

Radical Equations: Equations with radicals that have variables in the radicands.

Ex. 
$$\sqrt{c} + 8 = 13$$
 or  $\sqrt{3z} - 8 = -6$ 

When solving a radical equation, remember to:

- identify any restrictions on the variable
- identify whether any roots are extraneous by determining whether the values satisfy the original equation.

Ex. 1: State the restrictions and solve the following.

$$5 + \sqrt{2x - 1} = 12$$

step 1: isolate the radical

step 2: solve



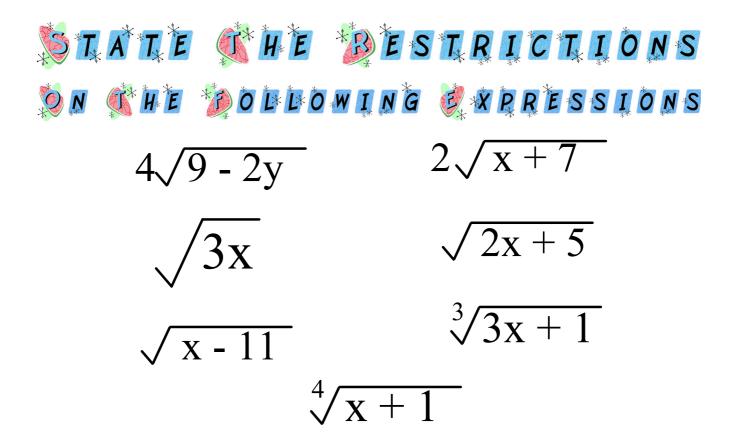
Ex. 2: Identify any restrictions and solve the equation.

$$-8 + \sqrt{\frac{3y}{5}} = -2$$



Ex. 3: What are the restrictions on 'n' if the equation  $n - \sqrt{5 - n} = -7$  involves real numbers? Solve.





Ex. 4: Solve 
$$7 + \sqrt{3x} = \sqrt{5x+4} + 5, x \ge 0$$



Ex. 5: Solve 
$$\sqrt{3+m} + \sqrt{2m-1} = 5, m \ge \frac{1}{2}$$
.



#### Key Ideas

- You can model some real-world relationships with radical equations.
- When solving radical equations, begin by isolating one of the radical terms.
- To eliminate a square root, raise both sides of the equation to the exponent two. For example, in  $3 = \sqrt{c+5}$ , square both sides.

$$3^{2} = \left(\sqrt{c+5}\right)^{2}$$
$$9 = c+5$$
$$4 = c$$

- To identify whether a root is extraneous, substitute the value into the original equation. Raising both sides of an equation to an even exponent may introduce an extraneous root.
- When determining restrictions on the values for variables, consider the following:
  - Denominators cannot be equal to zero.
  - For radicals to be real numbers, radicands must be non-negative if the index is an even number.