Find the value for the variable that makes the statement true. (SHOW WORK NEATLY)

1. $8\sqrt{2x+3}-10=30$

$+10 \quad +10$

$\frac{8\sqrt{2x+3}}{8} = \frac{40}{8}$

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

$2x+3 = 25$

$-3 \quad -3$

$\frac{2x}{2} = \frac{22}{2}$

$x = 11$

CHECK: $8\sqrt{2(11)+3}-10=30$

$8\sqrt{25}-10=30$

$40-10=30$ ✓

2. $2\sqrt{x+4}+9=1$

$-9 \quad -9$

$\frac{2\sqrt{x+4}}{2} = \frac{-8}{2}$

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

$x+4 = 16$

$-4 \quad -4$

$x = 12$

EXTRANEOUS

$\emptyset$ EMPTY SET

NO SOLUTION

CHECK: $2\sqrt{(12)+4}+9=1$

$2\sqrt{16}+9=1$

$2(4)+9=1$

$8+9=1$ ✗

3. $3\sqrt{4a}-5=13$

$+5 \quad +5$

$\frac{3\sqrt{4a}}{3} = \frac{18}{3}$

$(\sqrt{4a})^2 = (6)^2$

$\frac{4a}{4} = \frac{36}{4}$

$a = 9$

CHECK: $3\sqrt{4(9)}-5=13$

$3\sqrt{36}-5=13$

$3(6)-5=13$

$18-5=13$ ✓

4. $\frac{12}{2} = \frac{2\sqrt{2(x+1)-4}}{2}$

$6 = \sqrt{2(x+1)-4}$

$(6)^2 = (\sqrt{2(x+1)-4})^2$

$36 = 2(x+1)-4$

$36 = 2x+2-4$

$36 = 2x-2$

$+2 \quad +2$

$\frac{38}{2} = \frac{2x}{2}$

$19 = x$

CHECK: $12 = 2\sqrt{2(19+1)-4}$

$12 = 2\sqrt{40-4}$

$12 = 2\sqrt{36}$

$12 = 2(6)$ ✓

5. $\sqrt[3]{2x+1}+2=5$

$-2 \quad -2$

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

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

$2x+1 = 27$

$-1 \quad -1$

$\frac{2x}{2} = \frac{26}{2}$

$x = 13$

CHECK: $\sqrt[3]{2(13)+1}+2=5$

$\sqrt[3]{27}+2=5$

$3+2=5$ ✓

6. $\sqrt[3]{2x}-10=-6$

$+10 \quad +10$

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

$(\sqrt[3]{2x})^3 = (4)^3$

$\frac{2x}{2} = \frac{64}{2}$

$x = 32$

CHECK: $\sqrt[3]{2(32)}-10=-6$

$\sqrt[3]{64}-10=-6$

$4-10=-6$

$-6=-6$ ✓

One Radical Basic Equation

I. Isolate the Radical if possible.

Example: $3\sqrt{x+2}+4=19$

$-4 \quad -4$

$\frac{3\sqrt{x+2}}{3} = \frac{15}{3}$

$\sqrt{x+2} = 5$

II. Square Both Sides

Example: $(\sqrt{x+2})^2 = (5)^2$

$x+2 = 25$

III. Isolate the Variable

Example: $x+2 = 25$

$-2 \quad -2$

$x = 23$

IV. Must Verify the Solution
(This is not optional some solutions are extraneous.)

Example: $3\sqrt{(23)+2}+4=19$

$3\sqrt{25}+4=19$

$3(5)+4=19$

$15+4=19$

$19=19$ ✓

Find the value for the variable that makes the statement true. (SHOW WORK NEATLY)

