Chapter 11. Radical Expressions and Triangles

Ex. 11.3

Answer 1CU.

The objective is to describe the steps for solving a radical equation.

The equations which contains variables in the radicand are called radical equations.

For example:

$$x = \frac{\sqrt{y+1}}{2}.$$

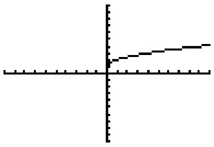
The steps to solve this equation is given below.

1. The first step is to isolate the radical on one side of the equation.
2. The second step is to square each side of the radical to eliminate the radical.
3. Then solve for the variable.
4. Check the solutions obtained to avoid extraneous solutions.

Answer 1GCI.

Graph and sketch the equation, $y = \sqrt{x^2} + 1$.

The graph of $y = \sqrt{x^2} + 1$ is plotted on the graphing calculator and the sketch is given below



State the domain of the graph and describe how the graph differs from the parent function $y = \sqrt{x}$

From the graph it can be seen that domain of x is $\{x | x \geq 1\}$.

The graph $y = \sqrt{x^2} + 1$ is shifted up 1 unit.

Thus the domain is $\boxed{\{x | x \geq 1\}}$

Answer 1PQ.

Consider the expression:

$\sqrt{48}$

Simplify:

$$\begin{aligned}\sqrt{48} &= \sqrt{2.2.2.2.3} \\ &= \sqrt{4^2 \cdot 3} \\ &= 4\sqrt{3}\end{aligned}$$

Thus the solution is $\boxed{4\sqrt{3}}$.

Answer 2CU.

The radical equation is necessary to check for extraneous solutions in radical equations.

Explain the reason as below,

The equation, $t = \frac{\sqrt{h}}{4}$ that contains radicals with variables in the radicand are called radical equations. Squaring each side of an equation sometimes produces extraneous solutions. An extraneous solution is a solution derived from an equation that is not a solution of the original equation. Therefore we must check all solutions in the original equation when we solve radical equations.

Answer 2GCI.

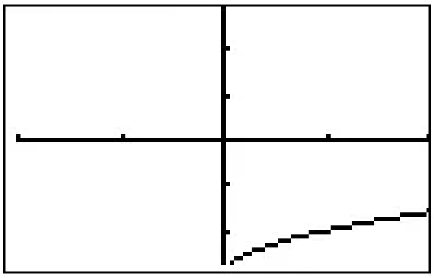
Consider the following equation:

$y = \sqrt{x} - 3.$

And the parent function $y = \sqrt{x}.$

The objective is to how the given equation differs from the parent function $y = \sqrt{x}.$

Use graphing calculator to sketch the graph of the given function as follows:



From the graph it can be seen that domain of x is $\{x | x \geq 9\}.$

The graph $y = \sqrt{x} - 3$ is shifted down 3 unit.

Therefore, the domain of the graph is $\{x | x \geq 9\}.$

Answer 2PQ.

To simplify $\sqrt{3}\cdot\sqrt{6}$

This is solved as

$$\begin{aligned}\sqrt{3}\cdot\sqrt{6} &= \sqrt{3}\cdot\sqrt{3}\cdot\sqrt{2}\\ &= \sqrt{3^2}\sqrt{2}\\ &= 3\sqrt{2}\end{aligned}$$

Thus the solution is $\boxed{3\sqrt{2}}$

Answer 3CU.

The objective give an example of radical equation and solve for the variable.

The equations which contains variables in the radicand are called radical equations.

For example:

$\sqrt{6x-8}=4$.

Solve the equation $\sqrt{6x-8}=4$ as follows:

$$\begin{aligned}\sqrt{6x-8} &= 4 && \text{Original equation}\\ \left(\sqrt{6x-8}\right)^2 &= 4^2 && \text{Square on both sides}\\ 6x-8 &= 16 && \text{Simplify}\end{aligned}$$

$$\begin{aligned}6x &= 16+8 && \text{Add both sides by 8}\\ 6x &= 24 && \text{Simplify}\\ x &= \frac{24}{6} && \text{Divide both sides 6}\\ x &= 4\end{aligned}$$

Thus $x=4$.

The solution is checked as follows:

For $x=4$,

$$\begin{aligned}\sqrt{6x-8} &= 4 && \text{Original equation}\\ \sqrt{6\cdot4-8} &\stackrel{?}{=} 4 && \text{Substitute } x=4\\ \sqrt{24-8} &\stackrel{?}{=} 4\\ \sqrt{16} &\stackrel{?}{=} 4 && \text{Simplify}\end{aligned}$$

$$4=4 \qquad \text{True}$$

Since $x=4$ satisfies the original equation $\sqrt{6x-8}=4$, $x=4$ is the only solution.

Therefore, the solution of the equation $\sqrt{6x-8}=4$ is $x=4$.

Answer 3GCI.

Consider the following graph:

$y = \sqrt{x+2}.$

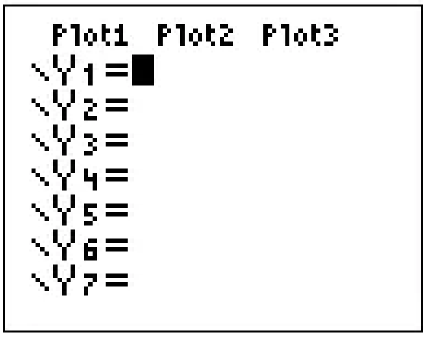
And the parent graph $y = \sqrt{x}.$

The objective is to how the given equation differs from the parent function $y = \sqrt{x}.$

Use graphing calculator to sketch the graph of the given function as follows:

Step 1: Press $\boxed{2nd}$, $\boxed{MODE}$ buttons to clear the screen. Again press $\boxed{Y=}$ button.

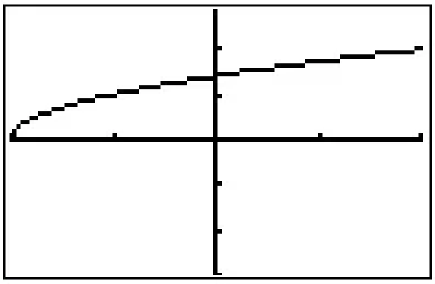
Then the screen will display as follows:



Step 2: Press $\boxed{2nd}$, $\boxed{(\sqrt{x})}$ and $\boxed{x,t,\theta,n}$, $\boxed{+}$ 2, $\boxed{)}$ buttons.

Next, press $\boxed{GRAPH}$ button.

Then the screen will disply as follows:



value of the radicand will be positive when $x+2 \geq 0$

m the graph it can be seen that domain of x is $\{x | x \geq -2\}$

graph $y = \sqrt{x+2}$ is shifted left 2 unit.

refore, the domain of the given graph is $\boxed{\{x | x \geq -2\}}$.

Answer 3PQ.

Simplify $\frac{3}{2+\sqrt{10}}$

This is solved as

$$\frac{3}{2+\sqrt{10}} = \frac{3}{2+\sqrt{10}} \cdot \frac{2-\sqrt{10}}{2-\sqrt{10}}$$

$$= \frac{3\left(2-\sqrt{10}\right)}{(2)^2 - \left(\sqrt{10}\right)^2}$$

$$= \frac{3\left(2-\sqrt{10}\right)}{4-10}$$

$$= \frac{3\left(2-\sqrt{10}\right)}{-6}$$

$$= \frac{-\left(2-\sqrt{10}\right)}{2}$$

Thus the solution is $\boxed{\frac{-2+\sqrt{10}}{2}}$

Answer 4CU.

Consider the following problem:

Alex and Victor solved the equation, $-\sqrt{x-5} = -2$ as follows:

Alex solved as,

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

$$\left(-\sqrt{x-5}\right)^2 = (-2)^2$$

$$x-5 = 4$$

$$x = 9$$

And Victor solved as .

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

$$\left(-\sqrt{x-5}\right)^2 = (-2)^2$$

$$-(x-5) = 4$$

$$-x+5 = 4$$

$$x = 1$$

Find who is correct.

The mistake that Victor did is in the third step of the equation. On squaring both sides minus becomes plus and hence the solution is wrong.

The correction in Victor solution at third step is,

$$\begin{aligned}\left(-\sqrt{x-5}\right)^2 &= (-)^2\left(\sqrt{x-5}\right)^2 \\ &= (x-5)\end{aligned}$$

Thus, $\boxed{\text{Alex is correct}}$

Answer 4GCI.

Consider the following function:

$y=\sqrt{x-5}.$

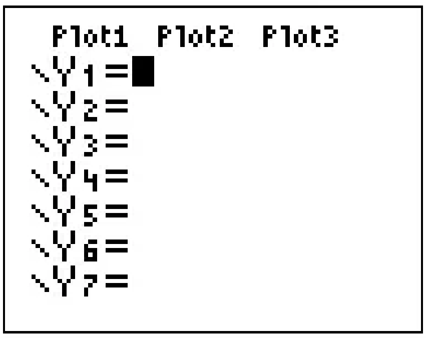
And the parent graph $y=\sqrt{x}.$

The objective is to how the given equation differs from the parent function $y=\sqrt{x}.$

Use graphing calculator to sketch the graph of the given function as follows:

Step 1: Press $\boxed{\text{2nd}}$, $\boxed{MODE}$ buttons to clear the screen. Again press $\boxed{Y=}$ button.

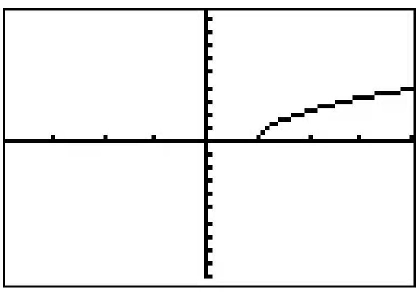
Then the screen will display as follows:



Step 2: Press $\boxed{\text{2nd}}$, $\boxed{(\sqrt{\ })}$ and $\boxed{\text{x,t,}\theta\text{,n}}$, $\boxed{-}$ 5, $\boxed{)}$ buttons.

Next, press $\boxed{GRAPH}$ button.

Then the screen will disply as follows:



The value of the radicand will be positive when $x-5 \geq 0.$

From the graph it can be seen that domain of x is $\{x|x \geq 5\}.$

The graph $y=\sqrt{x-5}$ is shifted right 5 unit.

Therefore, the domain of the given function is $\boxed{\{x|x \geq 5\}}.$

Answer 4PQ.

Simplify $6\sqrt{5}+3\sqrt{11}+5\sqrt{5}$

The expression has no common radicals therefore it cannot be simplified further.

Thus the solution is $\boxed{6\sqrt{5}+3\sqrt{11}+5\sqrt{5}}$

Answer 5CU.

The objective is to solve the equation $\sqrt{x}=5$.

Solve the equation $\sqrt{x}=5$ as follows:

$$\begin{aligned} \sqrt{x} &= 5 \\ \left(\sqrt{x}\right)^2 &= 5^2 \quad \text{Square on both sides} \\ x &= 25 \quad \text{Simplify} \end{aligned}$$

Thus $x=25$.

The solution is checked as

$$\begin{aligned} \sqrt{x} &= 5 \quad \text{Original equation} \\ \sqrt{25} &\stackrel{?}{=} 5 \quad \text{Substitute } x=25 \\ 5 &= 5 \quad \text{True} \end{aligned}$$

Since it is true, 25 satisfies the original equation $\sqrt{x}=5$.

Therefore, the solution of the equation $\sqrt{x}=5$ is $\boxed{x=25}$.

Answer 5GCI.

Consider the following function:

$$y=\sqrt{-x}.$$

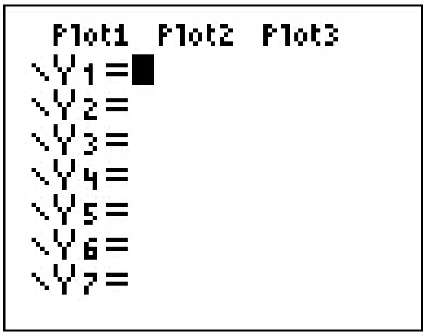
And the parent graph $y=\sqrt{x}.$

The objective is to how the given equation differs from the parent function $y=\sqrt{x}.$

Use graphing calculator to sketch the graph of the given function as follows:

Step 1: Press $\boxed{\text{2nd}}$, $\boxed{MODE}$ buttons to clear the screen. Again press $\boxed{Y=}$ button.

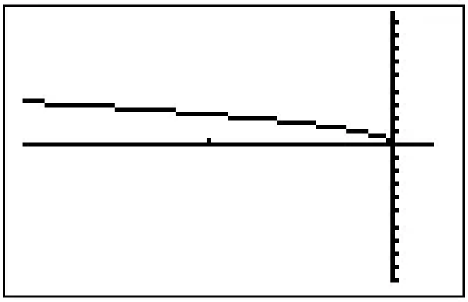
Then the screen will display as follows:



Step 2: Press $\boxed{\text{2nd}}$, $\boxed{(\sqrt{\ })}$ and $\boxed{\text{2nd}}$ $\boxed{ANS}$ $\boxed{\text{x,t},\theta,\text{n}}$, $\boxed{)}$ buttons.

Next, press $\boxed{GRAPH}$ button.

Then the screen will disply as follows:



The value of the radicand will be positive when $x \le 0$.

From the graph it can be seen that the domain of x is $\{x | x \le 0\}$.

The graph $y = \sqrt{-x}$ is shifted up 1 unit.

Therefore, the domain of the given function is $\boxed{\{x | x \le 0\}}$.

Answer 5PQ.

Simplify $2\sqrt{3} + 9\sqrt{12}$

This is solved as follows:

$$\begin{aligned} 2\sqrt{3} + 9\sqrt{12} &= 2\sqrt{3} + 9\sqrt{3} \cdot \sqrt{4} \\ &= 2\sqrt{3} + 9\sqrt{3} \cdot 2 \\ &= 2\sqrt{3} + 18\sqrt{3} \end{aligned}$$

$$= 20\sqrt{3}$$

Thus the solution is $\boxed{20\sqrt{3}}$

Answer 6CU.

The objective is to solve the equation $\sqrt{2b} = -8$.

Solve the equation $\sqrt{2b} = -8$ as follows:

$$\sqrt{2b} = -8$$

$$\left(\sqrt{2b}\right)^2 = (-8)^2 \quad \text{Square on both sides}$$

$$2b = 64 \quad \text{Simplify}$$

$$b = \frac{64}{2} \quad \text{Divide both sides by 2}$$

$$b = 32 \quad \text{Simplify}$$

Thus $b = 32$.

The solution is checked as follows:

$$\sqrt{2b} = -8 \quad \text{Original equation}$$

$$\sqrt{2(32)} \stackrel{?}{=} -8 \quad \text{Substitute } b = 32$$

$$\sqrt{64} \stackrel{?}{=} -8$$

$$8 \neq -8$$

Since $b = 32$ does not satisfy the original equation $\sqrt{2b} = -8$, the equation $\sqrt{2b} = -8$ has no solution.

Answer 6GCI.

Consider the following function:

$$y = \sqrt{3x}.$$

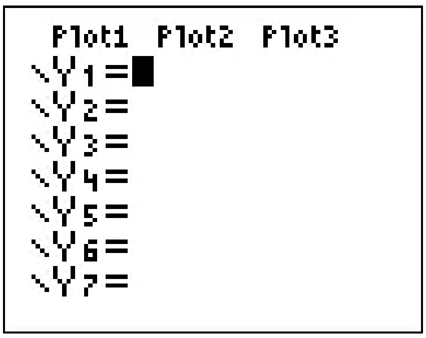
And the parent graph $y = \sqrt{x}$.

The objective is to how the given equation differs from the parent function $y = \sqrt{x}$.

Use graphing calculator to sketch the graph of the given function as follows:

Step 1: Press 2nd, MODE buttons to clear the screen. Again press $Y=$ button.

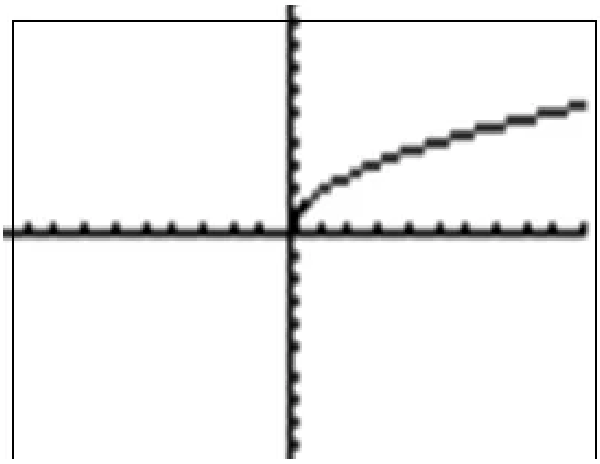
Then the screen will display as follows:



Step 2: Press $\boxed{\text{2nd}}, \boxed{(\sqrt{\ })}$ and $\boxed{\text{2nd}}$ $\boxed{ANS}$ $\boxed{\text{x,t},\theta,\text{n}}, \boxed{)}$ buttons.

