Squaring Property of Equality:
If both sides of an equation are squared, the solutions to the original equation are solutions to the resulting equation.

Note: Review examples1 to 8 in the text for guidance (pay extra attention to examples 6 to 8).

Additional examples

2) $\sqrt{3x+1}=4$

$$\sqrt{3x+1}=4$$
$$\left(\sqrt{3x+1}\right)^2=(4)^2$$
$$3x+1=16$$
$$3x=15$$
$$x=5$$

4) $\sqrt{6x+1}=-5$

$$\sqrt{6x+1}=-5$$
$$\left(\sqrt{6x+1}\right)^2=(-5)^2$$
$$6x+1=25$$
$$6x=24$$
$$x=4$$

discard

The value of $x=4$ does not satisfy the original equation; therefore, there is no solution.

6) $\sqrt{3y-1}=2$

$$\sqrt{3y-1}=2$$
$$\left(\sqrt{3y-1}\right)^2=(2)^2$$
$$3y-1=4$$
$$3y=5$$
$$y=\frac{5}{3}$$

8) $\sqrt{8x+3}=-6$

$$\sqrt{8x+3}=-6$$
$$\left(\sqrt{8x+3}\right)^2=(-6)^2$$
$$8x+3=36$$
$$8x=33$$
$$x=\frac{33}{8}$$

discard

The value of $x=\frac{33}{8}$ does not satisfy the original equation; therefore, there is no solution.

10) $\sqrt{3x+1}-4=1$

$$\sqrt{3x+1}-4=1$$
$$\sqrt{3x+1}=5$$
$$\left(\sqrt{3x+1}\right)^2=(5)^2$$
$$3x+1=25$$
$$3x=24$$
$$x=8$$

12) $\sqrt{5a-3}+6=2$

$$\sqrt{5a-3}+6=2$$
$$\sqrt{5a-3}=-4$$
$$\left(\sqrt{5a-3}\right)^2=(-4)^2$$
$$5a-3=16$$
$$5a=19$$
$$a=\frac{19}{5}$$
discard

The value of $a=\frac{19}{5}$ does not satisfy the original equation; therefore, there is no solution.

14) $\sqrt[4]{4x+1}=3$

$$\sqrt[4]{4x+1}=3$$
$$\left(\sqrt[4]{4x+1}\right)^4=(3)^4$$
$$4x+1=81$$
$$4x=80$$
$$x=20$$

16) $\sqrt[3]{5x+7}=2$

$$\sqrt[3]{5x+7}=2$$
$$\left(\sqrt[3]{5x+7}\right)^3=(2)^3$$
$$5x+7=8$$
$$5x=1$$
$$x=\frac{1}{5}$$

18) $\sqrt[3]{2a+7}=-2$

$$\sqrt[3]{2a+7}=-2$$
$$\left(\sqrt[3]{2a+7}\right)^3=(-2)^3$$
$$2a+7=-8$$
$$2a=-15$$
$$a=\frac{-15}{2}$$

20) $\sqrt{y+3}=y-3$

$$\sqrt{y+3}=y-3$$
$$\sqrt{y+3}=(y-3)$$
$$\left(\sqrt{y+3}\right)^2=(y-3)^2$$
$$y+3=y^2-6y+9$$
$$0=y^2-7y+6$$
$$0=(y-1)(y-6)$$
$$y-1=0 \qquad y-6=0$$
$$y=1 \qquad y=6$$
discard

The value of $y=1$ does not satisfy the original equation; therefore, the solution is $y=6$.

22) $\sqrt{a+10}=a-2$

$$\sqrt{a+10}=a-2$$
$$\sqrt{a+10}=(a-2)$$
$$\left(\sqrt{a+10}\right)^2=(a-2)^2$$
$$a+10=a^2-4a+4$$
$$0=a^2-5a-6$$
$$0=(a+1)(a-6)$$
$$a+1=0 \qquad a-6=0$$
$$a=-1 \qquad a=6$$
discard

The value of $a=-1$ does not satisfy the original equation; therefore, the solution is $a=6$.

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

$$\sqrt{3x+4}=-\sqrt{2x+3}$$
$$\left(\sqrt{3x+4}\right)^2=\left(-\sqrt{2x+3}\right)^2$$
$$3x+4=2x+3$$
$$x=-1$$
discard

The value of $x=-1$ does not satisfy the original equation; therefore, there is no solution.

26) $\sqrt{7a-1}=\sqrt{2a+4}$

$$\sqrt{7a-1}=\sqrt{2a+4}$$
$$\left(\sqrt{7a-1}\right)^2=\left(\sqrt{2a+4}\right)^2$$
$$7a-1=2a+4$$
$$5a=5$$
$$a=1$$

28) $\sqrt[4]{6x+7}=\sqrt[4]{x+2}$

$$\sqrt[4]{6x+7}=\sqrt[4]{x+2}$$
$$\left(\sqrt[4]{6x+7}\right)^4=\left(\sqrt[4]{x+2}\right)^4$$
$$6x+7=x+2$$
$$5x=-5$$
$$x=-1$$

30) $x-1=\sqrt{6x+1}$

$$x-1=\sqrt{6x+1}$$
$$(x-1)=\sqrt{6x+1}$$
$$(x-1)^2=\left(\sqrt{6x+1}\right)^2$$
$$x^2-2x+1=6x+1$$
$$x^2-8x=0$$
$$x(x-8)=0$$
$$x=0 \qquad x-8=0$$
$$\textit{discard} \qquad x=8$$

The value of $x=0$ does not satisfy the original equation; therefore, the solution is $x=8$.

