Solving Radical Equations – Intermediate Algebra

Steps to solving radical equations:

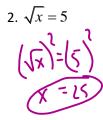
1. Isolate <u>a</u> radical on one side of the equation.

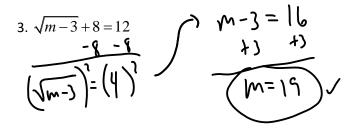
2."Square both sides of the equation to eliminate the radical.

- 3. Isolate any remaining radical if needed and square both sides again.
- 4. Solve the remaining equation.
- 5. Check your answer in the original equation. You may have extraneous answers.

Examples: Solve

1. $\sqrt{a} = 12$ 152)=(12)





4.
$$\sqrt{x+2-3}=0$$

1 solicke $\frac{11}{(\sqrt{x+2})^2(3)}$ Check: $\sqrt{7+2} - 3$
Square $(\sqrt{x+2})^2(3)$ $\sqrt{9} - 3$
Solve $\chi+2=9$ $3-3=0$
 $(\chi=7)$

Example: The period of a simple pendulum for a small amplitude is given by the function

 $T(L) = 2\pi \sqrt{\frac{L}{32}}$ where T(L) is the period in seconds and L is the length of the pendulum in feet.

a) Find the period of a pendulum if its length is 1 foot.

$$T \qquad l=1$$

$$T(1)=2\pi\sqrt{32} = 2\pi\sqrt{(1/32)} = 1.110720735$$

b) How long does a pendulum need to be if we want the period to be 2.5 seconds?

1.11 seconds

Find L

$$T=2.5$$

$$2.5 = 2\pi \sqrt{\frac{1}{31}}$$

$$32\left(\frac{2.5}{(2\pi)}\right)^{2} = L$$

$$\left(\frac{2.5}{(2\pi)}\right)\left(\sqrt{\frac{1}{32}}\right)$$

$$5.0LL059(9)$$

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$$5.0T ff = L$$

$$Square:$$

$$1:\left(\frac{2.5}{(2\pi)}\right) = \frac{1}{32}, 32$$

Example: At sea level, the speed of sound through air can be calculated by using the following formula. $c = 340.3 \sqrt{\frac{T+273.15}{288.15}}$ where <u>c</u> is the speed of sound in meters per second and <u>T</u> is the temperature in

degrees Celsius.

a) Find the speed of sound when the temperature is 25 degrees Celsius.

$$C = 340.3 \sqrt{\frac{25+273.15}{288.15}} = 346.5 \text{ m/s}$$

b) Find the temperature if the speed of sound is <u>350</u> m/s.

$$\frac{1}{T} \qquad C = 370$$

$$\frac{350}{250} = 340.2 \sqrt{\frac{T+273.5}{286.15}}$$

$$\frac{350}{340.2} \sqrt{\frac{T+273.5}{286.15}}$$

$$\frac{150024}{(\frac{150}{340.2})^2} = \left(\sqrt{\frac{T+273.5}{286.15}}\right)^2 = 7288.15 \left(\frac{350}{340.2}\right)^2 - 273.15 = 1$$

$$\frac{31.7^{6}C}{31.7^{6}C} = 1$$

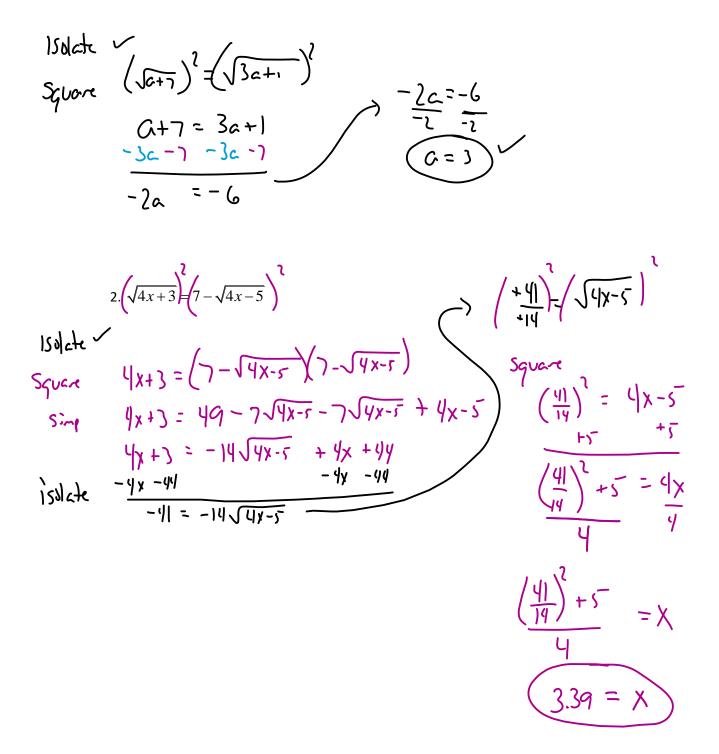
$$\frac{31.7^{6}C}{286.15} = 1$$

$$\frac{288.15}{(\frac{350}{340.2})^2} = \frac{T+273.15}{286.15} (288.15)$$

$$\frac{50126}{(\frac{350}{340.2})^2} = \frac{T+273.15}{286.15} - 273.15$$

Examples: Solve the following.

$$1. \ \sqrt{a+7} = \sqrt{3a+1}$$



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

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$$3. \sqrt{2x+7} = (3 - \sqrt{x-5})^{2} (3 - \sqrt{x-5})$$

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

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$$3 \sqrt{2x+7} = (-\sqrt{x-5} + \sqrt{x-5})^{2}$$

$$3 \sqrt{2x+7} = (-\sqrt{x-5})^{2}$$

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$$4\left(\sqrt{4x+4}\right)^{2} + \left(4+\sqrt{3x-2}\right)^{1}$$

$$\begin{aligned} 1solete & \qquad y_{X+Y} = (y + \sqrt{3x-2})^{Y}y + \sqrt{3x-1}) \\ Square & \qquad y_{X+Y} = (y + \sqrt{3x-2})^{Y}y + \sqrt{3x-1}) \\ Simp & \qquad y_{X+Y} = 1y + 3x + 8\sqrt{3x-2} + 3x - \frac{1}{2} \\ & \qquad y_{X+Y} = 1y + 3x + 8\sqrt{3x-2} \\ & \qquad -3x^{-1y} - 1y - 3x \\ \hline & (X-10)^{1} = (8\sqrt{3x-2})^{2} \\ \hline & X - 212x + 228 = 0 \\ & X - 212x + 228 = 0 \\ & X = -(-211)^{\frac{1}{2}} + \sqrt{(-111)^{2} - y(-1)(288)} \\ & X = -(-21)^{\frac{1}{2}} + \sqrt{(-111)^{2} - y(-1)(288)} \\ & X = -(-21)^{\frac{1}{2}} + \sqrt{(-111)$$