Next, press $\boxed{GRAPH}$ button.

Then the screen will disply as follows:



The value of the radicand will be positive when $3x \geq 0.$

From the graph it can be seen that domain of x is $\{x|x \geq 0\}.$

The graph $y = \sqrt{3x}$ is starting from the origin.

Therefore, the domain of the function is $\boxed{\{x|x \geq 0\}}.$

Answer 6PQ.

Simplify $\left(3 - \sqrt{6}\right)^2$

This is solved as follows:

$$\begin{aligned}\left(3 - \sqrt{6}\right)^2 &= (3)^2 - 2 \cdot 3 \cdot \sqrt{6} + \left(\sqrt{6}\right)^2 \\ &= 9 - 6\sqrt{6} + 6 \\ &= 15 - 6\sqrt{6}\end{aligned}$$

Thus the solution is $\boxed{15 - 6\sqrt{6}}$

Answer 7GCI.

Consider the following graph:

$y = -\sqrt{x}.$

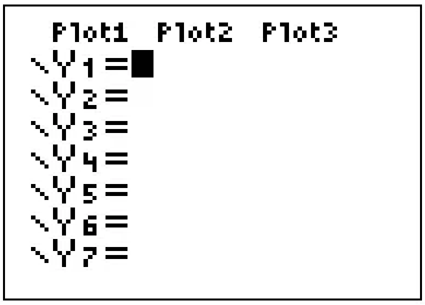
And the parent graph $y = \sqrt{x}.$

The objective is to how the given equation differs from the parent function $y = \sqrt{x}.$

Use graphing calculator to sketch the graph of the given function as follows:

Step 1: Press $\boxed{\text{2nd}}$, $\boxed{MODE}$ buttons to clear the screen. Again press $\boxed{Y=}$ button.

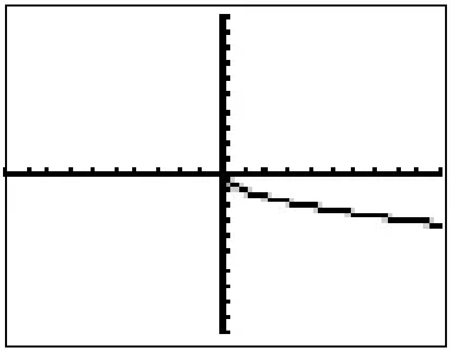
Then the screen will display as follows:



Step 2: Press $\boxed{-}\boxed{\text{2nd}}$, $\boxed{(\sqrt{\ })}$ and $\boxed{\text{x,t},\theta,\text{n}}$ buttons.

Next, press $\boxed{GRAPH}$ button.

Then the screen will disply as follows:



The value of the radicand will be positive when $-x \le 0$.

From the graph it can be seen that domain of x is $\{x|x \le 0\}$.

The graph $y = -\sqrt{x}$ is starting from the origin and goes downwards.

Therefore, the domain of the domain of the given function is $\boxed{\{x|x \le 0\}}$.

Answer 7PQ.

Find the area of the square whose side is $2+\sqrt{7}cm$

The area of a square is given as,

$$\text{Area} = \text{side}^2$$

Substitute the value of side in the above formula

$$A=\left(2+\sqrt{7}\right)^2$$

$$A=(2)^2+2\cdot2\cdot\sqrt{7}+\left(\sqrt{7}\right)^2$$

$$A=4+4\sqrt{7}+7$$

$$A=11+4\sqrt{7}$$

Thus the solution is $\boxed{11+4\sqrt{7}cm^2}$

Answer 8CU.

The objective is to solve the equation $\sqrt{-3a}=6$.

Solve the equation $\sqrt{-3a}=6$ as follows:

$$\begin{aligned}
\sqrt{-3a} &= 6 \\
\left(\sqrt{-3a}\right)^2 &= 6^2 && \text{Square on both sides} \\
-3a &= 36 && \text{Simplify} \\
a &= \frac{36}{-3} && \text{Divide both sides by} -3 \\
a &= -12 && \text{Simplify}
\end{aligned}$$

Thus $a=-12$.

The solution is checked as follows:

$$\begin{aligned}
\sqrt{-3a} &= 6 && \text{Original equation} \\
\sqrt{-3(-12)} &\stackrel{?}{=} 6 && \text{Substitute } a=-12 \\
\sqrt{36} &\stackrel{?}{=} 6 \\
6 &= 6 && \text{True}
\end{aligned}$$

Since it is true, -12 satisfies the original equation $\sqrt{-3a}=6$.

Therefore, the solution of the equation $\sqrt{-3a}=6$ is $\boxed{a=-12}$.

Answer 8GCI.

Consider the following function:

$$y=\sqrt{1+x}+6.$$

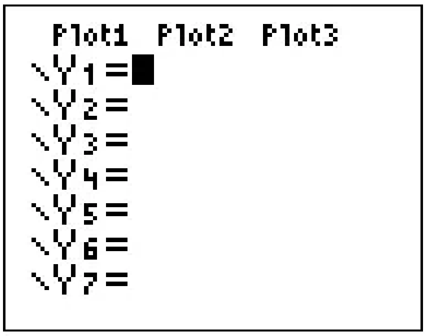
And the parent graph $y=\sqrt{x}.$

The objective is to how the given equation differs from the parent function $y=\sqrt{x}.$

Use graphing calculator to sketch the graph of the given function as follows:

Step 1: Press $\boxed{\text{2nd}}$, $\boxed{MODE}$ buttons to clear the screen. Again press $\boxed{Y=}$ button.

Then the screen will display as follows:

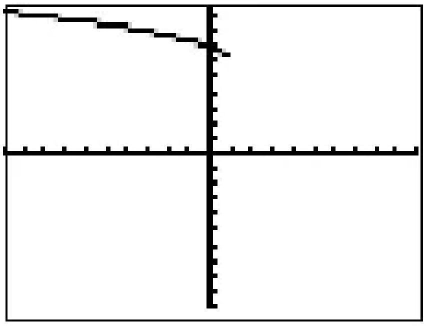


Step 2: Press $\boxed{\text{2nd}}$, $\boxed{(\sqrt{\ })}$ buttons.

Next, press $\boxed{(}$ $\boxed{1}$ $\boxed{-}$ and $\boxed{\text{x,t},\theta,\text{n}}$ $\boxed{)}$, $\boxed{+}$ 6 buttons.

Again, press $\boxed{GRAPH}$ button.

Then the screen will disply as follows



The value of the radicand will be positive when,

$$1-x \geq -6$$
$$-x \geq -6-1$$
$$-x \geq -7$$
$$x \geq 7.$$

From the graph, it can be seen that domain of x is $\{x|x \geq 7\}$.

The graph $y=\sqrt{1+x}+6$ shifts upwards 6 units.

Therefore, the domain of the given function is $\boxed{\{x|x \geq 7\}}$.

Answer 8PQ.

Solve $\sqrt{15-x}=4$

The given equation is $\sqrt{15-x}=4$

.

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

Thus the value is -1

The solution is checked as follows:

$$\sqrt{15-x}=4$$
$$\sqrt{15-(-1)}=4$$
$$\sqrt{16}=4$$
$$4=4$$

Since $x=-1$ satisfies the original equation.

Thus the answer is $\boxed{x=-1}$

Answer 9CU.

The objective is to solve the equation $\sqrt{8s}+1=5$.

Solve the equation $\sqrt{8s}+1=5$ as follows:

$$\sqrt{8s}+1=5$$
$$\sqrt{8s}=5-1 \quad \text{Subtract 1 on bothsides}$$
$$\sqrt{8s}=4 \quad \text{Simplify}$$
$$\left(\sqrt{8s}\right)^2=4^2 \quad \text{Square on both sides}$$
$$8s=16 \quad \text{Simplify}$$
$$s=\frac{16}{8} \quad \text{Divide both sides by 8}$$
$$s=2 \quad \text{Simplify}$$

Thus $s=2$.

The solution is checked as follows:

$$\sqrt{8s}+1=5 \quad \text{Original equation}$$
$$\sqrt{8(2)}+1\overset{?}{=}5 \quad \text{Substitute } s=2$$
$$\sqrt{16}+1\overset{?}{=}5$$
$$4+1\overset{?}{=}5 \quad \text{Simplify}$$
$$5=5 \quad \text{True}$$

Since it is true, 2 satisfies the original equation $\sqrt{8s}+1=5$.

Therefore, the solution of the equation $\sqrt{8s}+1=5$ is $\boxed{s=2}$.

Answer 9GCI.

Consider the following function:

$y=\sqrt{2x+5}-4.$

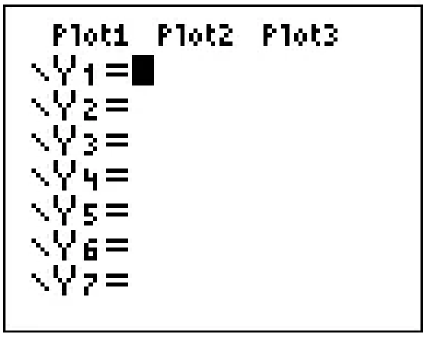
And the parent graph $y=\sqrt{x}.$

The objective is to how the given equation differs from the parent function $y=\sqrt{x}.$

Use graphing calculator to sketch the graph of the given function as follows:

Step 1: Press $\boxed{\text{2nd}}$, $\boxed{MODE}$ buttons to clear the screen. Again press $\boxed{Y=}$ button.

Then the screen will display as follows:

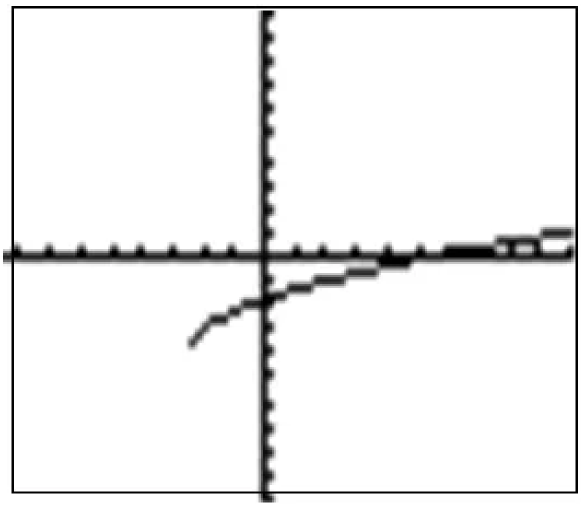


Step 2: Press $\boxed{\text{2nd}}$, $\boxed{(\sqrt{\ })}$ buttons.

Next, press $\boxed{(}$ $\boxed{2}$ $\boxed{\text{x,t},\theta,\text{n}}$ $\boxed{+}$ 5 $\boxed{)}$ and $\boxed{-}$ 4 buttons.

Again, press $\boxed{GRAPH}$ button.

Then the screen will disply as follows:



The value of the radicand will be positive when,

$$2x+5\geq 4$$
$$2x\geq 4-5$$
$$x\geq \frac{-1}{2}$$
$$x\geq -0.5$$

From the graph, it can be seen that domain of x is $\{x|x\geq -0.5\}$.

The graph $y=\sqrt{2x+5}-4$ shifts downwards 4 units.

Therefore, the domain of the given function is $\boxed{\{x|x\geq -0.5\}}$.

Answer 9PQ.

Solve $\sqrt{3x^2-32}=x$ and check the answer.

The given equation is $\sqrt{3x^2-32}=x$.

$$\sqrt{3x^2-32}=x$$
$$\left(\sqrt{3x^2-32}\right)^2=x^2 \quad \text{Squaring on both sides}$$
$$3x^2-32=x^2$$
$$3x^2-x^2=32$$
$$2x^2=32$$
$$x^2=16$$
$$x=\pm 4$$

Thus the value is ± 4

The solution is checked as follows:

At $x=4$

$$\sqrt{3x^2-32}=x$$
$$\left(\sqrt{3\cdot 4^2-32}\right)^2=4^2 \quad \text{Squaring on both sides}$$
$$3\cdot 4^2-32=4^2$$
$$\boxed{16=16}$$

Therefore, $x=4$ satisfies the original equation.

At $x=-4$

$$\sqrt{3x^2-32}=x$$
$$\left(\sqrt{3\cdot(-4)^2-32}\right)^2=(-4)^2 \quad \text{Squaring on both sides}$$
$$3\cdot 16-32=16$$
$$\boxed{16=16}$$

Since $x=-4$ satisfies the original equation.

Thus the answer is $\boxed{x=\pm 4}$

Answer 10CU.

The objective is to solve the equation $\sqrt{7x+18}=9$.

Solve the equation $\sqrt{7x+18}=9$ as follows:

$$\sqrt{7x+18}=9$$

$$\left(\sqrt{7x+18}\right)^2=9^2 \quad \text{Square on both sides}$$

$$7x+18=81 \quad \text{Simplify}$$

$$7x=81-18 \quad \text{Subtract bothsides by 18}$$

$$7x=63 \quad \text{Simplify}$$

$$x=\frac{63}{7} \quad \text{Divide both sides by 7}$$

$$x=9 \quad \text{Simplify}$$

Thus $x=9$.

The solution is checked as follows:

$$\sqrt{7x+18}=9 \quad \text{Original equation}$$

$$\sqrt{7(9)+18}\stackrel{?}{=}9 \quad \text{Substitute } x=9$$

$$\sqrt{63+18}\stackrel{?}{=}9$$

$$\sqrt{81}\stackrel{?}{=}9 \quad \text{Simplify}$$

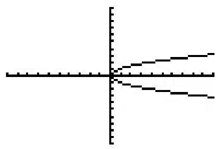
$$9=9 \quad \text{True}$$

Since it is true, 9 satisfies the original equation $\sqrt{7x+18}=9$.

Therefore, the solution of the equation $\sqrt{7x+18}=9$ is $\boxed{x=9}$.

Answer 10GCI.

The graph of $x=y^2$ is not a function. The following is the graph of $x=y^2$.



Now, if a vertical line is drawn in such a way that it intersects the graph of $x=y^2$, then it will be seen that the vertical line intersects the graph of $x=y^2$ in exactly two points. This means, there are two images for a single element. Therefore, the graph of $x=y^2$ is not a function.

Answer 10PQ.

Solve $\sqrt{2x-1} = 2x-7$ and check the answer.

The given equation is $\sqrt{2x-1} = 2x-7$

$$\sqrt{2x-1} = 2x-7$$

$$\left(\sqrt{2x-1}\right)^2 = (2x-7)^2 \quad \text{Squaring on both sides}$$

$$2x-1 = (2x)^2 - 2\cdot 2x\cdot 7 + (7)^2$$

$$2x-1 = 4x^2 - 28x + 49$$

$$4x^2 - 28x + 49 - 2x + 1 = 0$$

$$4x^2 - 30x + 50 = 0$$

$$2x - 10x - 5x + 25 = 0$$

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

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

$$x = \frac{5}{2}, 5$$

The solution is checked as follows:

At $x = \frac{5}{2}$

$$\sqrt{2x-1} = 2x-7$$

$$\left(\sqrt{2\cdot\frac{5}{2}-1}\right)^2 = (2\cdot\frac{5}{2}-7)^2 \quad \text{Squaring on both sides}$$

$$5-1 = (5-7)^2$$

$$\boxed{4 = 4}$$

Since $x = \frac{5}{2}$ satisfies the original equation.

At $x = 5$

$$\sqrt{2x-1} = 2x-7$$

$$\left(\sqrt{2\cdot 5-1}\right)^2 = (2\cdot 5-7)^2 \quad \text{squaring on both sides}$$

$$10-1 = (10-7)^2$$

$$\boxed{9 = 9}$$

Since $x = 5$ satisfies the original equation.

Thus the answer is $\boxed{x = \frac{5}{2}, 5}$

Answer 11CU.

The objective is to solve the equation $\sqrt{5x+1}+2=6$.

Solve the equation $\sqrt{5x+1}+2=6$ as follows:

$$\sqrt{5x+1}+2=6$$

$$\sqrt{5x+1}=6-2 \quad \text{Subtract 2 on bothsides}$$

$$\sqrt{5x+1}=4 \quad \text{Simplify}$$

$$\left(\sqrt{5x+1}\right)^2=4^2 \quad \text{Square on both sides}$$

$$5x+1=16 \quad \text{Simplify}$$

$$5x=16-1 \quad \text{Subtract both sides by 1}$$

$$5x=15 \quad \text{Simplify}$$

$$x=\frac{15}{5} \quad \text{Divide both sides by 8}$$

$$x=3 \quad \text{Simplify}$$

Thus $x=3$.

