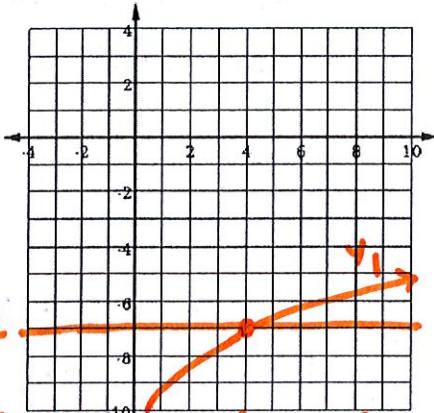


4.5 SOLVING RADICAL EQUATIONS

$-10 + \sqrt{3x-3} = -7$	<p>STEPS: in your own words</p>										
$\begin{aligned} -10 + \sqrt{3x-3} &= -7 \\ +10 & \quad +10 \\ \hline \sqrt{3x-3} &= 3 \end{aligned}$	<p>① Isolate the $\sqrt{\quad}$ "radical"</p>										
$\begin{aligned} (\sqrt{3x-3})^2 &= (3)^2 \\ 3x-3 &= 9 \end{aligned}$	<p>② Raise both sides to a power of:</p> <p>2 $\rightarrow \sqrt{\quad}$ 3 $\rightarrow \sqrt[3]{\quad}$ 4 $\rightarrow \sqrt[4]{\quad}$</p>										
$\begin{aligned} 3x-3 &= 9 \\ +3 & +3 \\ \hline \frac{3x}{3} &= \frac{12}{3} \end{aligned}$ <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 20px;">x = 4</div>	<p>③ solve for x using inverse operations.</p>										
$\begin{aligned} -10 + \sqrt{3(4)-3} &= -7 \\ -10 + \sqrt{9} &= -7 \\ -10 + 3 &= -7 \\ -7 &= -7 \end{aligned}$	<p>④ Check by <u>substitution</u> method for <u>extraneous</u> solutions.</p> <p><i>solutions that don't actually satisfy the original equation.</i></p>										
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Check Graphically:</p> <div style="text-align: center;"> $y_1 = -10 + \sqrt{3x-3}$ $y_2 = -7$ </div>  <p style="text-align: center; color: red;">intersect at x=4</p>	<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Check with Calculator:</p> <div style="text-align: center;"> $y_1 = -10 + \sqrt{3x-3}$ ALPHA - TRACE - Y1 - ENTER Y1(4) - ENTER </div> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr><td>1: Y1</td><td>6: Y6</td></tr> <tr><td>2: Y2</td><td>7: Y7</td></tr> <tr><td>3: Y3</td><td>8: Y8</td></tr> <tr><td>4: Y4</td><td>9: Y9</td></tr> <tr><td>5: Y5</td><td>0: Y0</td></tr> </table> <p style="text-align: center;">Confirm your answer of: <u>-7</u></p>	1: Y1	6: Y6	2: Y2	7: Y7	3: Y3	8: Y8	4: Y4	9: Y9	5: Y5	0: Y0
1: Y1	6: Y6										
2: Y2	7: Y7										
3: Y3	8: Y8										
4: Y4	9: Y9										
5: Y5	0: Y0										

2ND
TRACE
5: intersect
ENTER (3 times)

SOLVE RADICAL EQUATIONS

EXAMPLES

A $2\sqrt{5x+14} = 8$

$$\frac{2\sqrt{5x+14}}{2} = \frac{8}{2}$$

$$(\sqrt{5x+14})^2 = (4)^2$$

$$5x+14 = 64$$

$$\begin{array}{r} 5x+14 = 64 \\ -14 \quad -14 \\ \hline 5x = 50 \\ \frac{5x}{5} = \frac{50}{5} \\ \hline x = 10 \end{array}$$

Square or Cube each side???

CHECK:

$$2\sqrt{5(10)+14} \stackrel{?}{=} 8$$

$$8 = 8 \checkmark$$

B $-4(-4-13x)^{\frac{1}{2}} + 5 = -35$

$$-4\sqrt{-4-13x} + 5 = -35$$

$$-4\sqrt{-4-13x} = -40$$

$$\frac{-4\sqrt{-4-13x}}{-4} = \frac{-40}{-4}$$

$$(\sqrt{-4-13x})^2 = (10)^2$$

$$-4-13x = 100$$

TIP: A fractional exponent can be rewritten as a radical

$$\begin{array}{r} -4-13x = 100 \\ +4 \quad +4 \\ \hline -13x = 104 \\ \frac{-13x}{-13} = \frac{104}{-13} \\ \hline x = -8 \end{array}$$

CHECK:

$$-4(-4-13(-8))^{\frac{1}{2}} + 5 \stackrel{?}{=} -35$$

$$-35 = -35 \checkmark$$

C $2 \cdot \frac{\sqrt{16x-10}}{2} = -1 \cdot 2$

$$\sqrt{16x-10} - 10 = -2$$

$$\frac{\sqrt{16x-10}}{+10} = \frac{-2}{+10}$$

$$(\sqrt{16x-10})^2 = (8)^2$$

$$\frac{16x}{16} = \frac{64}{16}$$

$$x = 4$$

CHECK:

$$\frac{\sqrt{16(4)} - 10}{2} \stackrel{?}{=} -1$$

$$-1 = -1 \checkmark$$

D $\sqrt[3]{\frac{x}{6}} = (49-x)^{\frac{1}{3}}$

$$\left(\sqrt[3]{\frac{x}{6}}\right)^3 = \left(\sqrt[3]{49-x}\right)^3$$

$$6 \cdot \frac{x}{6} = (49-x) \cdot 6$$

$$\begin{array}{r} x = 294 - 6x \\ +6x \quad +6x \\ \hline 7x = 294 \\ \frac{7x}{7} = \frac{294}{7} \\ \hline x = 42 \end{array}$$

Two radicals = skip to Step 2

CHECK:

$$\sqrt[3]{\frac{42}{6}} = (49-42)^{\frac{1}{3}}$$

$$\sqrt[3]{7} = 7^{\frac{1}{3}} \checkmark$$

E $x = \sqrt{30-x}$

$$x^2 = (\sqrt{30-x})^2$$

$$x^2 = 30-x$$

$$\begin{array}{r} x^2 = 30-x \\ +x \quad -30 \quad +x \\ \hline x^2 + x - 30 = 0 \end{array}$$

You may need to factor!

$$(x-5)(x+6) = 0$$

$$\begin{array}{l} x-5=0 \quad x+6=0 \\ \boxed{x=5} \quad \boxed{x=-6} \\ \text{ext} \end{array}$$

1	30
2	15
3	10
5	6

CHECK:

$$5 \stackrel{?}{=} \sqrt{30-5} \quad -6 \stackrel{?}{=} \sqrt{30-(-6)}$$

$$5 = \sqrt{25} \checkmark \quad -6 = \sqrt{36} \checkmark$$