34) $\sqrt{2y+5}=\sqrt{5y+2}$

$$\sqrt{2y+5}=\sqrt{5y+2}$$
$$\left(\sqrt{2y+5}\right)^2=\left(\sqrt{5y+2}\right)^2$$
$$2y+5=5y+2$$
$$3=3y$$
$$1=y$$

32) $t+7=\sqrt{2t+13}$

$$t+7=\sqrt{2t+13}$$
$$(t+7)=\sqrt{2t+13}$$
$$(t+7)^2=\left(\sqrt{2t+13}\right)^2$$
$$t^2+14t+49=2t+13$$
$$t^2+12t+36=0$$
$$(t+6)(t+6)=0$$
$$(t+6)^2=0$$
$$t+6=0$$
$$t=-6$$

36) $\sqrt[3]{4x+9}=\sqrt[3]{3-2x}$

$$\sqrt[3]{4x+9}=\sqrt[3]{3-2x}$$
$$\left(\sqrt[3]{4x+9}\right)^3=\left(\sqrt[3]{3-2x}\right)^3$$
$$4x+9=3-2x$$
$$6x=-6$$
$$x=-1$$

38) $\sqrt{x+3}=\sqrt{x}-3$

$$\sqrt{x+3}=\sqrt{x}-3$$
$$\sqrt{x+3}=\left(\sqrt{x}-3\right)$$
$$\left(\sqrt{x+3}\right)^2=\left(\sqrt{x}-3\right)^2$$
$$x+3=x-6\sqrt{x}+9$$
$$6\sqrt{x}=6$$
$$\sqrt{x}=1$$
$$\left(\sqrt{x}\right)^2=(1)^2$$
$$x=1$$
$$\textit{discard}$$

The value of $x=1$ does not satisfy the original equation; therefore, there is no solution.

40) $\sqrt{x-1}=\sqrt{x}-1$

$$\sqrt{x-1}=\sqrt{x}-1$$
$$\sqrt{x-1}=\left(\sqrt{x}-1\right)$$
$$\left(\sqrt{x-1}\right)^2=\left(\sqrt{x}-1\right)^2$$
$$x-1=x-2\sqrt{x}+1$$
$$2\sqrt{x}=2$$
$$\sqrt{x}=1$$
$$\left(\sqrt{x}\right)^2=(1)^2$$
$$x=1$$

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

$$\sqrt{x+5}=\sqrt{x-3}+2$$
$$\sqrt{x+5}=\left(\sqrt{x-3}+2\right)$$
$$\left(\sqrt{x+5}\right)^2=\left(\sqrt{x-3}+2\right)^2$$
$$x+5=(x-3)+4\sqrt{x-3}+4$$
$$x+5=x+1+4\sqrt{x-3}$$
$$4=4\sqrt{x-3}$$
$$1=\sqrt{x-3}$$
$$(1)^2=\left(\sqrt{x-3}\right)^2$$
$$1=x-3$$
$$4=x$$

46) $\sqrt{5x+1}=1+\sqrt{5x}$

$$\sqrt{5x+1}=1+\sqrt{5x}$$
$$\sqrt{5x+1}=\left(1+\sqrt{5x}\right)$$
$$\left(\sqrt{5x+1}\right)^2=\left(1+\sqrt{5x}\right)^2$$
$$5x+1=1+2\sqrt{5x}+5x$$
$$0=2\sqrt{5x}$$
$$0=\sqrt{5x}$$
$$(0)^2=\left(\sqrt{5x}\right)^2$$
$$0=5x$$
$$0=x$$

44) $\sqrt{x-3}-4=\sqrt{x-3}$

$$\sqrt{x-3}-4=\sqrt{x-3}$$
$$\left(\sqrt{x-3}-4\right)=\sqrt{x-3}$$
$$\left(\sqrt{x-3}-4\right)^2=\left(\sqrt{x-3}\right)^2$$
$$(x-3)-8\sqrt{x-3}+16=x-3$$
$$x+13-8\sqrt{x-3}=x-3$$
$$16=8\sqrt{x-3}$$
$$2=\sqrt{x-3}$$
$$(2)^2=\left(\sqrt{x-3}\right)^2$$
$$4=x-3$$
$$7=x$$

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

$$\sqrt{2x-1}=\sqrt{x-4}+2$$
$$\sqrt{2x-1}=\left(\sqrt{x-4}+2\right)$$
$$\left(\sqrt{2x-1}\right)^2=\left(\sqrt{x-4}+2\right)^2$$
$$2x-1=(x-4)+4\sqrt{x-4}+4$$
$$2x-1=x+4\sqrt{x-4}$$
$$x-1=4\sqrt{x-4}$$
$$(x-1)^2=\left(4\sqrt{x-4}\right)^2$$
$$x^2-2x+1=16(x-4)$$
$$x^2-2x+1=16x-64$$
$$x^2-18x+65=0$$
$$(x-5)(x-13)=0$$
$$x-5=0 \quad x-13=0$$
$$x=5 \qquad x=13$$