The solution is checked as follows:

$$\sqrt{5x+1}+2=6 \quad \text{Original equation}$$

$$\sqrt{5(3)+1}+2\stackrel{?}{=}6 \quad \text{Substitute } x=3$$

$$\sqrt{15+1}+2\stackrel{?}{=}6$$

$$\sqrt{16}+2\stackrel{?}{=}6$$

$$4+2\stackrel{?}{=}6 \quad \text{Simplify}$$

$$6=6 \quad \text{True}$$

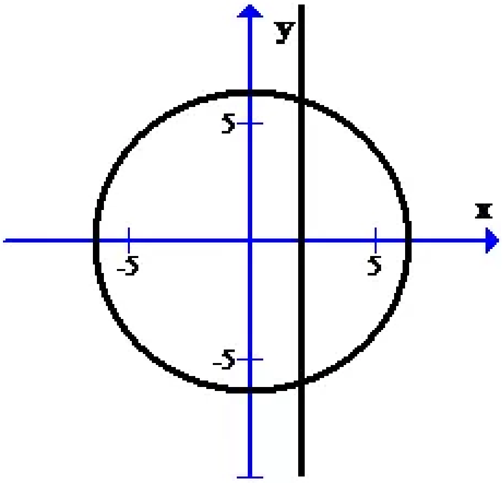
Since it is true, 2 satisfies the original equation $\sqrt{5x+1}+2=6$.

Therefore, the solution of the equation $\sqrt{5x+1}+2=6$ is $\boxed{x=3}$.

Answer 11GCI.

The equation $x^2+y^2=1$ does not determine y as a function of x.

The following is the graph of $x^2+y^2=1$.



Now, if a vertical line is drawn in such a way that it intersects the graph of $x^2+y^2=1$, then it will be seen that the vertical line intersects the graph of $x^2+y^2=1$ in exactly two points. This means, there are two images for a single element. Therefore, the graph of $x^2+y^2=1$ is not a function and hence, the equation $x^2+y^2=1$ does not determine y as a function of x

Answer 12CU.

The objective is to solve the equation $\sqrt{6x-8}=x-4$.

Solve the equation $\sqrt{6x-8}=x-4$ as follows:

$$\sqrt{6x-8}=x-4 \quad \text{Original equation}$$

$$\left(\sqrt{6x-8}\right)^2=(x-4)^2 \quad \text{Square on both sides}$$

$$6x-8=x^2-2\cdot x\cdot 4+4^2$$

$$6x-8=x^2-8x+16 \quad \text{Simplify}$$

$$x^2-8x+16=6x-8 \quad \text{Rearrange}$$

$$x^2-8x-6x+16+8=0 \quad \text{Add both sides by } -6x+8$$

$$x^2-14x+24=0 \quad \text{Simplify}$$

$$x^2-12x-2x+24=0 \quad \text{Write } -14x=-12x-2x$$

$$x(x-12)-2(x-12)=0 \quad \text{Factor}$$

$$(x-12)(x-2)=0 \quad \text{Factor again}$$

$$x-12=0 \quad \text{or} \quad x-2=0$$

$$x=12 \quad \text{or} \quad x=2$$

Thus $x=2,12$.

The solution is checked as follows:

For $x = 2$

$\sqrt{6x-8} = x-4$ Original equation

$\sqrt{6\cdot 2-8} \stackrel{?}{=} 2-4$ Substitute $x = 2$

$\sqrt{6\cdot 2-8} \stackrel{?}{=} -2$

$\sqrt{12-8} \stackrel{?}{=} -2$

$\sqrt{4} = -2$

$2 \neq -2$

Thus, $x = 2$ does not satisfy the equation $\sqrt{6x-8} = x-4$.

So $x = 2$ is not the solution of $4+\sqrt{x-2} = x$.

For $x = 12$,

$\sqrt{6x-8} = x-4$ Original equation

$\sqrt{6\cdot 12-8} \stackrel{?}{=} 12-4$ Substitute $x = 12$

$\sqrt{72-8} \stackrel{?}{=} 8$

$\sqrt{64} \stackrel{?}{=} 8$

$8 = 8$ True

Since $x = 12$ satisfies the original equation $\sqrt{6x-8} = x-4$, $x = 12$ is the only solution.

Therefore, the solution of the equation $\sqrt{6x-8} = x-4$ is $\boxed{x = 12}$.

Answer 13CU.

The objective is to solve the equation $4+\sqrt{x-2} = x$.

Solve the equation $4+\sqrt{x-2} = x$ as follows:

$4+\sqrt{x-2} = x$ Original equation

$\sqrt{x-2} = x-4$ Subtract both sides by 4

$\left(\sqrt{x-2}\right)^2 = (x-4)^2$ Square on both sides

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

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

$x^2-8x-x+16+2 = 0$ Add both sides by $-x+2$

$x^2-9x+18 = 0$ Simplify

$x^2-6x-3x+18 = 0$ Write $-9x = -6x-3x$

$x(x-6)-3(x-6) = 0$ Factor

$(x-6)(x-3) = 0$ Factor again

$x-6 = 0$ or $x-3 = 0$

$x = 6$ or $x = 3$

Thus $x = 3, 6$.

The solution is checked as follows:

For $x = 3$,

$4+\sqrt{x-2}=x$ Original equation

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

$4+\sqrt{1}\stackrel{?}{=}3$

$4+1\stackrel{?}{=}3$

$5 \neq 3$

Thus, $x=3$ does not satisfy the equation $4+\sqrt{x-2}=x$.

So $x=3$ is not the solution of $4+\sqrt{x-2}=x$.

For $x = 6$,

$4+\sqrt{x-2}=x$ Original equation

$4+\sqrt{6-2}\stackrel{?}{=}6$ Substitute $x=6$

$4+\sqrt{4}\stackrel{?}{=}6$

$4+2\stackrel{?}{=}6$

$6=6$ True

Since $x=6$ satisfies the original equation $4+\sqrt{x-2}=x$, $x=6$ is the only solution.

Therefore, the solution of the equation $4+\sqrt{x-2}=x$ is $\boxed{x=6}$.

Answer 14CU.

Consider the speed of the tsunami in meters per second is $s=3.1\sqrt{d}$, where d the depth of the ocean in meters is.

The objective is to find the speed of the tsunami if the depth of the ocean is 10 meters.

$s=3.1\sqrt{d}$

$s=3.1\sqrt{10}$ Substitute $d=10$

$s=3.1\cdot(3.16)$ Since $\sqrt{10}\approx 3.16$

$s\approx 9.80$ Multiply

Therefore, the speed of the tsunami is $\boxed{9.80 \text{ meters per second}}$.

Answer 15CU.

Consider the speed of the tsunami in meters per second is $s = 3.1\sqrt{d}$, where d is the depth of the ocean in meters.

The objective is to find the depth of the water if speed of the tsunami is 240 meters per second .

$$s = 3.1\sqrt{d}$$

$$240 = 3.1\sqrt{d} \qquad \text{Substitute } s = 240$$

$$\frac{240}{3.1} = \sqrt{d} \qquad \text{Divide both sides by } 3.1$$

$$\sqrt{d} = \frac{240}{3.1} \qquad \text{Rearrange}$$

$$\sqrt{d} \approx 77.42 \qquad \text{Simplify}$$

$$\left(\sqrt{d}\right)^2 = (77.42)^2 \qquad \text{Square on both sides}$$

$$d \approx 5994 \qquad \text{Simplify}$$

Therefore, the depth of the water is about $\boxed{5994 \text{meters}}$.

Answer 16CU.

Tsunamis or large tidal waves are generated by undersea earthquakes in the Pacific Ocean. The speed of the tsunami in meters per second is $s = 3.1\sqrt{d}$, where d is the depth of the ocean in meters. A tsunami may begin as a 2 foot high wave travelling 450-500 miles per hour. It can approach a coastline as a 50 foot wave .To find the speed that the waves loses if it travels from a depth of 10,000 meters to a depth of 20 meters.

The speed of the tsunami in meters per second is $s = 3.1\sqrt{d}$, where d is the depth of the ocean in meters. A tsunami may begin as a 2 foot high wave travelling 450-500 miles per hour. It can approach a coastline as a 50 foot wave .To find the speed that the waves loses if it travels from a depth of 10,000 meters to a depth of 20 meters.

In the first case depth of water is $10,000$ meters.

Then, the speed is,

$$s = 3.1\sqrt{d}$$

$$s = 3.1\sqrt{10000}$$

$$s = 3.1 \cdot 100$$

$$s = 310 \text{meters per second}$$

In the second case depth of water is 20 meters.

Then, the speed is,

$$s = 3.1\sqrt{d}$$
$$s = 3.1\sqrt{20}$$
$$s = 3.1 \cdot 4.5$$
$$s = 14 \text{ meters per second.}$$

The speed lost by the wave is,

$$s = (310 - 14) \text{ meters per second}$$
$$s = 296 \text{ meters per second.}$$

Thus, the speed of wave is lose by $\boxed{296 \text{ meters per second}}$

Answer 17PA.

The objective is to solve the equation $\sqrt{a} = 10$.

Solve the equation $\sqrt{a} = 10$ as follows:

$$\sqrt{a} = 10$$
$$\left(\sqrt{a}\right)^2 = 10^2 \quad \text{Square on both sides}$$
$$a = 100 \quad \text{Simplify}$$

Thus $a = 100$.

The solution is checked as follows:

$$\sqrt{a} = 10 \quad \text{Original equation}$$
$$\sqrt{100} \stackrel{?}{=} 10 \quad \text{Substitute } a = 100$$
$$10 = 10 \quad \text{True}$$

Since it is true, 100 satisfies the original equation $\sqrt{a} = 10$.

Therefore, the solution of the equation is $\boxed{a = 100}$.

Answer 18PA.

The objective is to solve the equation $\sqrt{-k}=4$.

Solve the equation $\sqrt{-k}=4$ as follows:

$$\sqrt{-k}=4$$
$$\left(\sqrt{-k}\right)^2=4^2 \quad \text{Square on both sides}$$
$$-k=16 \quad \text{Simplify}$$
$$k=-16 \quad \text{Divide both sides by} -1$$

Thus $k=-16$.

The solution is checked as follows:

$$\sqrt{-k}=4 \quad \text{Original equation}$$
$$\sqrt{-(-16)}\overset{?}{=}4 \quad \text{Substitute } a=-12$$
$$\sqrt{16}\overset{?}{=}4$$
$$4=4 \quad \text{True}$$

Since it is true, -16 satisfies the original equation $\sqrt{-k}=4$.

Therefore, the solution of the equation $\sqrt{-k}=4$ is $\boxed{k=-16}$.

Answer 19PA.

The objective is to solve the equation $5\sqrt{2}=\sqrt{x}$.

Solve the equation $5\sqrt{2}=\sqrt{x}$ as follows:

$$5\sqrt{2}=\sqrt{x}$$
$$\left(5\sqrt{2}\right)^2=\left(\sqrt{x}\right)^2 \quad \text{Square on both sides}$$
$$50=x \quad \text{Simplify}$$
$$x=50 \quad \text{Rearrange}$$

Thus $x=50$.

The solution is checked as follows:

$$5\sqrt{2}=\sqrt{x} \quad \text{Original equation}$$
$$5\sqrt{2}\overset{?}{=}\sqrt{50} \quad \text{Substitute } x=50$$
$$5\sqrt{2}\overset{?}{=}\sqrt{25\cdot 2}$$
$$5\sqrt{2}=5\sqrt{2} \quad \text{True}$$

Since it is true, 50 satisfies the original equation $5\sqrt{2}=\sqrt{x}$.

Therefore, the solution of the equation is $\boxed{x=50}$.

Answer 20PA.

The objective is to solve the equation $3\sqrt{7} = \sqrt{-y}$.

Solve the equation $3\sqrt{7} = \sqrt{-y}$ as follows:

$$3\sqrt{7} = \sqrt{-y}$$

$$\left(3\sqrt{7}\right)^2 = \left(\sqrt{-y}\right)^2 \quad \text{Square on both sides}$$

$$63 = -y \quad \text{Simplify}$$

$$-63 = y$$

$$y = -63 \quad \text{Rearrange}$$

Thus $y = -63$.

The solution is checked as follows:

$$3\sqrt{7} = \sqrt{-y} \quad \text{Original equation}$$

$$3\sqrt{7} \stackrel{?}{=} \sqrt{-(-63)} \quad \text{Substitute } y = -63$$

$$3\sqrt{7} \stackrel{?}{=} \sqrt{63} \quad \text{Simplify}$$

$$3\sqrt{7} \stackrel{?}{=} \sqrt{9 \cdot 7} \quad \text{Write } 63 = 9 \cdot 7$$

$$3\sqrt{7} = 3\sqrt{7} \quad \text{True}$$

Since it is true, -63 satisfies the original equation $3\sqrt{7} = \sqrt{-y}$.

Therefore, the solution of the equation is $\boxed{y = -63}$.

Answer 21PA.

Solve and verify the equation.

It is given that, $3\sqrt{4a} - 2 = 10$

$$3\sqrt{4a} - 2 = 10$$

$$3\sqrt{4a} = 12$$

$$\left(3\sqrt{4a}\right)^2 = (12)^2$$

$$9 \cdot 4a = 144$$

$$36a = 144$$

$$a = \frac{144}{36}$$

$$a = 4$$

Thus, the value is 4

The solution is checked as,

$$3\sqrt{4a}-2=10$$
$$3\sqrt{4\cdot 4}=12$$
$$3\sqrt{16}=12$$
$$\pm 3\cdot 4=12$$

Since, the value 4 satisfies the original equation.

Therefore, the answer is $\boxed{a=4}$

Answer 22PA.

Solve the given equation and check whether the solution is right or wrong.

It is given that, $3+5\sqrt{n}=18$

$$3+5\sqrt{n}=18$$
$$5\sqrt{n}=18-3$$
$$\left(5\sqrt{n}\right)^2=(15)^2$$
$$25n=225$$
$$n=\frac{225}{25}$$
$$n=9$$

Thus, the value is 9.

The solution is checked as

$$3+5\sqrt{n}=18$$
$$5\sqrt{9}=18-3$$
$$5\cdot 3=15$$
$$\pm 15=15$$

Since, the value 9 satisfies the original equation.

Therefore, the answer is $\boxed{a=9}$.

Answer 23PA.

Solve the given equation and check whether the solution is right or wrong.

It is given that, $\sqrt{x+3}=-5$

$$\sqrt{x+3}=-5$$
$$\left(\sqrt{x+3}\right)^2=(-5)^2 \qquad \text{(Apply square on both sides)}$$
$$x+3=25$$
$$x=22$$

Thus, the value is 22

The solution is checked as

$$\sqrt{x+3} = -5$$
$$\sqrt{22+3} = -5$$
$$\sqrt{25} = -5$$
$$\pm 5 = -5$$

Since, the value 22 satisfies the original equation.

Therefore, the answer is $\boxed{x = 22}$.

Answer 24PA.

Solve the given equation and check whether the solution is right or wrong.

It is given that $\sqrt{x-5} = 2\sqrt{6}$.

$$\sqrt{x-5} = 2\sqrt{6}$$
$$\left(\sqrt{x-5}\right)^2 = \left(2\sqrt{6}\right)^2 \quad \text{(Apply square on both sides)}$$
$$x-5 = 4\cdot 6$$
$$x = 24+5$$
$$x = 29$$

Thus, the value is 29.

The solution is checked as

$$\sqrt{x-5} = 2\sqrt{6}$$
$$\sqrt{29-5} = 2\sqrt{6}$$
$$\sqrt{24} = 2\sqrt{6}$$
$$\sqrt{4\cdot 6} = 2\sqrt{6}$$
$$\sqrt{4}\cdot\sqrt{6} = 2\sqrt{6}$$
$$\pm 2\sqrt{6} = 2\sqrt{6}$$

Since, the value 29 satisfies the original equation.

Therefore, the answer is $\boxed{x = 29}$.

Answer 25PA.

Solve the given equation and check whether the solution is right or wrong.

It is given that $\sqrt{3x+12} = 3\sqrt{3}$

$$\sqrt{3x+12} = 3\sqrt{3}$$
$$\left(\sqrt{3x+12}\right)^2 = \left(3\sqrt{3}\right)^2 \quad \text{(Apply square on both sides)}$$
$$3x+12 = 9\cdot 3$$
$$3x = 27-12$$
$$3x = 15$$
$$x = \frac{15}{3}$$
$$x = 5$$

Thus, the value is 5

The solution is checked as

$$\begin{aligned}\sqrt{3x+12} &= 3\sqrt{3}\\ \sqrt{3\cdot 5+12} &= 3\sqrt{3}\\ \sqrt{15+12} &= 3\sqrt{3}\\ \sqrt{27} &= 3\sqrt{3}\end{aligned}$$

$$\begin{aligned}\sqrt{9\cdot 3} &= 3\sqrt{3}\\ \sqrt{9}\cdot\sqrt{3} &= 3\sqrt{3}\\ \pm 3\sqrt{3} &= 3\sqrt{3}\end{aligned}$$

Since, the value 5 satisfies the original equation.

