

$$22. \sqrt{x+4} - \sqrt{3x} = -2$$

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

$$(\sqrt{x+4})^2 = (-2 + \sqrt{3x})^2$$

$$\begin{array}{r} x+4 = 4 - 4\sqrt{3x} + 3x \\ -3x \quad -4 \quad +4 \quad -3x \end{array}$$

$$-2x = -4\sqrt{3x}$$

$$(\div -2) \quad \frac{-2x}{-2} = \frac{-4\sqrt{3x}}{-2}$$

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

$$x^2 = 4 \cdot 3x$$

$$x^2 - 12x = 0$$

$$x(x-12) = 0$$

$$x=0 \quad x=12$$

$$ck: x=0$$

$$\sqrt{4} - \sqrt{0} = -2 \quad \sqrt{16} - \sqrt{36} = -2$$

$$2 = -2$$

Reject!

$$4 - 6 = -2$$

$$-2 = -2 \quad \checkmark$$

$$23. (x^2 - 6x)^2 + 13(x^2 - 6x) + 40 = 0$$

$$[(x^2 - 6x) + 8][(x^2 - 6x) + 5] = 0$$

$$(x^2 - 6x + 8)(x^2 - 6x + 5) = 0$$

$$(x-4)(x-2)(x-5)(x-1) = 0$$

$$\boxed{x=4 \quad x=2 \quad x=5 \quad x=1}$$

$$24. \frac{x^2 - 12}{x} - \frac{20x}{x^2 - 12} = 1$$

$$\text{let } u = \frac{x^2 - 12}{x} \quad \frac{1}{u} = \frac{x}{x^2 - 12}$$

$$u \left(u - 20 \cdot \frac{1}{u} \right) = 1$$

$$u^2 - 20 = u$$

$$u^2 - u - 20 = 0$$

$$(u-5)(u+4) = 0$$

$$u=5 \quad u=-4$$

$$x \cdot \frac{x^2 - 12}{x} = 5 \quad x \cdot \frac{x^2 - 12}{x} = -4$$

$$x^2 - 12 = 5x \quad x^2 - 12 = -4x$$

$$x^2 - 5x - 12 = 0 \quad x^2 + 4x - 12 = 0$$

$$a=1 \quad b=-5 \quad c=-12 \quad (x+6)(x-2) = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \boxed{x=-6 \quad x=2}$$

$$= \frac{5 \pm \sqrt{(-5)^2 - 4(1)(-12)}}{2(1)}$$

$$= \frac{5 \pm \sqrt{25 + 48}}{2} = \boxed{\frac{5 \pm \sqrt{73}}{2}}$$