

Solve.

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

$$2x+3=25$$

$$2x=22$$

$$\boxed{x=11}$$

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

$$(\sqrt{x-1})^2 = (x-3)^2$$

$$x-1 = x^2 - 6x + 9$$

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

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

$$x = 5, 2$$

$$\boxed{5}$$

2 is extraneous

3.  $\sqrt{x+6}-x=4$

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

$$x+6 = x^2 + 8x + 16$$

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

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

$$x = -2, -5$$

$$\boxed{x=-2}$$

-5 is extraneous

4.  $x - \sqrt{6-x} = 4$

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

$$x^2 - 8x + 16 = 6 - x$$

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

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

$$x = 5, 2$$

$$\boxed{x=5}$$

2 is extraneous

5.  $\sqrt{7-6x} + 3x = 2$

$$(\sqrt{7-6x})^2 = (2-3x)^2$$

$$7-6x = 4 - 12x + 9x^2$$

$$0 = 9x^2 - 6x - 3$$

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

$$0 = 3(3x+1)(x-1)$$

$$x = -1/3, 1$$

$$\boxed{x=-1/3}$$

1 is extraneous

6.  $(\sqrt[3]{4x+1})^3 = (-3)^3$

$$4x+1 = -27$$

$$4x = -28$$

$$\boxed{x=-7}$$

Simplify.

$$7. \frac{4}{\sqrt[3]{32}}$$

$$\frac{4}{\sqrt[3]{8 \cdot \sqrt[3]{4}}}$$

$$\frac{4 \cdot \sqrt[3]{2}}{2 \sqrt[3]{4 \cdot \sqrt[3]{2}}}$$

$$\frac{4 \sqrt[3]{2}}{2 \cdot 2} = \boxed{\sqrt[3]{2}}$$

$$8. \frac{5}{2-3\sqrt{2}} \frac{(2+3\sqrt{2})}{(2+3\sqrt{2})}$$

$$\frac{10+15\sqrt{2}}{4-18}$$

$$\boxed{\frac{10+15\sqrt{2}}{-14}}$$

$$9. \frac{4(\sqrt{7}+\sqrt{3})}{(\sqrt{7}-\sqrt{3})(\sqrt{7}+\sqrt{3})}$$

$$\frac{4\sqrt{7}+4\sqrt{3}}{7-3}$$

$$\frac{4\sqrt{7}+4\sqrt{3}}{4}$$

$$\boxed{\sqrt{7}+\sqrt{3}}$$

$$10. \frac{3\sqrt{2} + 5\sqrt{2}}{2\sqrt{2} \cdot \sqrt{2} \cdot 4}$$

$$\frac{3\sqrt{2}}{4} + \frac{5\sqrt{2}}{4}$$

$$\frac{8\sqrt{2}}{4}$$

$$\boxed{2\sqrt{2}}$$

$$11. \sqrt{12} + 2\sqrt{75} - 4\sqrt{3}$$

$$2\sqrt{3} + 2\sqrt{25 \cdot 3} - 4\sqrt{3}$$

$$2\sqrt{3} + 10\sqrt{3} - 4\sqrt{3}$$

$$\boxed{8\sqrt{3}}$$

$$12. \frac{2 + \frac{1}{\sqrt{3}} \cdot \sqrt{3}}{1 - \frac{1}{\sqrt{3}} \cdot \sqrt{3}}$$

$$\frac{(2\sqrt{3}+1)(\sqrt{3}+1)}{(\sqrt{3}-1)(\sqrt{3}+1)}$$

$$\frac{6+3\sqrt{3}+1}{3-1}$$

$$3-1$$

$$\boxed{\frac{7+3\sqrt{3}}{2}}$$