Therefore, the answer is $\boxed{x=5}$.

Answer 26PA.

Solve the given equation and check whether the solution is right or wrong.

It is given that, $\sqrt{2c-4}=8$

$$\begin{aligned}\sqrt{2c-4} &= 8\\ \left(\sqrt{2c-4}\right)^2 &= (8)^2 \qquad \text{(Sqare on both sides)}\\ 2c-4 &= 64\\ 2c &= 68\end{aligned}$$

$$c=\frac{68}{2}$$
$$c=34$$

Thus, the value is 34.

The solution is checked as

$$\begin{aligned}\sqrt{2c-4} &= 8\\ \sqrt{2\cdot 34-4} &= 8\\ \sqrt{68-4} &= 8\\ \sqrt{64} &= 8\end{aligned}$$

$$\pm 8 = 8$$

Since, the value 34 satisfies the original equation.

Therefore, the answer is $\boxed{c=34}$.

Answer 27PA.

Solve the given equation and check whether the solution is right or wrong.

It is given that, $\sqrt{4b+1}-3=0$

$$\sqrt{4b+1}-3=0$$
$$\sqrt{4b+1}=3$$
$$\left(\sqrt{4b+1}\right)^2=(3)^2 \qquad \text{(Apply square on bothe sides)}$$
$$4b+1=9$$
$$4b=9-1$$
$$4b=8$$
$$b=\frac{8}{4}$$
$$b=2$$

Thus, the value is 2.

The solution is checked as

$$\sqrt{4b+1}-3=0$$
$$\sqrt{4\cdot 2+1}=3$$
$$\sqrt{9}=3$$
$$\pm 3=3$$

Since, the value 2 satisfies the original equation.

Therefore, the answer is $\boxed{b=2}$.

Answer 28PA.

Solve the given equation and check whether the solution is right or wrong.

It is given that, $\sqrt{3r-5}+7=3$

$$\sqrt{3r-5}+7=3$$
$$\sqrt{3r-5}=3-7$$
$$\left(\sqrt{3r-5}\right)^2=(-4)^2 \qquad \text{(Apply square on both sides)}$$
$$3r-5=16$$
$$3r=16+5$$
$$3r=21$$
$$r=\frac{21}{3}$$
$$r=7$$

Thus, the value is 7

The solution is checked as

$$\sqrt{3r-5}+7=3$$
$$\sqrt{3\cdot 7-5}=3-7$$
$$\sqrt{16}=-4$$
$$\pm 4=-4$$

Since, the value 7 satisfies the original equation.

Therefore, the answer is $\boxed{r=7}$.

Answer 29PA.

Solve the given equation and check whether the solution is right or wrong.

It is given that, $\sqrt{\frac{4x}{5}}-9=3$

$$\sqrt{\frac{4x}{5}}-9=3$$
$$\sqrt{\frac{4x}{5}}=3+9$$
$$\left(\sqrt{\frac{4x}{5}}\right)^2=(12)^2 \qquad \text{(Apply square on both sides)}$$
$$\frac{4x}{5}=144$$
$$4x=144\cdot 5$$
$$4x=720$$
$$x=\frac{720}{4}$$
$$x=180$$

Thus, the value is 180

The solution is checked as

$$\sqrt{\frac{4x}{5}}-9=3$$
$$\sqrt{\frac{4x}{5}}=9+3$$
$$\sqrt{\frac{4\cdot 180}{5}}=12$$
$$\sqrt{\frac{720}{5}}=12$$
$$\sqrt{144}=12$$
$$\pm 12=12$$

Since, the value 180 satisfies the original equation.

Therefore, the answer is $\boxed{x=180}$.

Answer 30PA.

Solve the given equation and check whether the solution is right or wrong.

It is given that, $5\sqrt{\frac{4t}{3}}-2=0$

$$\left(5\sqrt{\frac{4t}{3}}\right)^2=(2)^2 \qquad \text{(Apply square on both sides)}$$

$$25\left(\frac{4t}{3}\right)=4$$

$$\frac{4t}{3}=\frac{4}{25}$$

$$x=0.12$$

Thus, the value is $\boxed{0.12}$.

The solution is checked as

$$5\sqrt{\frac{4t}{3}}-2=0$$

$$5\sqrt{\frac{4(0.12)}{3}}-2=0$$

$$0=0$$

Since, the value 0.12 satisfies the original equation.

Therefore, the answer is $\boxed{x=0.12}$.

Answer 31PA.

The objective is to solve the equation $\sqrt{x^2+9x+14}=x+4$.

Solve the equation $\sqrt{x^2+9x+14}=x+4$ as follows:

$$\sqrt{x^2+9x+14}=x+4$$

$$\left(\sqrt{x^2+9x+14}\right)^2=(x+4)^2 \qquad \text{Square on both sides}$$

$$x^2+9x+14=x^2+2\cdot x\cdot 4+4^2$$

$$x^2+9x+14=x^2+8x+16 \qquad \text{Simplify}$$

$$x^2-x^2+9x-8x+14-16=0 \qquad \text{Subtact both side by}\left(x^2+8x+16\right)$$

$$x-2=0 \qquad \text{Simplify}$$

$$x=2 \qquad \text{Add both sides by 2}$$

Thus, $x=2$.

The solution is checked as follows:

$$\sqrt{x^2+9x+14}=x+4 \qquad \text{Original equation}$$

$$\sqrt{2^2+9\cdot 2+14}\overset{?}{=}2+4 \qquad \text{Substitute } x=2$$

$$\sqrt{4+18+14}\overset{?}{=}6 \qquad \text{Simplify}$$

$$\sqrt{36}\overset{?}{=}6$$

$$6=6 \qquad \text{True}$$

Since 2 satisfies the original equation, $x=2$ is the solution of the equation.

Therefore, the solution of the equation $\sqrt{x^2+9x+14}=x+4$ is $\boxed{x=2}$.

Answer 32PA.

The objective is to solve the equation $y+2=\sqrt{y^2+5y+4}$.

Solve the equation $y+2=\sqrt{y^2+5y+4}$ as follows:

$$y+2=\sqrt{y^2+5y+4}$$

$$\left(\sqrt{y^2+5y+4}\right)^2=(y+2)^2 \qquad \text{Square on both sides}$$

$$y^2+5y+4=y^2+2\cdot y\cdot 2+2^2$$

$$y^2+5y+4=y^2+4y+4 \qquad \text{Simplify}$$

$$y^2+5y+4-y^2-4y-4=0 \qquad \text{Subtact both side by}\left(y^2+4y+4\right)$$

$$y=0 \qquad \text{Simplify}$$

Thus, $y=0$.

The solution is checked as follows:

$$y+2=\sqrt{y^2+5y+4} \qquad \text{Original equation}$$

$$0+2\overset{?}{=}\sqrt{0^2+5\cdot 0+4} \qquad \text{Substitute } y=0$$

$$2\overset{?}{=}\sqrt{4} \qquad \text{Simplify}$$

$$2=2 \qquad \text{True}$$

Since $y=0$ satisfies the original equation, $y=0$ is the solution of the equation.

Therefore, the solution of the equation $y+2=\sqrt{y^2+5y+4}$ is $\boxed{y=0}$.

Answer 33PA.

Consider the square root of the sum of a number and 7 is 8.

The objective is to find the number.

Assume number is x.

The square root of the sum of a number and 7 is 8.

So, $\sqrt{x+7}=8$

To find the number, solve the equation as follows:

$$\begin{aligned} \sqrt{x+7} &= 8 \\ \left(\sqrt{x+7}\right)^2 &= 8^2 && \text{Square on both sides} \\ x+7 &= 64 && \text{Simplify} \\ x &= 57 && \text{Subtract both sides by 7} \end{aligned}$$

Thus, the number is 57.

Check:

Substitute $x=57$ in $\sqrt{x+7}=8$.

$$\begin{aligned} \sqrt{x+7} &= 8 \\ \sqrt{57+7} &\overset{?}{=} 8 && \text{Substitute } x=57 \\ \sqrt{64} &\overset{?}{=} 8 && \text{Simplify} \\ 8 &= 8 && \text{True} \end{aligned}$$

Therefore, the number is $\boxed{57}$.

Answer 34PA.

Consider the square root of the quotient of a number and 6 is 9.

The objective is to find the number.

Assume number is x.

The square root of the quotient of a number and 6 is 9.

So, $\sqrt{\frac{x}{6}}=9$

To find the number, solve the equation as follows:

$$\begin{aligned} \sqrt{\frac{x}{6}} &= 9 \\ \left(\sqrt{\frac{x}{6}}\right)^2 &= 9^2 && \text{Square on both sides} \\ \frac{x}{6} &= 81 && \text{Simplify} \\ x &= 486 && \text{Multiply both sides by 6} \end{aligned}$$

Thus, the number is 486.

Check:

Substitute $x = 486$ in $\sqrt{\frac{x}{6}} = 9$.

$$\sqrt{\frac{x}{6}} = 9$$

$$\sqrt{\frac{486}{6}} \stackrel{?}{=} 9 \qquad \text{Substitute } x = 486$$

$$\sqrt{81} \stackrel{?}{=} 9 \qquad \text{Simplify}$$

$$9 = 9 \qquad \text{True}$$

Therefore, the number is $\boxed{486}$.

Answer 35PA.

The objective is to solve the equation $x = \sqrt{6 - x}$.

Solve the equation $x = \sqrt{6 - x}$ as follows:

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

$$(x)^2 = \left(\sqrt{6 - x}\right)^2 \qquad \text{Square on both sides}$$

$$x^2 = 6 - x \qquad \text{Simplify}$$

$$x^2 - 6 + x = 0 \qquad \text{Add both sides by } -6 + x$$

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

$$x^2 + 3x - 2x - 6 = 0 \qquad \text{Rewrite}$$

$$x(x + 3) - 2(x + 3) = 0 \qquad \text{Factor}$$

$$(x + 3)(x - 2) = 0 \qquad \text{Factor again}$$

$$x + 3 = 0 \quad \text{or} \quad x - 2 = 0$$

$$x = -3 \quad \text{or} \quad x = 2$$

Thus, $x = -3, 2$.

The solutions are checked as follows:

Substitute $x=-3$ in $x=\sqrt{6-x}$.

$$\begin{aligned} x &= \sqrt{6-x} && \text{Original equation} \\ -3 &\stackrel{?}{=} \sqrt{6-(-3)} && \text{Substitute } x=-3 \\ -3 &\stackrel{?}{=} \sqrt{6+3} && \text{Simplify} \\ -3 &\neq 3 \end{aligned}$$

Since $x=-3$ does not satisfy the original equation $x=\sqrt{6-x}$, $x=-3$ is not the solution of the equation $x=\sqrt{6-x}$.

Now Substitute $x=2$ in $x=\sqrt{6-x}$.

$$\begin{aligned} x &= \sqrt{6-x} && \text{Original equation} \\ 2 &\stackrel{?}{=} \sqrt{6-2} && \text{Substitute } x=-3 \\ 2 &\stackrel{?}{=} \sqrt{4} && \text{Simplify} \\ 2 &= 2 && \text{True} \end{aligned}$$

Since $x=2$ satisfies the equation $x=\sqrt{6-x}$, $x=2$ is the solution of the equation $x=\sqrt{6-x}$.

Therefore, the solution of the equation $x=\sqrt{6-x}$ is $\boxed{x=2}$.

Answer 36PA.

The objective is to solve the equation $x=\sqrt{x+20}$.

Solve the equation $x=\sqrt{x+20}$ as follows:

$$\begin{aligned} x &= \sqrt{x+20} \\ (x)^2 &= \left(\sqrt{x+20}\right)^2 && \text{Square on both sides} \\ x^2 &= x+20 && \text{Simplify} \\ x^2-x-20 &= 0 && \text{Add both sides by } -x-20 \\ x^2-5x+4x-20 &= 0 && \text{Rewrite} \\ x(x-5)+4(x-5) &= 0 && \text{Factor} \\ (x+4)(x-5) &= 0 && \text{Factor again} \end{aligned}$$

$$x+4=0 \quad \text{or} \quad x-5=0$$
$$x=-4 \quad \text{or} \quad x=5$$

Thus, $x=-4,5$.

The solutions are checked as follows:

Substitute $x=-4$ in $x=\sqrt{x+20}$.

$$x=\sqrt{x+20} \quad \text{Original equation}$$
$$-4\overset{?}{=}\sqrt{-4+20} \quad \text{Substitute } x=-4$$
$$-4\overset{?}{=}\sqrt{16} \quad \text{Simplify}$$
$$-4\neq 4$$

Since $x=-4$ does not satisfy the original equation $x=\sqrt{x+20}$, $x=-4$ is not the solution of the equation $x=\sqrt{x+20}$.

Now Substitute $x=5$ in $x=\sqrt{x+20}$.

$$x=\sqrt{x+20} \quad \text{Original equation}$$
$$5\overset{?}{=}\sqrt{5+20} \quad \text{Substitute } x=5$$
$$5\overset{?}{=}\sqrt{25} \quad \text{Simplify}$$
$$5=5 \quad \text{True}$$

Since $x=5$ satisfies the equation $x=\sqrt{x+20}$, $x=5$ is the solution of the equation $x=\sqrt{x+20}$.

Therefore, the solution of the equation $x=\sqrt{x+20}$ is $\boxed{x=5}$.

Answer 37PA.

The objective is to solve the equation $\sqrt{5x-6}=x$.

Solve the equation $\sqrt{5x-6}=x$ as follows:

$$\sqrt{5x-6}=x$$
$$\left(\sqrt{5x-6}\right)^2=(x)^2 \quad \text{Square on both sides}$$
$$5x-6=x^2 \quad \text{Simplify}$$
$$0=x^2-5x+6 \quad \text{Add both sides by } -5x+6$$
$$x^2-5x+6=0 \quad \text{Rearrange}$$
$$x^2-2x-3x+6=0 \quad \text{Rewrite}$$
$$x(x-2)-3(x-2)=0 \quad \text{Factor}$$
$$(x-2)(x-3)=0 \quad \text{Factor again}$$
$$x-2=0 \quad \text{or} \quad x-3=0$$
$$x=2 \quad \text{or} \quad x=3$$

Thus, $x=2,3$.

The solutions are checked as follows:

Substitute $x=2$ in $\sqrt{5x-6}=x$.

$$\begin{aligned} \sqrt{5x-6} &= x && \text{Original equation} \\ \sqrt{5\cdot 2-6} &\overset{?}{=} 2 && \text{Substitute } x=2 \\ \sqrt{4} &\overset{?}{=} 2 && \text{Simplify} \\ 2 &= 2 && \text{True} \end{aligned}$$

Since $x=2$ satisfies the equation $\sqrt{5x-6}=x$, $x=2$ is the solution of the equation $\sqrt{5x-6}=x$.

Now Substitute $x=3$ in $\sqrt{5x-6}=x$.

$$\begin{aligned} \sqrt{5x-6} &= x && \text{Original equation} \\ \sqrt{5\cdot 3-6} &\overset{?}{=} 3 && \text{Substitute } x=3 \\ \sqrt{9} &\overset{?}{=} 3 && \text{Simplify} \\ 3 &= 3 && \text{True} \end{aligned}$$

Since $x=3$ satisfies the equation $\sqrt{5x-6}=x$, $x=3$ is the solution of the equation $\sqrt{5x-6}=x$.

Therefore, the solutions of the equation $\sqrt{5x-6}=x$ are $\boxed{x=2,3}$.

Answer 38PA.

The objective is to solve the equation $\sqrt{28-3x}=x$.

Solve the equation $\sqrt{28-3x}=x$ as follows:

$$\begin{aligned} \sqrt{28-3x} &= x \\ \left(\sqrt{28-3x}\right)^2 &= (x)^2 && \text{Square on both sides} \\ 28-3x &= x^2 && \text{Simplify} \\ 0 &= x^2+3x-28 && \text{Add both sides by } 3x-28 \\ x^2+3x-28 &= 0 && \text{Rearrange} \\ x^2+7x-4x-28 &= 0 && \text{Rewrite} \\ x(x+7)-4(x+7) &= 0 && \text{Factor} \\ (x+7)(x-4) &= 0 && \text{Factor again} \end{aligned}$$

$$x+7=0 \quad \text{or} \quad x-4=0$$
$$x=-7 \quad \text{or} \quad x=4$$

Thus, $x=-7,4$.

