23.	$2x^{2/3} = 32$ $x^{2/3} = 16$ $(x^{2/3})^{3/2} = 16^{3/2}$ $x = \pm(16^{1/2})^3$ $x = \pm 4^3$ $x = \pm 64$ Check $x = 64$: $2(64)^{2/3} \stackrel{?}{=} 32$ $2(64^{1/3})^2 \stackrel{?}{=} 32$ $2(4)^2 \stackrel{?}{=} 32$ $2(16) \stackrel{?}{=} 32$ $32 = 32$ ✓ Check $x = -64$: $2(-64)^{2/3} \stackrel{?}{=} 32$ $2[(-64)^{1/3}]^2 \stackrel{?}{=} 32$ $2(-4)^2 \stackrel{?}{=} 32$ $2(16) \stackrel{?}{=} 32$ $32 = 32$ ✓
25.	$9x^{2/5} = 36$ $x^{2/5} = 4$ $(x^{2/5})^{5/2} = 4^{5/2}$ $x = \pm(4^{1/2})^5$ $x = \pm 2^5$ $x = \pm 32$ Check $x = 32$: $9(32)^{2/5} \stackrel{?}{=} 36$ $9(32^{1/5})^2 \stackrel{?}{=} 36$ $9(2)^2 \stackrel{?}{=} 36$ $9(4) \stackrel{?}{=} 36$ $36 = 36$ ✓ Check $x = -32$: $9(-32)^{2/3} \stackrel{?}{=} 36$ $9[(-32)^{1/5}]^2 \stackrel{?}{=} 36$ $2(-2)^2 \stackrel{?}{=} 36$ $2(4) \stackrel{?}{=} 36$ $36 = 36$ ✓
27.	$\frac{1}{7}(x + 9)^{3/2} = 49$ $(x + 9)^{3/2} = 343$ $[(x + 9)^{3/2}]^{2/3} = 343^{2/3}$ $x + 9 = 49$ $x = 40$ Check: $(40 + 9)^{3/2} \stackrel{?}{=} 343$ $49^{3/2} \stackrel{?}{=} 343$ $343 = 343$ ✓

29.	$\left(\frac{1}{3}x - 11\right)^{1/2} = 5$ $\left[\left(\frac{1}{3}x - 11\right)^{1/2}\right]^2 = 5^2$ $\frac{1}{3}x - 11 = 25$ $\frac{1}{3}x = 36$ $x = 108$ Check: $\left[\frac{1}{3}(108) - 11\right]^{1/2} \stackrel{?}{=} 5$ $(36 - 11)^{1/2} \stackrel{?}{=} 5$ $25^{1/2} \stackrel{?}{=} 5$ $5 = 5$ ✓
31.	$(3x + 43)^{2/3} + 22 = 38$ $(3x + 43)^{2/3} = 16$ $[(3x + 43)^{2/3}]^{3/2} = 16^{3/2}$ $3x + 43 = \pm(16^{1/2})^3$ $3x + 43 = \pm 4^3$ $3x + 43 = \pm 64$ $3x = 21$ or $3x = -107$ $x = 7$ or $x = -\frac{107}{3}$ Check $x = 7$: Check $x = -\frac{107}{3}$: $(3(7) + 43)^{2/3} + 22 \stackrel{?}{=} 38$ $\left[3\left(-\frac{107}{3}\right) + 43\right]^{2/3} + 22 \stackrel{?}{=} 38$ $(21 + 43)^{2/3} + 22 \stackrel{?}{=} 38$ $(-107 + 43)^{2/3} + 22 \stackrel{?}{=} 38$ $64^{2/3} + 22 \stackrel{?}{=} 38$ $(-64)^{2/3} + 22 \stackrel{?}{=} 38$ $(64^{1/3})^2 + 22 \stackrel{?}{=} 38$ $[(-64)^{1/3}]^2 + 22 \stackrel{?}{=} 38$ $4^2 + 22 \stackrel{?}{=} 38$ $(-4)^2 + 22 \stackrel{?}{=} 38$ $16 + 22 \stackrel{?}{=} 38$ $16 + 22 \stackrel{?}{=} 38$ $38 = 38$ ✓ $38 = 38$ ✓

