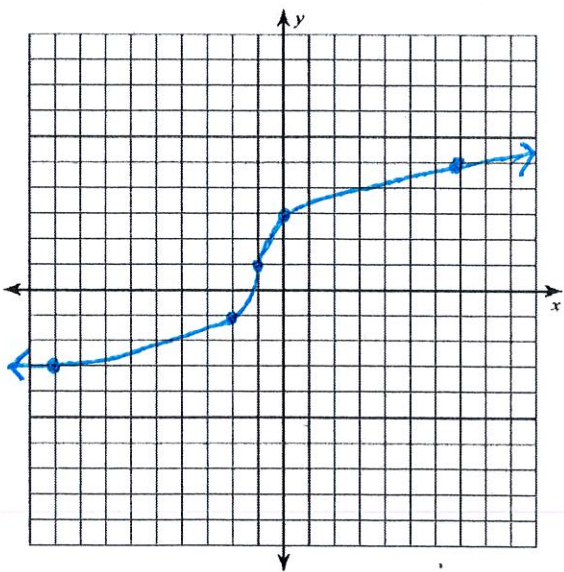
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4



5



6

