

More Solving

$$\textcircled{1} (\sqrt{3x-17})^2 = (\sqrt{x+21})^2$$

$$\begin{array}{r} 3x-17 = x+21 \\ -x \quad -x \\ \hline 2x-17 = 21 \\ +17 \quad +17 \\ \hline 2x = 38 \\ \frac{2x}{2} = \frac{38}{2} \\ \boxed{x=19} \end{array}$$

check!

$$\begin{aligned} \sqrt{3(19)-17} &= \sqrt{(19)+21} \\ \sqrt{57-17} &= \sqrt{40} \\ \sqrt{40} &= \sqrt{40} \checkmark \end{aligned}$$

$$\textcircled{2} (\sqrt{3x-2})^2 = (\sqrt{x-4})^2$$

$$\begin{array}{r} 3x-2 = x-4 \\ -x \quad -x \\ \hline 2x-2 = -4 \\ +2 \quad +2 \\ \hline 2x = -2 \\ \frac{2x}{2} = \frac{-2}{2} \\ x = -1 \end{array}$$

no real solutions

check!

$$\begin{aligned} \sqrt{3(-1)-2} &= \sqrt{(-1)-4} \\ \sqrt{-5} &= \sqrt{-5} \end{aligned}$$

$$\textcircled{3} \sqrt{3x+2} = 5\sqrt{x-7}$$

$$* \textcircled{4} (\sqrt{x-1})^2 = (4\sqrt{x+1})^2$$

$$\begin{array}{r} x-1 = 16(x+1) \\ x-1 = 16x+16 \\ -x \quad -x \\ \hline -1 = 15x+16 \\ -16 \quad -16 \\ \hline -17 = 15x \end{array}$$

$$\frac{-17}{15} = \frac{15x}{15}$$

$$\frac{-17}{15} = x$$

no real solution

check!

$$\sqrt{\left(-\frac{17}{15}\right)-1} = 4\sqrt{\left(-\frac{17}{15}\right)+1}$$

$$\sqrt{\frac{-32}{15}} = 4\sqrt{\frac{2}{15}}$$

$$\textcircled{5} x^2 = (\sqrt{42-x})^2$$

$$\begin{array}{r} x^2 = 42-x \\ +x \quad +x \\ \hline x^2 + x = 42 \\ -42 \quad -42 \\ \hline \end{array}$$

check!

$$\begin{aligned} (-7) &= \sqrt{42-(-7)} \\ -7 &= \sqrt{49} \\ -7 &\neq 7 \end{aligned}$$

$$\textcircled{6} (\sqrt{11x-24})^2 = (x)^2$$

$$\begin{array}{r} 11x-24 = x^2 \\ -11x+24 \quad -11x+24 \\ \hline 0 = x^2 - 11x + 24 \\ 0 = (x-8)(x-3) \end{array}$$

$$\begin{aligned}
 x^2 + x &= 42 \\
 -42 \quad -42 \\
 \hline
 x^2 + x - 42 &= 0 \\
 (x+7)(x-6) &= 0 \\
 \begin{array}{l} / \quad \backslash \\ x+7=0 \quad x-6=0 \\ \cancel{x=-7} \quad \boxed{x=6} \end{array}
 \end{aligned}$$

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$$\begin{aligned}
 (6) &= \sqrt{42-6} \\
 6 &= \sqrt{36} \\
 6 &= 6\checkmark
 \end{aligned}$$

$$\begin{aligned}
 0 &= x^2 - 11x + 24 \\
 0 &= (x-8)(x-3) \\
 \begin{array}{l} / \quad \backslash \\ 0=x-8 \quad 0=x-3 \\ +8 \quad +8 \quad +3 \quad +3 \\ \boxed{8=x} \quad \boxed{3=x} \end{array}
 \end{aligned}$$

check!

$$\begin{aligned}
 \sqrt{11(8)-24} &= 8 & \sqrt{11(3)-24} &= 3 \\
 \sqrt{88-24} &= 8 & \sqrt{33-24} &= 3 \\
 \sqrt{64} &= 8 & \sqrt{9} &= 3 \\
 8 &= 8\checkmark & 3 &= 3\checkmark
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{7} (2x)^2 &= (\sqrt{1-3x})^2 \\
 4x^2 &= 1-3x \\
 4x^2 + 3x - 1 &= 0 \\
 (4x-1)(x+1) &= 0 \\
 \begin{array}{l} / \quad \backslash \\ 4x-1=0 \quad x+1=0 \\ +1 \quad +1 \\ \hline 4x=1 \\ \frac{4}{4} \quad \frac{1}{4} \\ \boxed{x=\frac{1}{4}} \end{array} \quad \begin{array}{l} \cancel{x=-1} \end{array}
 \end{aligned}$$

check!