33.	Each side of the equation should have been squared, no just one side. $(x+7)^{1/2} = 5$ $[(x+7)^{1/2}]^2 = 5^2$ $x + 7 = 25$ $x = 18$
35.	$x - 10 = \sqrt{9x}$ $(x-10)^2 = (\sqrt{9x})^2$ $x^2 - 20x + 100 = 9x$ $x^2 - 29x + 100 = 0$ $(x-4)(x-25) = 0$ $x - 4 = 0$ or $x - 25 = 0$ $x = 4$ or $x = 25$ Check $x = 4$: $4 - 10 \stackrel{?}{=} \sqrt{9(4)}$ $-6 \stackrel{?}{=} \sqrt{36}$ $-6 \neq 6$ Check $x = 25$: $25 - 10 \stackrel{?}{=} \sqrt{9(25)}$ $15 \stackrel{?}{=} \sqrt{255}$ $15 = 15$ The only solution is 25.
37.	$\sqrt{21x+1} = x + 5$ $(\sqrt{21x+1})^2 = (x+5)^2$ $21x + 1 = x^2 + 10x + 25$ $0 = x^2 - 11x + 24$ $0 = (x-8)(x-3)$ $x - 8 = 0$ or $x - 3 = 3$ $x = 8$ or $x = 3$ Check $x = 8$: $\sqrt{21(8)+1} \stackrel{?}{=} 8 + 5$ $\sqrt{169} \stackrel{?}{=} 13$ $13 = 13$ ✓ Check $x = 3$: $\sqrt{21(3)+1} \stackrel{?}{=} 3 + 5$ $\sqrt{64} \stackrel{?}{=} 8$ $8 = 8$ ✓ The solutions are 3 and 8.

39.	$\sqrt{x^2+4} = x+5$ $\left(\sqrt{x^2+4}\right)^2 = (x+5)^2$ $x^2+4 = x^2+10x+25$ $-21 = 10x$ $-\frac{21}{10} = x$ Check: $\sqrt{\left(\frac{21}{10}\right)^2} + 4 \stackrel{?}{=} -\frac{21}{10} + 5$ $\sqrt{8.41} \stackrel{?}{=} 2.9$ $2.9 = 2.9$ ✓

$$\sqrt[4]{3 - 8x^2} = 2x$$

$$\left(\sqrt[4]{3 - 8x^2}\right)^4 = (2x)^4$$

$$3 - 8x^2 = 16x^4$$

$$0 = 16x^4 + 8x^2 - 3$$

$$0 = (4x^2 + 3)(4x^2 - 1)$$

$$0 = (4x^2 + 3)(2x + 1)(2x - 1)$$

$4x^2 + 3 = 0$ or $2x + 1 = 0$ or $2x - 1 = 0$

$x^2 = -\frac{3}{4}$ $\quad$ $2x = -1$ $\quad$ $2x = 1$

$x = \pm\sqrt{-\frac{3}{4}}$ $\quad$ $x = -\frac{1}{2}$ $\quad$ $x = \frac{1}{2}$

$x = \pm\frac{i\sqrt{3}}{2}$

Check $x = \frac{i\sqrt{3}}{2}$:

$$\sqrt[4]{3 - 8\left(\frac{i\sqrt{3}}{2}\right)^2} \stackrel{?}{=} 2\left(\frac{i\sqrt{3}}{2}\right)$$

$$\sqrt[4]{3 - 8\left(\frac{i^2\sqrt{9}}{4}\right)} \stackrel{?}{=} i\sqrt{3}$$

$$\sqrt[4]{3 + 2(3)} \stackrel{?}{=} i\sqrt{3}$$

$$\sqrt[4]{9} \neq i\sqrt{3}$$

Check $x = -\frac{i\sqrt{3}}{2}$:

$$\sqrt[4]{3 - 8\left(-\frac{i\sqrt{3}}{2}\right)^2} \stackrel{?}{=} 2\left(-\frac{i\sqrt{3}}{2}\right)$$

$$\sqrt[4]{3 - 8\left(\frac{i^2\sqrt{9}}{4}\right)} \stackrel{?}{=} -i\sqrt{3}$$

$$\sqrt[4]{3 + 2(3)} \stackrel{?}{=} -i\sqrt{3}$$

$$\sqrt[4]{9} \neq -i\sqrt{3}$$

Check $x = -\frac{1}{2}$:

$$\sqrt[4]{3 - 8\left(-\frac{1}{2}\right)^2} \stackrel{?}{=} 2\left(-\frac{1}{2}\right)$$

$$\sqrt[4]{3 - 8\left(\frac{1}{4}\right)} \stackrel{?}{=} -1$$

$$\sqrt[4]{3 - 2} \stackrel{?}{=} -1$$

$$1 \neq -1$$

Check $x = \frac{1}{2}$:

$$\sqrt[4]{3 - 8\left(\frac{1}{2}\right)^2} \stackrel{?}{=} 2\left(\frac{1}{2}\right)$$

$$\sqrt[4]{3 - 8\left(\frac{1}{4}\right)} \stackrel{?}{=} 1$$

$$\sqrt[4]{3 - 2} \stackrel{?}{=} 1$$

$$1 = 1 \checkmark$$

The only solution is $\frac{1}{2}$.