The solutions are checked as follows:

Substitute $x=-7$ in $\sqrt{28-3x}=x$.

$$\sqrt{28-3x}=x \quad \text{Original equation}$$
$$\sqrt{28-3(-7)}\overset{?}{=}-7 \quad \text{Substitute } x=-7$$
$$\sqrt{28+21}\overset{?}{=}-7 \quad \text{Simplify}$$
$$\sqrt{49}\overset{?}{=}-7$$
$$7\neq-7$$

Since $x=-7$ does not satisfy the equation $\sqrt{28-3x}=x$, $x=-7$ is not the solution of the equation $\sqrt{28-3x}=x$.

Now Substitute $x=4$ in $\sqrt{28-3x}=x$.

$$\sqrt{28-3x}=x \quad \text{Original equation}$$
$$\sqrt{28-3\cdot4}\overset{?}{=}4 \quad \text{Substitute } x=4$$
$$\sqrt{28-12}\overset{?}{=}4 \quad \text{Simplify}$$
$$\sqrt{16}\overset{?}{=}4$$
$$4=4 \quad \text{True}$$

Since $x=4$ satisfies the equation $\sqrt{28-3x}=x$, $x=4$ is the solution of the equation $\sqrt{28-3x}=x$.

Therefore, the solution of the equation $\sqrt{28-3x}=x$ is $\boxed{x=4}$.

Answer 39PA.

The objective is to solve the equation $\sqrt{x+1}=x-1$.

Solve the equation $\sqrt{x+1}=x-1$ as follows:

$$\sqrt{x+1}=x-1$$
$$\left(\sqrt{x+1}\right)^2=(x-1)^2 \quad \text{Square on both sides}$$
$$x+1=x^2-2x+1 \quad \text{Simplify}$$
$$0=x^2-2x+1-x-1 \quad \text{Add both sides by} -x-1$$
$$0=x^2-3x$$
$$x^2-3x=0 \quad \text{Rearrange}$$
$$x(x-3)=0 \quad \text{Factor}$$
$$x=0 \quad \text{or} \quad x-3=0$$
$$x=0 \quad \text{or} \quad x=3$$

Thus, $x=0,3$.

The solutions are checked as follows:

Substitute $x=0$ in $\sqrt{x+1}=x-1$.

$$\begin{aligned} \sqrt{x+1} &= x-1 && \text{Original equation} \\ \sqrt{0+1} &\overset{?}{=} 0-1 && \text{Substitute } x=0 \\ \sqrt{1} &\overset{?}{=} -1 && \text{Simplify} \\ 1 &\neq 1 \end{aligned}$$

Since $x=0$ does not satisfy the equation $\sqrt{x+1}=x-1$, $x=0$ is not the solution of the equation $\sqrt{x+1}=x-1$.

Now Substitute $x=3$ in $\sqrt{x+1}=x-1$.

$$\begin{aligned} \sqrt{x+1} &= x-1 && \text{Original equation} \\ \sqrt{3+1} &\overset{?}{=} 3-1 && \text{Substitute } x=3 \\ \sqrt{4} &\overset{?}{=} 2 && \text{Simplify} \\ 2 &= 2 && \text{True} \end{aligned}$$

Since $x=3$ satisfies the equation $\sqrt{x+1}=x-1$, $x=3$ is the solution of the equation $\sqrt{x+1}=x-1$.

Therefore, the solution of the equation $\sqrt{x+1}=x-1$ is $\boxed{x=3}$.

Answer 40PA.

The objective is to solve the equation $\sqrt{1-2b}=1+b$.

Solve the equation $\sqrt{1-2b}=1+b$ as follows:

$$\begin{aligned} \sqrt{1-2b} &= 1+b \\ \left(\sqrt{1-2b}\right)^2 &= (1+b)^2 && \text{Square on both sides} \\ 1-2b &= 1+2b+b^2 && \text{Simplify} \\ 0 &= b^2+2b+1+2b-1 && \text{Add both sides by } 2b-1 \\ 0 &= b^2+4b \\ b^2+4b &= 0 && \text{Rearrange} \\ b(b+4) &= 0 && \text{Factor} \end{aligned}$$

$$\begin{aligned} b &= 0 \quad \text{or} \quad b+4=0 \\ b &= 0 \quad \text{or} \quad b=-4 \end{aligned}$$

Thus, $b=0,-4$.

The solutions are checked as follows:

Substitute $b=0$ in $\sqrt{1-2b}=1+b$.

$$\sqrt{1-2b}=1+b \qquad \text{Original equation}$$
$$\sqrt{1-2(0)}\stackrel{?}{=}1-0 \qquad \text{Substitute } b=0$$
$$\sqrt{1}\stackrel{?}{=}1 \qquad \text{Simplify}$$
$$1=1 \qquad \text{True}$$

Since $b=0$ does not satisfy the equation $\sqrt{1-2b}=1+b$, $b=0$ is not the solution of the equation $\sqrt{1-2b}=1+b$.

Answer 41PA.

Consider the equation

$$4+\sqrt{m-2}=m$$

As a first step add -4 on both sides and square.

$$4+\sqrt{m-2}=m$$
$$4+\sqrt{m-2}-4=m-4$$
$$\sqrt{m-2}=m-4$$
$$\left(\sqrt{m-2}\right)^2=(m-4)^2$$

Simplify on either side.

$$m-2=m^2+16-8m$$
$$m^2-9m+18=0$$

Factor to solve for m

$$m^2-9m+18=0$$
$$m^2-6m-3m+18=0$$
$$(m-6)(m-3)=0$$
$$(m-6)=0 \text{ or } (m-3)=0$$
$$m=6 \text{ or } m=3$$

Check part:

$$4+\sqrt{m-2}=m$$
$$4+\sqrt{6-2}=6 \qquad (\text{Take } m=6)$$
$$4+\sqrt{4}=6$$
$$4+2=6$$
$$6=6 \qquad (\text{True})$$

$$4+\sqrt{m-2}=m$$
$$4+\sqrt{3-2}=3 \qquad (\text{Take } m=3)$$
$$4+\sqrt{1}=3$$
$$4+1=3 \qquad (\text{Not true})$$

Therefore solution of given equation is $\boxed{m=6}$

Answer 42PA.

Consider the equation,

$$\sqrt{3d-8}=d-2$$

As a first step square on both sides

$$\sqrt{3d-8}=d-2$$
$$\left(\sqrt{3d-8}\right)^2=(d-2)^2$$
$$3d-8=d^2+4-4d$$
$$d^2-7d+12=0$$

Factor and solve for d.

$$d^2-7d+12=0$$
$$d^2-4d-3d+12=0$$
$$(d-4)(d-3)=0$$
$$(d-4)=0 \text{ or } (d-3)=0$$
$$d=4 \text{ or } d=3$$

Check part:

$$\sqrt{3d-8}=d-2$$
$$\sqrt{12-8}=4-2 \qquad (\text{Take } d=4)$$
$$\sqrt{4}=2$$
$$2=2 \qquad (\text{True})$$

$$\sqrt{3d-8}=d-2$$
$$\sqrt{9-8}=3-2 \qquad (\text{Take } d=3)$$
$$\sqrt{1}=1$$
$$1=1 \qquad (\text{True})$$

Both the values of d satisfying the given equation

Therefore solutions of given equation are $\boxed{d=3 \ \& \ 4}$

Answer 43PA.

Consider the equation

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

Rewrite the equation and square on either side.

$$\sqrt{6-x}=4-x$$
$$\left(\sqrt{6-x}\right)^2=(4-x)^2$$
$$6-x=16+x^2-8x$$
$$x^2+7x-10=0$$

Factor to solve for x

$$x^2-7x+10=0$$
$$x^2-5x-2x+10=0$$
$$(x-5)(x-2)=0$$
$$(x-5)=0 \text{ or } (x-2)=0$$
$$x=5 \text{ or } x=2$$

Check part:

$$x+\sqrt{6-x}=4$$
$$5+\sqrt{6-5}=4 \quad (\text{Take } x=5)$$
$$5+\sqrt{1}=4$$
$$5+1=4$$
$$6=4 \quad (\text{Not True})$$

Check the other solution.

$$x+\sqrt{6-x}=4$$
$$2+\sqrt{6-2}=4 \quad (\text{Take } x=2)$$
$$2+\sqrt{4}=4$$
$$2+2=4$$
$$4=4 \quad (\text{True})$$

Therefore solution of given equation is $\boxed{x=2}$

Answer 44PA.

Consider the equation,

$$\sqrt{6-3x} = x+16$$

As a first step square on both sides

$$\sqrt{6-3x} = x+16$$
$$\left(\sqrt{6-3x}\right)^2 = (x+16)^2$$
$$6-3x = x^2+256+32x$$
$$x^2+35x+250=0$$

Factor and solve for x.

$$x^2+35x+250=0$$
$$x^2+25x+10x+250=0$$
$$(x+25)(x+10)=0$$
$$(x+25)=0 \text{ or } (x+10)=0$$
$$x=-25 \text{ or } d=-10$$

Check part:

$$\sqrt{6-3x} = x+16$$
$$\sqrt{6+75} = -25+16 \quad (\text{Take } x=-25)$$
$$\sqrt{81} = -9$$
$$9=-9 \quad (\text{Not True})$$

Check the other value.

$$\sqrt{6-3x} = x+16$$
$$\sqrt{6+30} = -10+16 \quad (\text{Take } x=-25)$$
$$\sqrt{36} = 6$$
$$6=6 \quad (\text{True})$$

Therefore solutions of given equation is $\boxed{x=10}$

Answer 45PA.

Consider the equation,

$$\sqrt{2r^2-121}=r$$

As a first step square on both sides

$$\sqrt{2r^2-121}=r$$
$$\left(\sqrt{2r^2-121}\right)^2=r^2$$
$$2r^2-121=r^2$$
$$r^2-121=0$$

Factor and solve for r.

$$r^2-121=0$$
$$r^2-(11)^2=0$$
$$(r-11)(r+11)=0$$
$$(r-11)=0 \text{ or } (r+11)=0$$
$$r=11 \text{ or } r=-11$$

Check part:

$$\sqrt{2r^2-121}=r$$
$$\sqrt{2(121)-121}=11 \qquad (\text{Take } r=11)$$
$$\sqrt{242-121}=11$$
$$\sqrt{121}=11$$
$$11=11 \qquad (\text{True})$$

Check the other value.

$$\sqrt{2r^2-121}=r$$
$$\sqrt{2(121)-121}=-11 \qquad (\text{Take } r=-11)$$
$$\sqrt{242-121}=-11$$
$$\sqrt{121}=-11$$
$$11=-11 \qquad (\text{Not True})$$

Therefore solutions of given equation is $\boxed{r=11}$

Answer 46PA.

Consider the equation,

$$\sqrt{5p^2-7}=2p$$

As a first step square on both sides,

$$\sqrt{5p^2-7}=2p$$
$$\left(\sqrt{5p^2-7}\right)^2=(2p)^2$$
$$5p^2-7=4p^2$$
$$p^2-7=0$$

Factor and solve for p.

$$p^2-7=0$$
$$p^2-\left(\sqrt{7}\right)^2=0$$
$$\left(p-\sqrt{7}\right)\left(p+\sqrt{7}\right)=0$$
$$\left(p-\sqrt{7}\right)=0 \quad \text{or} \quad \left(p+\sqrt{7}\right)=0$$
$$p=\sqrt{7} \text{ or } p=-\sqrt{7}$$

Check part:

$$\sqrt{5p^2-7}=2p$$
$$\sqrt{5(7)-7}=2\sqrt{7} \qquad \left(\text{Take } p=\sqrt{7}\right)$$
$$\sqrt{35-7}=2\sqrt{7}$$
$$\sqrt{28}=2\sqrt{7}$$
$$2\sqrt{7}=2\sqrt{7} \qquad (\text{True})$$

Check the other value.

$$\sqrt{5p^2-7}=2p$$
$$\sqrt{5(7)-7}=-2\sqrt{7} \qquad \left(\text{Take } p=-\sqrt{7}\right)$$
$$\sqrt{35-7}=-2\sqrt{7}$$
$$\sqrt{28}=-2\sqrt{7}$$
$$2\sqrt{7}=-2\sqrt{7} \qquad (\text{Not True})$$

Therefore solutions of given equation is $\boxed{p=\sqrt{7}}$

Answer 47PA.

Consider the equation,

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

Take any number greater than 5.

Take $x = 8$

$$\sqrt{(8-5)^2} = 8-5$$
$$\sqrt{(3)^2} = 3$$
$$\sqrt{9} = 3$$
$$3 = 3 \qquad \text{(True)}$$

Given equation is true for $x = 5$ as well.

Take any number less than 5.

Take $x = 3$

$$\sqrt{(3-5)^2} = 3-5$$
$$\sqrt{(-2)^2} = -2$$
$$\sqrt{4} = -2$$
$$2 = -2 \qquad \text{(This is not true)}$$

The given equation is true for any number greater than or equal to 5 and not true for any number less than 5.

Therefore the given equation is sometimes true.

Answer 48PA.

Square on both sides and solve further.

$$(42)^2 = (0.1669)P$$
$$1764 = (0.1669)P$$
$$P = \frac{1764}{0.1669}$$
$$= 10569.203$$

The maximum takeoff weight of the aircraft is $\boxed{10569.203}$ Pounds

Answer 49PA.

Plug in the values and solve.

$$L = \sqrt{kP}$$
$$232 = \sqrt{(870,000)k}$$

Square on both sides and solve for k.

$$(232)^2 = (870000)k$$
$$k = \frac{(232)^2}{870000} = \frac{53824}{870000} = 0.0619$$

Therefore the value of constant of proportionality k is $\boxed{0.0619}$

Answer 50PA.

Write down the formula for area of a circle.

$A = \pi r^2$ (r, is the radius of the circle)

Solve for r in terms of A.

$$A = \pi r^2$$
$$r^2 = \frac{A}{\pi}$$
$$r = \sqrt{\frac{A}{\pi}}$$

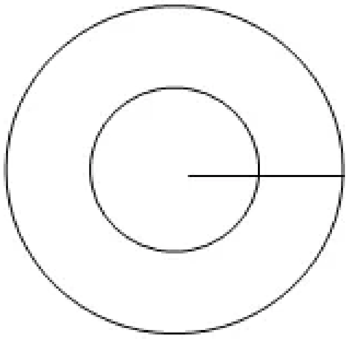
Therefore $r = \boxed{\sqrt{\frac{A}{\pi}}}$

Answer 51PA.

The area A of a circle is equal to πr^2 where r is the radius of the circle.

The area of the larger square is 96π square meters.

The objective is to find the radius of the larger circle.



The area of a circle is $A = \pi r^2$.

$\pi r^2 = A$ Rearrange

$r^2 = \frac{A}{\pi}$ Divide both sides by π

$r = \sqrt{\frac{A}{\pi}}$ Take square roots on both sides

$r = \sqrt{\frac{96\pi}{\pi}}$ Substitute $A = 96\pi$

$r = \sqrt{96}$ Simplify

$r \approx 9.8$

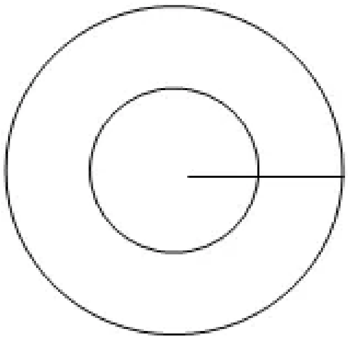
Thus the value of the radius for the larger circle is $\boxed{r = 9.8m}$.

Answer 52PA.

The area A of a circle is equal to πr^2 where r is the radius of the circle.

The area of the smaller square is 48π square meters.

The objective is to find the radius of the smaller circle.



The area of a circle is $A = \pi r^2$.

$\pi r^2 = A$ Rearrange

$r^2 = \frac{A}{\pi}$ Divide both sides by π

$r = \sqrt{\frac{A}{\pi}}$ Take square roots on both sides

$r = \sqrt{\frac{48\pi}{\pi}}$ Substitute $A = 48\pi$

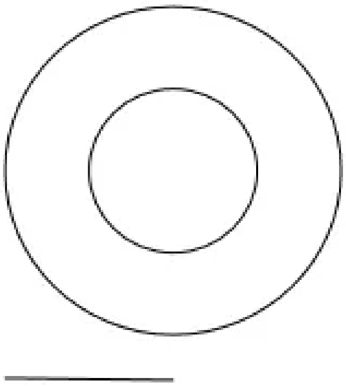
$r = \sqrt{48}$ Simplify

$r \approx 6.93$

Thus the value of the radius for the smaller circle is $\boxed{r = 6.93m}$.

Answer 53PA.