7. $\sqrt{5x+2} = \sqrt{3x+12}$

$(\sqrt{5x+2})^2 = (\sqrt{3x+12})^2$

$5x+2 = 3x+12$

$-3x \quad -3x$

$2x+2 = 12$

$-2 \quad -2$

$\frac{2x}{2} = \frac{10}{2}$

$x = 5$

CHECK: $\sqrt{5(5)+2} = \sqrt{3(5)+12}$

$\sqrt{25+2} = \sqrt{15+12}$

$\sqrt{27} = \sqrt{27}$ ✓

8. $2\sqrt{x-5} = \sqrt{3x+2}$

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

$4(x-5) = 3x+2$

$4x-20 = 3x+2$

$-3x \quad -3x$

$x-20 = 2$

$+20 \quad +20$

$x = 22$

68 = 2 · 34 = 2 · 2 · 17

CHECK: $2\sqrt{(22)-5} = \sqrt{3(22)+2}$

$2\sqrt{17} = \sqrt{68}$

$2\sqrt{17} = \sqrt{4 \cdot 17}$

$2\sqrt{17} = 2\sqrt{17}$ ✓

9. $(2\sqrt{5x-4})^2 = (3\sqrt{x+8})^2$

$4(5x-4) = 9(x+8)$

$20x-16 = 9x+72$

$-9x \quad -9x$

$11x-16 = 72$

$+16 \quad +16$

$\frac{11x}{11} = \frac{88}{11}$

$x = 8$

CHECK: $2\sqrt{5(8)-4} = 3\sqrt{(8)+8}$

$2\sqrt{36} = 3\sqrt{16}$

$2(6) = 3(4)$

$12 = 12$ ✓

10. $(2\sqrt[3]{5x-3})^3 = (\sqrt[3]{35x+6})^3$

$8(5x-3) = 35x+6$

$40x-24 = 35x+6$

$-35x \quad -35x$

$5x-24 = 6$

$+24 \quad +24$

$\frac{5x}{5} = \frac{30}{5}$

$x = 6$

CHECK: $2\sqrt[3]{5(6)-3} = \sqrt[3]{35(6)+6}$

$2\sqrt[3]{27} = \sqrt[3]{216}$

$2(3) = 6$

$6 = 6$ ✓

11. $(x+3)^2 = (\sqrt{15+x})^2$

$(x+3)(x+3) = 15+x$

$x^2+3x+3x+9 = 15+x$

$x^2+6x+9 = 15+x$

$-x \quad -15 \quad -15 \quad -x$

$x^2+5x-6 = 0$

$(x-1)(x+6) = 0$

$x-1=0 \quad x+6=0$

$+1 \quad +1 \quad -6 \quad -6$

$x = 1$ or ~~$x = -6$~~ EXTRANEOUS

-6: $1, -6$; $-1, 6$; $2, -3$; $-2, 3$

CHECK: $(x=1)$ $(1)+3 = \sqrt{15+(1)}$

$4 = \sqrt{16}$

$4 = 4$ ✓

CHECK: $(x=-6)$ $(-6)+3 = \sqrt{15+(-6)}$

$-3 = \sqrt{9}$

$-3 = 3$ X

$x = 1$

Two Radical Basic Equation

I. Square Both Sides

Example

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

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

$5x+2 = 9(x-2)$

II. Eliminate Parenthesis

Example

$5x+2 = 9(x-2)$

$5x+2 = 9x-18$

III. Move variables to one side and constants to the other

Example

$5x+2 = 9x-18$

$-5x \quad -5x$

$2 = 4x-18$

$+18 \quad +18$

$20 = 4x$

IV. Divide both sides by the coefficient

Example

$\frac{20}{4} = \frac{4x}{4}$

$5 = x$

V. Must Verify the Solution

(This is not optional some solutions are extraneous.)

Example

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

$\sqrt{25+2} = 3\sqrt{3}$

$\sqrt{27} = 3\sqrt{3}$

$3\sqrt{3} = 3\sqrt{3}$ ✓

Find the value for the variable that makes the statement true. (SHOW WORK NEATLY)

