

Nov. 5

Day 8: Solving Radical Equations

So, who uses any of these equations we are learning to solve?????

At the scene of an accident, police measure the approximate speed that a vehicle was travelling by measuring the length of the skid marks left on the pavement. One formula used for this purpose is

$$v = 14.9\sqrt{L} - 20.4$$

where " v " represents the speed of the vehicle and L represents the length of the skid marks in metres. A vehicle is travelling at 55 km/h and brakes so that it skids to a stop. Determine the length of the skid marks.

$$55 = 14.9\sqrt{L} - 20.4$$

$$20.4 \quad + 20.4$$

$$\frac{75.4}{14.9} = \frac{14.9\sqrt{L}}{14.9}$$

$$5.06^2 = \sqrt{L}$$

$$25.61 \text{ m} = L$$

Examples - Solve each of the following:

$$\sqrt{x+2} - 5 = 0$$

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

$$x+2 = 5^2$$

$$x+2 = 25$$

$$\begin{array}{r} -2 \\ -2 \end{array}$$

$$x = 23$$

* MUST
Check

$$\sqrt{x+2} + 5 = 0$$

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

$$x+2 = 25$$

$$\cancel{x = 23}$$

Extraneous solutions: solutions which are found by solving an equation algebraically, but do not satisfy the equation.

Note: You can easily check your work by graphing the left side of the equation in Y^1 and the right side in Y^2 . The intersection of the two graphs are the solutions of the equation. Using this method, it is easy to tell if a solution is extraneous. This procedure works for all equations. BIG HINT - this is a really quick way of answering multiple choice questions...

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More examples - Solve for x:

$$\frac{2}{2}\sqrt{3x+1} = \frac{4}{2}$$

$$\sqrt{3x+1} = 2$$

$$3x+1 = 2^2$$

$$3x+1 = 4$$

$$3x = 3$$

$$x = 1$$

$$2\sqrt{3x+1} = 4$$

$$\sqrt{3x+1} \cdot \sqrt{4} = 4$$

$$\sqrt{3x+1} \cdot 2 = 4$$

$$(3x+1)(4) = 16$$

$$12x+4 = 16$$

$$12x = 12$$

$$x = 1$$

$$\sqrt{3x+3} - x = 1$$

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

$$3x+3 = (x+1)(x+1)$$

$$3x+3 = x^2 + 2x + 1$$

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

$$\begin{array}{|c|} \hline -2 \\ \hline 1 \\ \hline -1 \\ \hline \end{array}$$

$$x - 2$$

$$\begin{array}{|c|} \hline -2 \\ \hline 1 \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline 1 \\ \hline -1 \\ \hline \end{array}$$

$$(x-2)(x+1) = 0$$

$$x = 2$$

$$x = -1$$

$$\sqrt{4x+5} + \sqrt{2x-1} = 2$$

$$(\sqrt{4x+5})^2 = (2 - \sqrt{2x-1})^2$$

$$4x+5 = (2 - \sqrt{2x-1})(2 - \sqrt{2x-1})$$

$$4x+5 = 4 - 2\sqrt{2x-1} - 2\sqrt{2x-1} + 2x-1$$

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

$$(2x+2)(2x+2) = 16 \cdot (2x-1)$$

$$4x^2 + 8x + 4 = 32x - 16$$

$$4x^2 - 24x + 20 = 0$$

$$4(x^2 - 6x + 5) = 0$$

$$4(x-5)(x-1) = 0$$

~~$x=5$~~ | ~~$x=1$~~

$$\left(-\sqrt{2x-1}\right) \left(-\sqrt{2x-1}\right)$$

$$+ (2x-1)$$

$$\begin{array}{r} -2x \quad -2x \\ -2\sqrt{2x-1} \quad -2\sqrt{2x-1} \end{array}$$

$$\begin{array}{r} -4x \\ -4\sqrt{2x-1} \end{array}$$

Assignment:

Pg. 284 #3, 5, 13, 14odds, 16odds

odds