The area A of a circle is equal to πr^2 where r is the radius of the circle. The area of the smaller square is 48π square meters.



If the area of the circle is doubled, then the radius of the circle is,

The area of the circle is given by,

$$A = \pi r^2$$

Write the equation for radius r.

$$r^2 = \frac{A}{\pi}$$

$$r = \sqrt{\frac{A}{\pi}}$$

If the area of the circle is doubled,

Then, new radius is,

$$\begin{aligned} r_1 &= \sqrt{\frac{2A}{\pi}} \\ &= \sqrt{\frac{2\pi r^2}{\pi}} \\ &= \sqrt{2r^2} \\ &= \sqrt{2}r \end{aligned}$$

Thus, the change in value of r is increases by a factor of $\sqrt{2}$.

Answer 54PA.

The period of the pendulum of length l feet is given by,

$$P = 2\pi\sqrt{\frac{l}{32}}$$

Where, P is the number of seconds it takes for the pendulum to swing back and forth once.

If the pendulum completes three periods in 2 seconds, then the length of the pendulum is,

$$P = 2\pi\sqrt{\frac{l}{32}}$$

$$\sqrt{\frac{l}{32}} = \frac{P}{2\pi}$$

$$\left(\sqrt{\frac{l}{32}}\right)^2 = \left(\frac{P}{2\pi}\right)^2$$

$$\frac{l}{32} = \frac{P^2}{4\pi^2}$$

Substitute value 2 for P.

$$\frac{l}{32} = \frac{(2)^2}{4\cdot(3.14)^2}$$

$$l = \frac{4\cdot 32}{39.43}$$

$$l = 3.24$$

Thus, the length of the pendulum is $\boxed{3.24\text{ feet}}$

Answer 5PA.

Consider:

$P = 2\pi\sqrt{\frac{l}{32}}$ where l is the length of the pendulum in feet and P is the period of seconds it takes for the pendulum to swing back and forth once.

The first clock requires 1 second to complete one period.

The second clock requires 2 seconds to complete one period.

The objective is to determine how much longer one pendulum from the other.

The period of the pendulum is given as

$$P = 2\pi\sqrt{\frac{l}{32}}$$

$$\sqrt{\frac{l}{32}} = \frac{P}{2\pi} \qquad \text{Divide bothsides by } 2\pi$$

$$\left(\sqrt{\frac{l}{32}}\right)^2 = \left(\frac{P}{2\pi}\right)^2 \qquad \text{Square on both sides}$$

$$\frac{l}{32} = \frac{P^2}{4\pi^2}$$

In the first case, the clock requires 1 second for its pendulum to complete one period.

$$\frac{l_1}{32} = \frac{(1)^2}{4\pi^2} \quad \text{Substitute } P = 1$$

$$l_1 = \frac{1 \cdot 32}{4\pi^2} \quad \text{Multiply both sides by 32}$$

$$l_1 = \frac{32}{4\pi^2}$$

In the second case, the clock requires 2 seconds for its pendulum to complete one period.

$$\frac{l_2}{32} = \frac{(2)^2}{4\pi^2} \quad \text{Substitute } P = 2$$

$$l_2 = \frac{4 \cdot 32}{4\pi^2} \quad \text{Multiply both sides by 32}$$

$$l_2 = \frac{128}{4\pi^2}$$

The difference in length of the pendulum is found as

$$\begin{aligned} l_2 - l_1 &= \frac{128}{4\pi^2} - \frac{32}{4\pi^2} && \text{Sustitute } l_2, l_1 \\ &= \frac{128-32}{4\pi^2} \\ &= \frac{96}{4\pi^2} \\ &\approx 2.43 && \text{Simplify} \end{aligned}$$

Thus difference of the two pendulums is about $\boxed{2.43 \text{ feet}}$.

Answer 56PA.

Consider:

$P = 2\pi\sqrt{\frac{l}{32}}$ where l is the length of the pendulum in feet and P is the period of seconds it takes for the pendulum to swing back and forth once.

The first clock requires t seconds to complete one period.

The second clock requires $2t$ seconds to complete one period.

The objective is to determine how much longer one pendulum from the other.

The period of the pendulum is given as

$$P = 2\pi\sqrt{\frac{l}{32}}$$

$$\sqrt{\frac{l}{32}} = \frac{P}{2\pi} \quad \text{Divide bothsides by } 2\pi$$

$$\left(\sqrt{\frac{l}{32}}\right)^2 = \left(\frac{P}{2\pi}\right)^2 \quad \text{Square on both sides}$$

$$\frac{l}{32} = \frac{P^2}{4\pi^2}$$

In the first case, the clock requires t seconds for its pendulum to complete one period.

$$\frac{l_1}{32} = \frac{(t)^2}{4\pi^2} \quad \text{Substitute } P = t$$

$$l_1 = \frac{t^2 \cdot 32}{4\pi^2} \quad \text{Multiply both sides by 32}$$

$$l_1 = \frac{32t^2}{4\pi^2}$$

In the second case, the clock requires $2t$ seconds for its pendulum to complete one period.

$$\frac{l_2}{32} = \frac{(2t)^2}{4\pi^2} \quad \text{Substitute } P = 2t$$

$$l_2 = \frac{4t^2 \cdot 32}{4\pi^2} \quad \text{Multiply both sides by 32}$$

$$l_2 = \frac{128t^2}{4\pi^2}$$

The difference in length of the pendulum is found as

$$l_2 - l_1 = \frac{128t^2}{4\pi^2} - \frac{32t^2}{4\pi^2} \quad \text{Sustitute } l_2, l_1$$

$$= \frac{(128-32)t^2}{4\pi^2}$$

$$= \frac{96t^2}{4\pi^2}$$

$$\approx 2.43t^2 \quad \text{Simplify}$$

Thus difference of the two pendulums is about $\boxed{2.43t^2 \text{ feet}}$.

Answer 57PA.

The speed of the sound V near earth's surface is given by,

$$V = 20\sqrt{t+273}$$

Where, t is the surface temperature in degrees Celsius.

If, the speed of the sound V is 356 meters per second,

Then, the equation for temperature t.

$$V = 20\sqrt{t+273}$$
$$V = 20\sqrt{t+273}$$
$$\sqrt{t+273} = \frac{V}{20}$$
$$\left(\sqrt{t+273}\right)^2 = \left(\frac{V}{20}\right)^2$$
$$t+273 = \left(\frac{V}{20}\right)^2$$
$$t = \left(\frac{V}{20}\right)^2 - 273$$

Now, substitute the value 356 for V.

$$t = \left(\frac{356}{20}\right)^2 - 273$$
$$= (17.8)^2 - 273$$
$$= 316.84 - 273$$
$$= 43.84$$

Thus, the temperature at speed 356 meters per second is $\boxed{43.84 \text{ degrees Celsius}}$.

Answer 58PA.

The speed of the sound V near earth's surface is given by,

$$V = 20\sqrt{t+273}$$

Where, t is the surface temperature in degrees Celsius.

The speed of the sound at Earth's surface is given by,

$V = 340$ meters per second

Then, the equation for temperature t.

$$V = 20\sqrt{t+273}$$
$$V = 20\sqrt{t+273}$$
$$\sqrt{t+273} = \frac{V}{20}$$
$$\left(\sqrt{t+273}\right)^2 = \left(\frac{V}{20}\right)^2$$
$$t+273 = \left(\frac{V}{20}\right)^2$$
$$t = \left(\frac{V}{20}\right)^2 - 273$$

Now, substitute the value 340 for V.

$$t = \left(\frac{340}{20}\right)^2 - 273$$
$$= (17)^2 - 273$$
$$= 289 - 273$$
$$= 16$$

Thus, the accurate temperature at speed 356 meters per second is $\boxed{16 \text{ degrees Celsius}}$.

Answer 59PA.

The speed of the sound V near earth's surface is given by,

$$V = 20\sqrt{t+273}$$

Where, t is the surface temperature in degrees Celsius.

Calculate the speed of the sound when the surface temperature is below $0^0 C$.

Then, the temperature is $t = 0^0 C$.

Substitute the t value in given speed equation V.

$$V = 20\sqrt{t+273}$$
$$V = 20\sqrt{0+273}$$
$$V = 20\sqrt{273}$$
$$V = 330.45$$

Thus, the speed of sound when the surface temperature is below $0^0 C$ is $\boxed{V < 330.45 m/s}$

Answer 60PA.

The objective is to solve the equation $\sqrt{h+9}-\sqrt{h}=\sqrt{3}$.

Solve the equation $\sqrt{h+9}-\sqrt{h}=\sqrt{3}$ as follows:

$$\sqrt{h+9}-\sqrt{h}=\sqrt{3}$$

$$\left(\sqrt{h+9}-\sqrt{h}\right)^2=\left(\sqrt{3}\right)^2 \qquad \text{Square on both sides}$$

$$\left(\sqrt{h+9}\right)^2+\left(\sqrt{h}\right)^2-2.\sqrt{h+9}.\sqrt{h}=3 \qquad (a-b)^2=a^2+b^2-2ab$$

$$h+9+h-2.\sqrt{h^2+9h}=3$$

$$2h-2\sqrt{h^2+9h}=-6 \qquad \text{Simplify}$$

$$-2\sqrt{h^2+9h}=-6-2h \qquad \text{Subtract both sides by } 2h$$

$$2\sqrt{h^2+9h}=6+2h \qquad \text{Multiply both sides by } -1$$

$$\left(2\sqrt{h^2+9h}\right)^2=(6+2h)^2 \qquad \text{Square on both sides}$$

$$4h^2+36h=4h^2+24h+36$$

$$36h-24h=36 \qquad \text{Add both sides by } -4h^2-24h$$

$$12h=36 \qquad \text{Simplify}$$

$$h=3 \qquad \text{Divide both sides by } 12$$

Thus the solution is $h=3$.

Check:

Substitute $h=3$ in $\sqrt{h+9}-\sqrt{h}=\sqrt{3}$.

$$\sqrt{h+9}-\sqrt{h}=\sqrt{3} \qquad \text{Original equation}$$

$$\sqrt{3+9}-\sqrt{3}\stackrel{?}{=}\sqrt{3} \qquad \text{Substitute } h=3$$

$$\sqrt{12}-\sqrt{3}\stackrel{?}{=}\sqrt{3} \qquad \text{Simplify}$$

$$\sqrt{4\cdot 3}-\sqrt{3}\stackrel{?}{=}\sqrt{3}$$

$$2\sqrt{3}-\sqrt{3}\stackrel{?}{=}\sqrt{3}$$

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

Since $h=3$ satisfies the equation $\sqrt{h+9}-\sqrt{h}=\sqrt{3}$, $h=3$ is the solution of the equation $\sqrt{h+9}-\sqrt{h}=\sqrt{3}$.

Therefore, the solution of the equation $\sqrt{h+9}-\sqrt{h}=\sqrt{3}$ is $\boxed{h=3}$.

Answer 61PA.

To determine how the radical equations to find free fall times and include the following:

- The time it take a skydiver to fall 10,000 feet if he falls 1200 feet every 5 seconds and the time using the $t = \frac{\sqrt{h}}{4}$ and to explain why the two methods find different times.
- To describe the ways the skydiver can increase or decrease his speed

The free fall times of a skydiver can be determined by using a radical equation.

The answers also include the following:

- It would take a skydiver approximately 42 seconds to fall $10,000$ feet.

Then using the equation it would take 25 seconds.

The time is different in the two calculations because, air resistance slows down the skydiver.

- A skydiver can increase the speed of his fall by lowering air resistance.

This can be done by pulling his arms and legs close to his body.

A skydiver can decrease his speed by holding his arms and legs out, which increases the air resistance.

Answer 62PA.

Consider the following equation:

$$8+\sqrt{x+1}=2$$

Objective is to solve the equation.

$$\begin{aligned}
8+\sqrt{x+1}&=2 && \text{Original equation}\\
8+\sqrt{x+1}-8&=2-8 && \text{Substract 8 from both sides}\\
\sqrt{x+1}&=-6 && \text{Simplify}\\
\left(\sqrt{x+1}\right)^2&=(-6)^2 && \text{Square on both sides}\\
x+1&=36 && \text{Simplify}\\
x+1-1&=36-1 && \text{Substract 1 from both sides}\\
x&=35 && \text{Simplify}
\end{aligned}$$

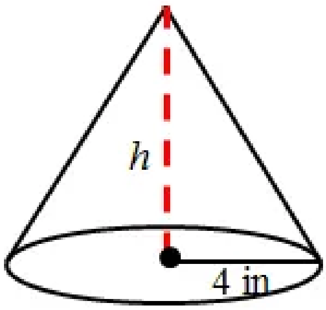
Therefore, the solution of the equation is $\boxed{x=35}$.

This solution is equal to the value of the option *E*.

So, the correct answer is $\boxed{E}$.

Answer 63PA.

Consider the following figure of a cone:



The surface area S of the above cone is $169\ \text{in}^2$, and the radius r of the cone is 4 in.

Objective is to find the height of the cone.

The formula to find the surface area S of a cone is $S = \pi r\sqrt{r^2 + h^2}$.

Here, r is the radius of the base and h is the height of the cone.

Substitute 4 for r and 169 for S in $S = \pi r\sqrt{r^2 + h^2}$:

$$169 = \pi \cdot 4\sqrt{(4)^2 + h^2}$$

$$\frac{169}{4\pi} = \sqrt{16 + h^2} \qquad \text{Divide both sides by } 4\pi$$

$$(13.45)^2 = 16 + h^2 \qquad \text{Square on both sides}$$

$$180.90 - 16 = h^2 \qquad \text{Substract 16 from both sides}$$

$$164.9 = h^2 \qquad \text{Simplify}$$

$$h = 12.84 \qquad \text{Square root on both sides}$$

Therefore, the height of the cone is 12.84 in.

Thus the correct answer is $\boxed{C}$.

Answer 64PA.

Consider the following equation:

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

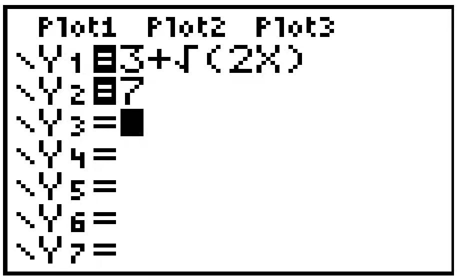
Objective is to solve the equation using the Ti-84 graphing calculator.

Step 1: First press $\boxed{Y =}$.

Next, enter the equation as $Y_1 = 3 + \sqrt{2x}$ and $Y_2 = 7$ by pressing the following keys.

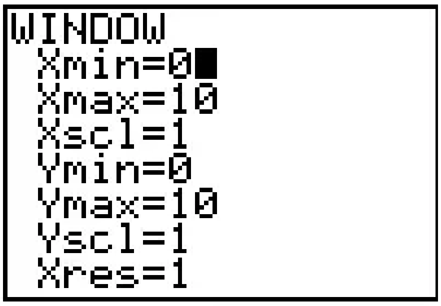
$\boxed{3}\ \boxed{+}\ \boxed{\text{2ND}}\ \boxed{\sqrt{\ }}\ \boxed{2}\ \boxed{\text{X,T},\theta,\text{n}}\ \boxed{)}$ and $\boxed{\text{ENTER}}\ \boxed{7}$.

The below output will be displayed as follows:

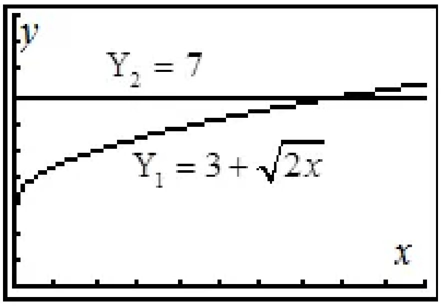


Step 2: Press WINDOW and set the window settings to get the better view of the required graph.

The output will be displayed as follows:



Step 3: Press GRAPH to get the desired graph of the equation as shown below:

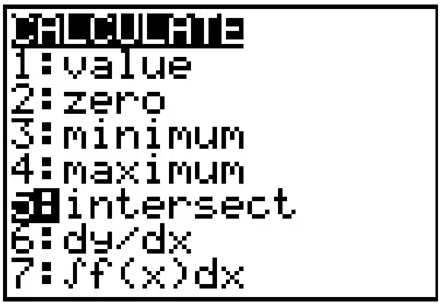


From the graph, it can be observed that the graphs of two equations intersect at one point.

Step 4: To find the intersecting point, use the CALC option.

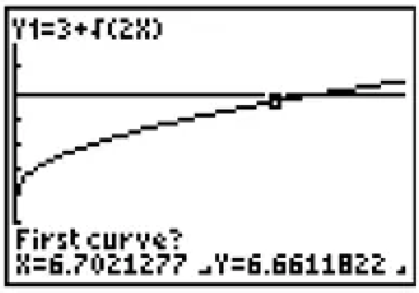
Press 2ND CALC.