$$\begin{aligned}
 2\left(\frac{1}{4}\right) &= \sqrt{1-3\left(\frac{1}{4}\right)} \\
 \frac{2}{4} &= \sqrt{1-\frac{3}{4}} \\
 \frac{1}{2} &= \sqrt{\frac{1}{4}} \\
 \frac{1}{2} &= \frac{\sqrt{1}}{\sqrt{4}} = \frac{1}{2}\checkmark \\
 2(-1) &= \sqrt{1-3(-1)} \\
 -2 &= \sqrt{4} \\
 -2 &\neq 2
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{8} (\sqrt{2-x})^2 &= (x+4)^2 \\
 2-x &= x^2 + 8x + 16 \\
 -2+x & \quad +x \quad -2 \\
 \hline
 0 &= x^2 + 9x + 14 \\
 0 &= (x+7)(x+2) \\
 \begin{array}{l} / \quad \backslash \\ 0=x+7 \quad 0=x+2 \\ \cancel{x=-7} \quad \boxed{x=-2} \end{array}
 \end{aligned}$$

check!

$$\begin{aligned}
 \sqrt{2-(-7)} &= -7+4 & \sqrt{2-(-2)} &= -2+4 \\
 \sqrt{9} &= -3 & \sqrt{4} &= 2 \\
 3 &\neq -3 & 2 &= 2
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{9} (2-\sqrt{x+1})^2 &= (\sqrt{x+3})^2 \\
 5-4\sqrt{x+1} + \cancel{x} &= \cancel{x} + 3 \\
 \hline
 5-4\sqrt{x+1} &= 3 \\
 -5 & \quad -5 \\
 \hline
 -4\sqrt{x+1} &= -2 \\
 \frac{-4\sqrt{x+1}}{-4} &= \frac{-2}{-4} \\
 (\sqrt{x+1})^2 &= \left(\frac{1}{2}\right)^2
 \end{aligned}$$

check!

$$\begin{aligned}
 2-\sqrt{\frac{3}{4}+1} &= \sqrt{\frac{3}{4}+3} \\
 2-\sqrt{\frac{3}{4}+\frac{4}{4}} &= \sqrt{\frac{3}{4}+\frac{12}{4}} \\
 2-\sqrt{\frac{7}{4}} &= \sqrt{\frac{15}{4}}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{10} (\sqrt{x+2})^2 &= (\sqrt{x-1})^2 \\
 (\sqrt{x+2})(\sqrt{x+2}) &= x-1 \\
 x+2\sqrt{x}+2\sqrt{x}+4 &= x-1 \\
 \cancel{x} + 4\sqrt{x} + 4 &= \cancel{x} - 1 \\
 \hline
 4\sqrt{x} + 4 &= -1 \\
 -4 \quad -4 \\
 \hline
 4\sqrt{x} &= -5
 \end{aligned}$$

check!

$$\begin{aligned}
 \sqrt{\frac{25}{16}+2} &= \sqrt{\frac{25}{16}-1} \\
 \frac{5}{4} + \frac{8}{4} &= \sqrt{\frac{25}{16}-\frac{16}{16}} \\
 \frac{13}{4} &= \sqrt{\frac{9}{16}} \\
 \underline{13} & \quad \underline{3}
 \end{aligned}$$

$$\begin{aligned}(\sqrt{x+1})^2 &= \left(\frac{1}{2}\right)^2 \\ x+1 &= \frac{1}{4} \\ \hline -1 & \quad -1 \\ \hline x &= -\frac{3}{4}\end{aligned}$$

$$2 - \sqrt{\frac{1}{4}} = \sqrt{\frac{9}{4}}$$

$$2 - \frac{1}{2} = \frac{3}{2}$$

$$\frac{4}{2} - \frac{1}{2} = \frac{3}{2}$$

$$\frac{3}{2} = \frac{3}{2} \checkmark$$

$$\frac{4\sqrt{x}}{4} = -\frac{5}{4}$$

$$(\sqrt{x})^2 = \left(\frac{5}{4}\right)^2$$

$$x = \frac{25}{16}$$

no
real
solution

$$\frac{13}{4} \neq \frac{3}{4}$$