12. $(x-1)^2=(\sqrt{5x-9})^2$

$(x-1)(x-1)=5x-9$

$x^2-1x-1x+1=5x-9$

$x^2-2x+1=5x-9$

$-5x+9 \quad -5x+9$

$x^2-7x+10=0$

$(x-2)(x-5)=0$

$x-2=0 \quad x-5=0$

$+2+2 \quad +5+5$

$x=2$ or $x=5$

10: $1,10$; $-1,-10$; $2,5$; $-2,-5$

CHECK: $(x=2)$ $(2)-1=\sqrt{5(2)-9}$

$1=\sqrt{10-9}$

$1=\sqrt{1}$ ✓

CHECK: $(x=5)$ $(5)-1=\sqrt{5(5)-9}$

$4=\sqrt{25-9}$

$4=\sqrt{16}$ ✓

13. $(2x+1)^2=(\sqrt{11-2x})^2$

$(2x+1)(2x+1)=11-2x$

$4x^2+2x+2x+1=11-2x$

$4x^2+4x+1=11-2x$

$+2x \quad -11 \quad -11+2x$

$4x^2+6x-10=0$

$2(2x^2+3x-5)$

$2x-2 \quad 2x+5$

$2 \quad 1$

$2(x-1)(2x+5)=0$

$x-1=0 \quad 2x+5=0$

$+1+1 \quad \frac{2x}{2}=\frac{-5}{2}$

$x=1 \quad x=-5/2$ EXTRANEOUS

-10: $1,-10$; $-1,10$; $2,-5$; $-2,5$

CHECK: $(x=1)$ $2(1)+1=\sqrt{11-2(1)}$

$2+1=\sqrt{11-2}$

$3=\sqrt{9}$ ✓

CHECK: $(x=-2.5)$ $2(-2.5)+1=\sqrt{11-2(-2.5)}$

$-5+1=\sqrt{11+5}$

$-4=\sqrt{16}$

$-4=4$ X

$x=1$

Find the values for the variable that make the inequality statement true. (SHOW WORK NEATLY)

14. $(\sqrt{3x+3})^2\le(6)^2$

$3x+3\ge 0 \quad 3x+3\le 36$

$-3 \quad -3 \quad -3 \quad -3$

$\frac{3x}{3}\ge\frac{-3}{3} \quad \frac{3x}{3}\le\frac{33}{3}$

$x\ge -1$ AND $x\le 11$

SET: $-1\le x\le 11$ INT: $[-1,11]$

TEST $x=-2$: $\sqrt{-3}\le 6$ F

TEST $x=0$: $\sqrt{3}\le 6$ T

TEST $x=12$: $\sqrt{39}\le 6$ F

15. $-2\sqrt{x+1}<-8$

$-2 \quad -2$

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

$x+1\ge 0 \quad x+1>16$

$-1 \quad -1 \quad -1 \quad -1$

$x\ge -1 \quad x>15$

SET: $x>15$ INT: $(15,\infty)$

16. $\sqrt{2x+1}\ge -4$

$2x+1\ge 0 \quad 2x+1\ge 16$

$-1 \quad -1 \quad -1 \quad -1$

$\frac{2x}{2}\ge\frac{-1}{2} \quad \frac{2x}{2}\ge\frac{15}{2}$

$x\ge -1/2 \quad x\ge 7.5$

SET: $x\ge -1/2$ INT: $[-\frac{1}{2},\infty)$

TEST $x=-1$: $\sqrt{-1}\ge -4$ F

TEST $x=0$: $\sqrt{1}\ge -4$ T

TEST $x=8$: $\sqrt{17}\ge -4$ T

17. $9\ge 5+\sqrt{x-2}$

$-5 \quad -5$

$(4)^2\ge(\sqrt{x-2})^2$

$x-2\ge 0 \quad 16\ge x-2$

$+2 \quad +2 \quad +2 \quad +2$

$x\ge 2 \quad 18\ge x$

$x\le 18$

SET: $2\le x\le 18$ INT: $[2,18]$

TEST $x=0$: $9\ge 5+\sqrt{-2}$ F

TEST $x=3$: $9\ge 5+\sqrt{1}$ T

TEST $x=20$: $9\ge 5+\sqrt{18}$ F

18. $(\sqrt[3]{4x-1})^3\le(3)^3$

$4x-1\le 27$

$+1 \quad +1$

$\frac{4x}{4}\le\frac{28}{4}$

$x\le 7$

SET: $x\le 7$ INT: $(-\infty,7]$