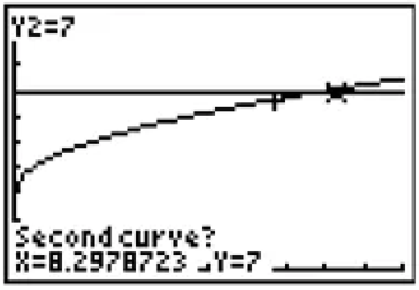
Then a CALC menu will be displayed, from this select the INTERSECT command by pressing 5. The output will be displayed as shown below:

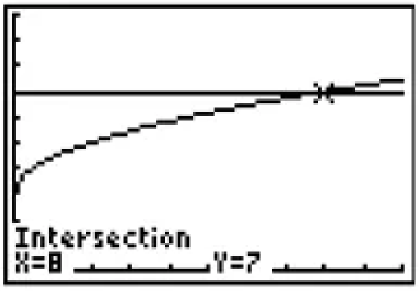


Step 5: Finally, set the boundaries near the intersecting point for the two curves and press ENTER two times.

The output will be displayed as shown below:







Therefore, the intersecting point is $(8,7)$.

Hence, the solution of the equation $3+\sqrt{2x}=7$ is $\boxed{x=8}$.

Answer 65PA.

Consider the following equation:

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

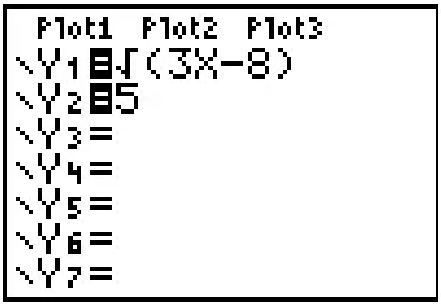
Objective is to solve the equation using the Ti-84 graphing calculator.

Step 1: First press $\boxed{\text{Y}=}$.

Next, enter the equation as $\text{Y}_1=\sqrt{3x-8}$ and $\text{Y}_2=5$ by pressing the following keys.

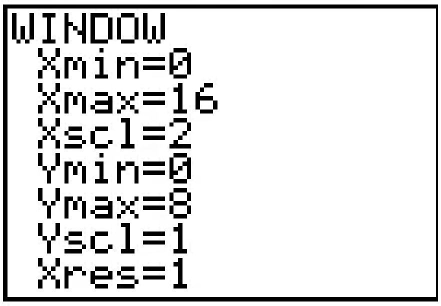
$\boxed{\text{2ND}}\ \boxed{\sqrt{\ }}\ \boxed{3}\ \boxed{\text{X,T},\theta,\text{n}}\ \boxed{-}\ \boxed{8}\ \boxed{)}$ and $\boxed{\text{ENTER}}\ \boxed{5}$.

The below output will be displayed as follows:

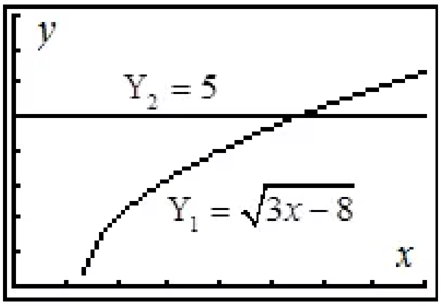


Step 2: Press WINDOW and set the window settings to get the better view of the required graph.

The output will be displayed as follows:



Step 3: Press GRAPH to get the desired graph of the equation as shown below:

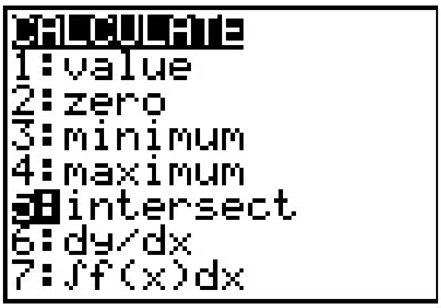


From the graph, it can be observed that the graphs of two equations intersect at one point.

Step 4: To find the intersecting point, use the CALC option.

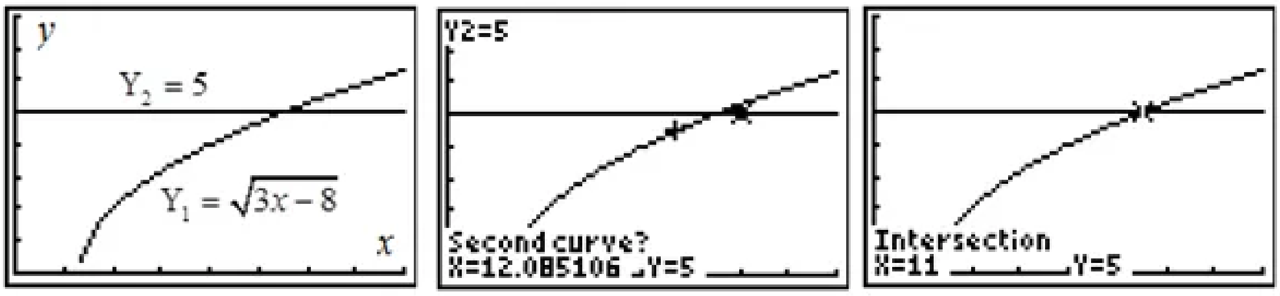
Press 2ND CALC.

Then a CALC menu will be displayed, from this select the INTERSECT command by pressing 5. The output will be displayed as shown below:



Step 5: Finally, set the boundaries near the intersecting point for the two curves and press ENTER two times.

The output will be displayed as shown below:



Therefore, the intersecting point is $(11,5)$.

Hence, the solution of the equation $\sqrt{3x-8}=5$ is $\boxed{x=11}$.

Answer 66PA.

Consider the following equation:

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

Objective is to solve the equation using the Ti-84 graphing calculator.

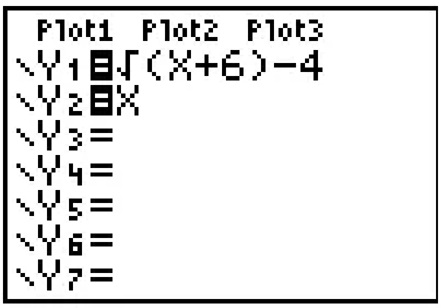
Step 1: First press $\boxed{\text{Y}=}$.

Next, enter the equation as $\text{Y}_1=\sqrt{x+6}-4$ and $\text{Y}_2=x$ by pressing the following keys.

For Y_1 : $\boxed{\text{2ND}}\ \boxed{\sqrt{\ }}\ \boxed{\text{X,T},\theta,\text{n}}\ \boxed{+}\ \boxed{6}\ \boxed{)}\ \boxed{-}\ \boxed{4}$ and

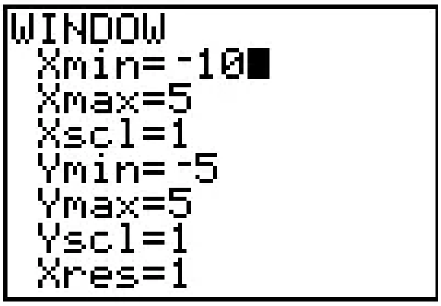
For Y_2: $\boxed{\text{ENTER}}\ \boxed{\text{X,T},\theta,\text{n}}$.

The below output will be displayed as follows:

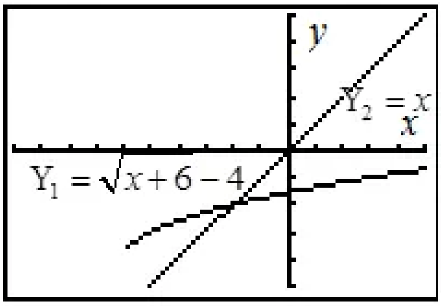


Step 2: Press WINDOW and set the window settings to get the better view of the required graph.

The output will be displayed as follows:



Step 3: Press GRAPH to get the desired graph of the equation as shown below:

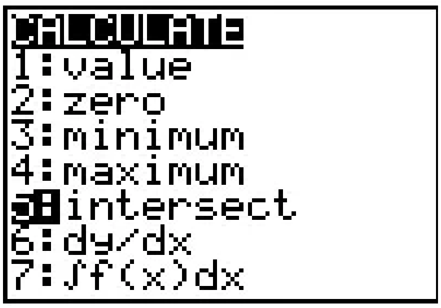


From the graph, it can be observed that the graphs of two equations intersect at one point.

Step 4: To find the intersecting point, use the CALC option.

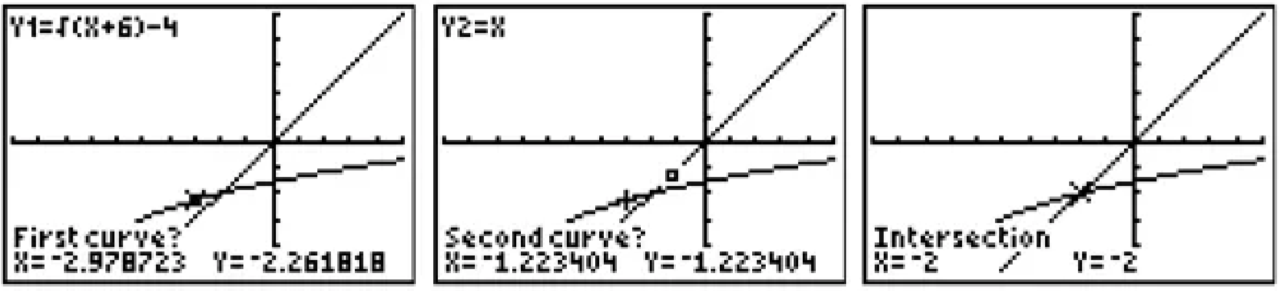
Press 2ND CALC.

Then a CALC menu will be displayed, from this select the INTERSECT command by pressing 5. The output will be displayed as shown below:



Step 5: Finally, set the boundaries near the intersecting point for the two curves and press ENTER two times.

The output will be displayed as shown below:



Therefore, the intersecting point is $(-2,-2)$.

Hence, the solution of the equation $\sqrt{x+6}-4=x$ is $\boxed{x=-2}$.

Answer 67PA.

Consider the following equation:

$$\sqrt{4x+5}=x-7.$$

Objective is to solve the equation using the Ti-84 graphing calculator.

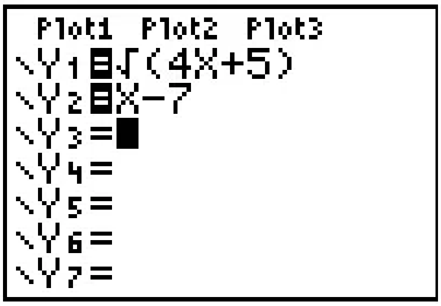
Step 1: First press $\boxed{\text{Y}=}$.

Next, enter the equation as $\text{Y}_1=\sqrt{4x+5}$ and $\text{Y}_2=x-7$ by pressing the following keys.

For Y_1 : $\boxed{\text{2ND}}\ \boxed{\sqrt{\ }}\ \boxed{4}\ \boxed{\text{X,T},\theta,\text{n}}\ \boxed{+}\ \boxed{5}\ \boxed{)}$ and

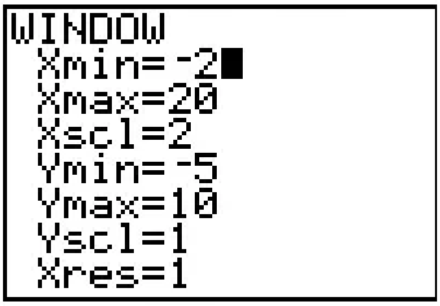
For Y_2: $\boxed{\text{ENTER}}\ \boxed{\text{X,T},\theta,\text{n}}\ \boxed{-}\ \boxed{7}$.

The below output will be displayed as follows:

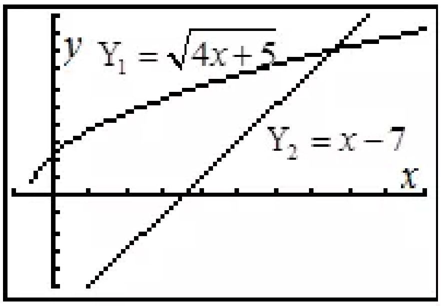


Step 2: Press WINDOW and set the window settings to get the better view of the required graph.

The output will be displayed as follows:



Step 3: Press GRAPH to get the desired graph of the equation as shown below:

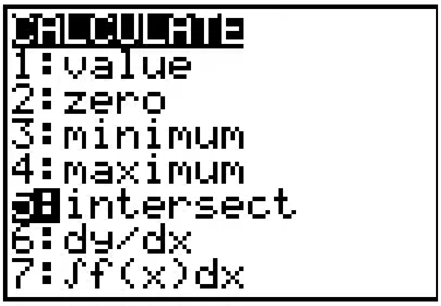


From the graph, it can be observed that the graphs of two equations intersect at one point.

Step 4: To find the intersecting point, use the CALC option.

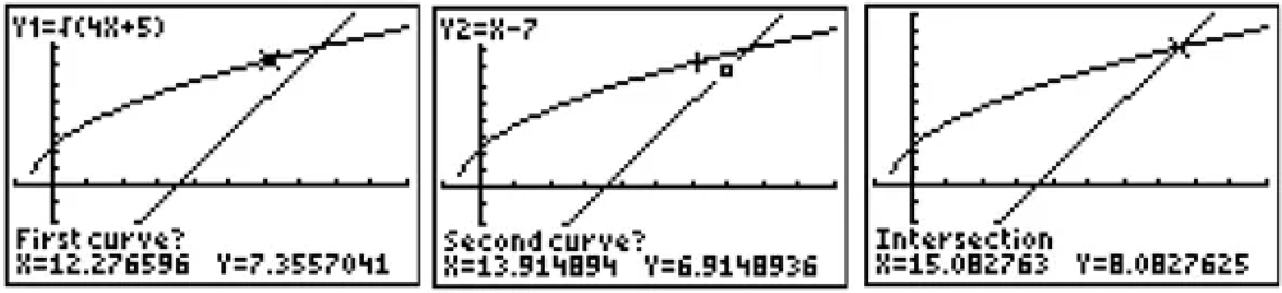
Press 2ND CALC.

Then a CALC menu will be displayed, from this select the INTERSECT command by pressing 5. The output will be displayed as shown below:



Step 5: Finally, set the boundaries near the intersecting point for the two curves and press ENTER two times.

The output will be displayed as shown below:



Therefore, the intersecting point is $(15.08, 8.08)$.

Hence, the solution of the equation $\sqrt{4x+5} = x-7$ is $\boxed{x = 15.08}$.

Answer 68PA.

Consider the following equation:

$x + \sqrt{7-x} = 4$.

Objective is to solve the equation using the Ti-84 graphing calculator.

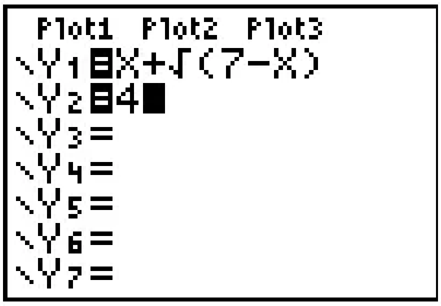
Step 1: First press $\boxed{\text{Y} =}$.

Next, enter the equation as $\text{Y}_1 = x + \sqrt{7-x}$ and $\text{Y}_2 = 4$ by pressing the following keys.

For Y_1: $\boxed{\text{X,T},\theta,\text{n}}$ $\boxed{+}$ $\boxed{\text{2ND}}$ $\boxed{\sqrt{\ }}$ $\boxed{7}$ $\boxed{-}$ $\boxed{\text{X,T},\theta,\text{n}}$ $\boxed{)}$ and

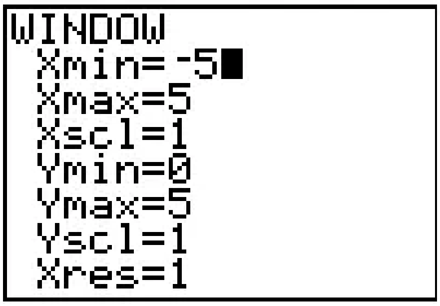
For Y_2: $\boxed{\text{ENTER}}$ $\boxed{4}$.

The below output will be displayed as follows:

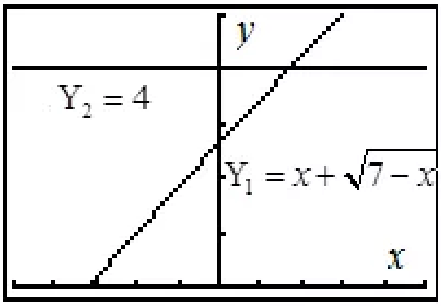


Step 2: Press WINDOW and set the window settings to get the better view of the required graph.

The output will be displayed as follows:



Step 3: Press GRAPH to get the desired graph of the equation as shown below:

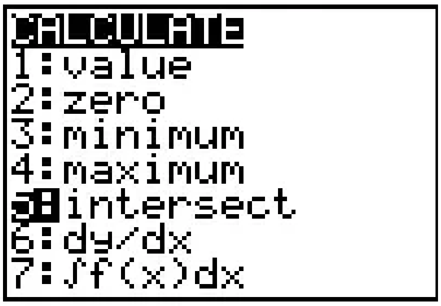


From the graph, it can be observed that the graphs of two equations intersect at one point.

Step 4: To find the intersecting point, use the CALC option.

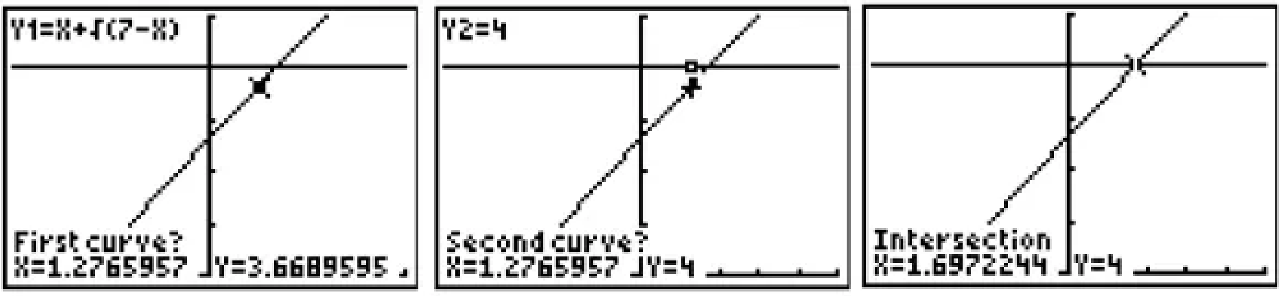
Press 2ND CALC.

Then a CALC menu will be displayed, from this select the INTERSECT command by pressing 5. The output will be displayed as shown below:



Step 5: Finally, set the boundaries near the intersecting point for the two curves and press ENTER two times.

The output will be displayed as shown below:



Therefore, the intersecting point is $(1.69, 4)$.

Hence, the solution of the equation $x+\sqrt{7-x}=4$ is $\boxed{x=1.69}$.

Answer 69PA.

Consider the following equation:

$\sqrt{3x-9}=2x+6$.

Objective is to solve the equation using the Ti-84 graphing calculator.

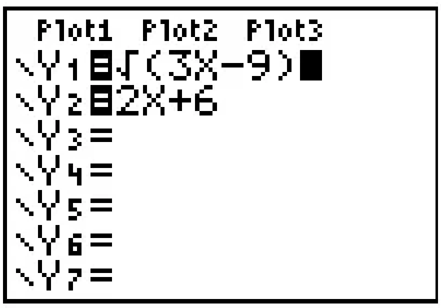
Step 1: First press $\boxed{\text{Y}=}$.

Next, enter the equation as $\text{Y}_1=\sqrt{3x-9}$ and $\text{Y}_2=2x+6$ by pressing the following keys.

For Y_1: $\boxed{\text{2ND}}\ \boxed{\sqrt{\ }}\ \boxed{3}\ \boxed{\text{X,T},\theta,\text{n}}\ \boxed{-}\ \boxed{9}\ \boxed{)}$ and

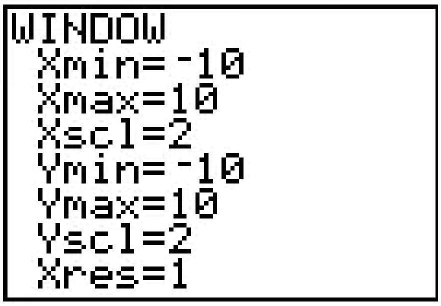
For Y_2: $\boxed{\text{ENTER}}\ \boxed{2}\ \boxed{\text{X,T},\theta,\text{n}}\ \boxed{+}\ \boxed{6}$.

The below output will be displayed as follows:

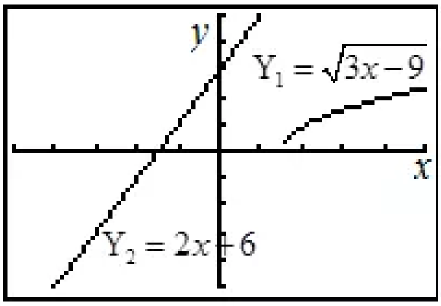


Step 2: Press $\boxed{\text{WINDOW}}$ and set the window settings to get the better view of the required graph.

The output will be displayed as follows:



Step 3: Press $\boxed{\text{GRAPH}}$ to get the desired graph of the equation as shown below:



From the graph, it can be observed that the graphs of two equations do not intersect at any point.

Step 4: if one use the CALC option to find the intersecting point, the output will be displayed as shown below:

Hence, the solution of the equation $\sqrt{3x-9}=2x+6$ is $\boxed{\{\varnothing\} \text{ or no solution}}$.

Answer 70MYS.

Consider the following expression:

$$5\sqrt{6}+12\sqrt{6}.$$

Objective is to simplify the expression.

The expression given is radical expression.

$$\begin{aligned} 5\sqrt{6}+12\sqrt{6} &= (5+12)\sqrt{6} && \text{Use the distributive property} \\ &= 17\sqrt{6} && \text{Simplify} \end{aligned}$$

Thus, the solution is $\boxed{17\sqrt{6}}$.

Answer 71MYS.

Consider the radical expression $\sqrt{12}+6\sqrt{27}$

Use radical properties and distributive property $ac+bc=(a+b)c$ to simplify the expression.

$$\begin{aligned}\sqrt{12}+6\sqrt{27} &= \sqrt{3\cdot 4}+6\sqrt{3\cdot 9}\\ &= 2\sqrt{3}+6\cdot 3\sqrt{3} && \text{Since } \sqrt{ab}=\sqrt{a}\cdot\sqrt{b}\\ &= (2+18)\sqrt{3} && \text{Use } ac+bc=(a+b)c\\ &= \boxed{20\sqrt{3}}\end{aligned}$$

Answer 72MYS.

Consider the radical expression $\sqrt{18}+5\sqrt{2}-3\sqrt{32}$

Use radical properties and distributive property to simplify the expression.

$$\begin{aligned}\sqrt{18}+5\sqrt{2}-3\sqrt{32} &= \sqrt{9\cdot 2}+5\sqrt{2}-3\sqrt{16\cdot 2}\\ &= 3\sqrt{2}+5\sqrt{2}-3\cdot 4\sqrt{2} && \text{Since } \sqrt{ab}=\sqrt{a}\cdot\sqrt{b}\\ &= (3+5-12)\sqrt{2} && \text{Use } (a+b-c)d=ad+bd-cd\\ &= \boxed{-4\sqrt{2}}\end{aligned}$$

Answer 73MYS.

Consider the radical expression $\sqrt{192}$

Factorize 192 and use radical properties to simplify the expression as follows:

$$\begin{aligned}\sqrt{192} &= \sqrt{2\cdot 2\cdot 2\cdot 2.2.2.3}\\ &= \sqrt{8^2\cdot 3}\\ &= \sqrt{8^2}\,\sqrt{3} && \text{Since } \sqrt{ab}=\sqrt{a}\cdot\sqrt{b}\\ &= \boxed{8\sqrt{3}} && \text{Since } \sqrt{a^2}=a\end{aligned}$$

Answer 74MYS.

Consider the radical expression $\sqrt{6}\cdot\sqrt{10}$

Use radical properties to simplify the expression as follows:

$$\begin{aligned}\sqrt{6}\cdot\sqrt{10} &= \sqrt{2\cdot 3}\cdot\sqrt{2\cdot 5} && \text{Write } 6=2\cdot 3 \text{ and } 10=2\cdot 5\\ &= \sqrt{2}\cdot\sqrt{3}\cdot\sqrt{2}\cdot\sqrt{5} && \text{Use } \sqrt{ab}=\sqrt{a}\cdot\sqrt{b}\\ &= \left(\sqrt{2}\right)^2\cdot\sqrt{3\cdot 5} && \text{Use } \sqrt{a}\cdot\sqrt{b}=\sqrt{ab}\\ &= \boxed{2\sqrt{15}} && \text{Use } \left(\sqrt{a}\right)^2=a\end{aligned}$$

Answer 75MYS.

Consider the radical expression $\frac{21}{\sqrt{10}+\sqrt{3}}$.

Rationalize the denominator by rationalizing the denominator.

Rationalization factor of $\sqrt{10}+\sqrt{3}$ is $\sqrt{10}-\sqrt{3}$.

Multiply and divide the expression with $\sqrt{10}-\sqrt{3}$.

$$\frac{21}{\sqrt{10}+\sqrt{3}} = \frac{21}{\sqrt{10}+\sqrt{3}} \cdot \frac{\sqrt{10}-\sqrt{3}}{\sqrt{10}-\sqrt{3}}$$

$$= \frac{21\left(\sqrt{10}-\sqrt{3}\right)}{\left(\sqrt{10}\right)^2-\left(\sqrt{3}\right)^2} \qquad \text{use } (a+b)(a-b)=a^2-b^2$$

$$= \frac{21\left(\sqrt{10}-\sqrt{3}\right)}{10-3} \qquad \text{use } \left(\sqrt{a}\right)^2 = a$$

$$= \frac{21\left(\sqrt{10}-\sqrt{3}\right)}{7}$$

$$= \boxed{3\left(\sqrt{10}-\sqrt{3}\right)}$$

Answer 76MYS.

Write the trinomial $d^2+50d+225$.

Try to write this, in the form $a^2+2ab+b^2=(a+b)^2$, which is a perfect square.

$$d^2+50d+225 = d^2+2d(25)+15^2 \neq (d+15)^2$$

Thus, the given trinomial is $\boxed{\text{not a perfect square}}$.

Answer 77MYS.

Consider the trinomial $4n^2-28n+49$.

Try to write this, in the form $a^2+2ab+b^2=(a+b)^2$, which is a perfect square.

$$4n^2-28n+49 = (2n)^2-2\cdot 2n\cdot 7+(7)^2$$

$$=(2n-7)^2$$

Thus, $4n^2-28n+49$ is a **perfect square**, $\boxed{(2n-7)^2}$.

Answer 78MYS.

Consider the trinomial $16b^2 - 56bc + 49c^2$.

Try to write this, in the form $a^2 + 2ab + b^2 = (a+b)^2$, which is a perfect square.

$$\begin{aligned} 16b^2 - 56bc + 49c^2 &= (4b)^2 - 2 \cdot 4b \cdot 7c + (7c)^2 \\ &= (4b - 7c)^2 \end{aligned}$$

Thus, $16b^2 - 56bc + 49c^2$ is a **perfect square** and is $\boxed{(4b-7c)^2}$.

Answer 79MYS.

Consider the expression $(r+3)(r-4)$.

To find the product, use Distributive property $a(b+c) = ab + ac$ and then simplify as follows:

$$\begin{aligned} (r+3)(r-4) &= r(r-4) + 3(r-4) \\ &= r^2 - 4r + 3r - 12 \qquad \text{Combine like terms} \\ &= \boxed{r^2 - r - 12} \end{aligned}$$

Answer 80MYS.

Consider the expression $(3z+7)(2z+10)$.

To find the product, use Distributive property $a(b+c) = ab + ac$ and then simplify as follows:

$$\begin{aligned} (3z+7)(2z+10) &= 3z(2z+10) + 7(2z+10) \\ &= 6z^2 + 30z + 14z + 70 \qquad \text{Combine like tems.} \\ &= \boxed{6z^2 + 44z + 70} \end{aligned}$$

Answer 81MYS.

Consider the expression:

$$(2p+5)(3p^2 - 4p + 9)$$

The steps for finding the product are as follows:

$(2p+5)(3p^2 - 4p + 9) = 2p(3p^2 - 4p + 9) + 5(3p^2 - 4p + 9)$ Using distributive property

$= 6p^3 - 8p^2 + 18p + 15p^2 - 20p + 45$ Using distributive property

$= 6p^3 + 7p^2 - 2p + 45$ Combine like terms

Thus the solution is $\boxed{6p^3 + 7p^2 - 2p + 45}$

Answer 82MYS.

The relationship between degree and Fahrenheit is

$$F=\frac{9}{5}C+32$$

To find out the temperature range 35^0C to 40^0C, put *C* values in the Fahrenheit relation.

For 35^0C

$$F_1=\frac{9}{5}C_1+32$$
$$=\frac{9}{5}\cdot 35+32$$
$$=63+32$$
$$=95F$$

For 40^0C

$$F_2=\frac{9}{5}C_2+32$$
$$=\frac{9}{5}\cdot 40+32$$
$$=72+32$$
$$=104F$$

Thus the temperature range is $\boxed{95F\text{to }104F}$

Answer 83MYS.

Consider the equation:

$$y=2x+\frac{3}{7}$$

To write equation in standard form, the steps are as shown below:

$y=2x+\frac{3}{7}$ Original equation

$y=\frac{14x+3}{7}$ Do LCM

$7y=14x+3$ Multiply each side by 7 to eliminate the fraction

$7y-7y=14x+3-7y$ Subtract $7y$ from each side

$0=14x-7y+3$ Simplify

$0-3=14x-7y+3-3$ Subtract 3 from each side

$-3=14x-7y$ Simplify

$14x-7y=-3$ Rewrite the equation

Thus the equation in standard form is $\boxed{14x-7y=-3}$

Answer 84MYS.

Consider the equation:

$$y-3=-2(x-6)$$

To write equation in standard form, the steps are as shown below:

$y-3=-2(x-6)$ Original equation

$y-3=-2x+12$ Apply Distributive property

$y-3+2x=-2x+12+2x$ Add $2x$ on each side

$y+2x-3=12$ Simplify

$y+2x-3+3=12+3$ Add 3 on each side

$2x+y=15$ Simplify

Thus the equation in standard form is $\boxed{2x+y=15}$

Answer 85MYS.

Consider the equation:

$$y+2=7.5(x-3)$$

To write equation in standard form, the steps are as shown below:

$y+2=7.5(x-3)$ Original equation

$y+2=7.5x-22.5$ Apply Distributive property

$y+2-y=7.5x-22.5-y$ Subtract y from each side

$2=7.5x-y-22.5$ Simplify

$2-2=7.5x-y-22.5-2$
$0=7.5x-y-24.5$ Subtract 2 from each side

$7.5x-y=24.5$ Simplify

$75x-10y=245$
$15x-2y=49$ Multiply with 10 on both sides

Thus the equation in standard form is $\boxed{15x-2y=49}$

Answer 86MYS.

Consider the expression:

$$\sqrt{a^2+b^2}$$

To evaluate $\sqrt{a^2+b^2}$ where $a=3,b=4$

Substitute $a=3,b=4$ in the expression $\sqrt{a^2+b^2}$.

$$\sqrt{a^2+b^2}=\sqrt{3^2+4^2}$$
$$=\sqrt{9+16}$$
$$=\sqrt{25}$$
$$=5$$

Thus the solution is $\boxed{5}$.

Answer 87MYS.

Consider the expression:

$$\sqrt{a^2+b^2}$$

To evaluate $\sqrt{a^2+b^2}$ where $a=24,b=7$

Substitute $a=24,b=7$ in the expression $\sqrt{a^2+b^2}$.

$$\sqrt{a^2+b^2}=\sqrt{24^2+7^2}$$
$$=\sqrt{576+49}$$
$$=\sqrt{625}$$
$$=25$$

Thus the solution is $\boxed{25}$

Answer 88MYS.

Consider the expression:

$$\sqrt{a^2+b^2}$$

To evaluate $\sqrt{a^2+b^2}$ where $a=1,b=1$

Substitute $a=1,b=1$ in the expression $\sqrt{a^2+b^2}$.

$$\sqrt{a^2+b^2}=\sqrt{1^2+1^2}$$
$$=\sqrt{2}$$

Thus the solution is $\boxed{\sqrt{2}}$.

Answer 89MYS.

Consider the expression:

$$\sqrt{a^2+b^2}$$

To evaluate $\sqrt{a^2+b^2}$ where $a=8, b=12$

Substitute $a=8, b=12$ in the expression $\sqrt{a^2+b^2}$.

$$\begin{aligned}\sqrt{a^2+b^2} &= \sqrt{8^2+12^2}\\ &= \sqrt{208}\\ &= 4\sqrt{13}\end{aligned}$$

Thus the solution is $\boxed{4\sqrt{13}}$.