Chapter 11. Radical Expressions and Triangles

Answer 1PT3.

The ratio of the opposite leg and the hypotenuse is called the sine ratio of the angle.

Therefore measure of the opposite leg divided by the measure of the hypotenuse is called **sine**.

Thus the correct option is: **(b)**.

The ratio of the adjacent leg and the hypotenuse is called the cosine ratio of the angle.

Therefore measure of the adjacent leg divided by the measure of the hypotenuse is called **cosine**.

Thus the correct option is: **(a)**.

The ratio of the opposite leg and the adjacent leg is called the tangent ratio of the angle.

Therefore measure of the opposite leg divided by the measure of the adjacent leg is called **tangent**.

Thus the correct option is: **(c)**.

Answer 1STP.

Consider the table:

X	-5	-2	1	4
Y	11	5	-1	-7

Observing the data it can be said that as *x* increases the value of *y* decreases. This indicates the slope of the equation is negative.

Since except equation $y = -2x + 1$ all others equations has positive slopes, therefore

The correct option is: **(D)**

Answer 1VC.

Consider the expressions:

$-3+\sqrt{7}$ and $3-\sqrt{7}$

These binomials are not conjugate to each others.

Therefore the statement is **false**.

The correct statement is:

The binomials $-3+\sqrt{7}$ and $\underline{-3-\sqrt{7}}$ are conjugates.

Answer 2STP.

It is given that the length of the rectangle is 6 feet more than the width.

Therefore the equation can be written as:

$$l = w+6$$

Again the perimeter of the rectangle is 92 feet.

Therefore

$2(l+w)=92$ or $2l+2w=92$

Thus the correct option will be: **(C)**

Answer 2VC.

The radicand of a radical expression is the number that is under the radical sign.

In the given expression $-4\sqrt{5}$, 5 is under the radical sign

Therefore the statement is **true**.

Answer 3STP.

It is given that highway resurfacing project and a bridge repair project cost $2,500,000. The cost of bridge repair is $200,000 less than twice the cost of the highway resurfacing.

Let the costs of high resurfacing and bridge repairing is *x* and *y* respectively.

Therefore a system of equation can be made as follows:

$$x+y=2500000 \qquad \text{......(1)}$$
$$y=2x-200000 \qquad \text{......(2)}$$

Now put the value of *y* in the equation (1) as follows:

$$\begin{aligned} x+2x-200000 &= 2500000 \\ 3x &= 2500000+200000 \\ &= 2700000 \\ x &= \frac{2700000}{3} \end{aligned}$$

$$x = 900000$$

Thus the cost for highway resurfacing is $900,000.

Thus the correct option will be: **(C)**

Answer 3VC.

The sine ratio of an angle is the measure of the ratio of the opposite leg and the hypotenuse.

Therefore the given statement is **true**.

Answer 4PT.

Consider the expression:

$$2\sqrt{27}+\sqrt{63}-4\sqrt{3}$$

To simplify the expression follows the steps:

$$\begin{aligned}2\sqrt{27}+\sqrt{63}-4\sqrt{3} &= 2\sqrt{9\times 3}+\sqrt{9\times 7}-4\sqrt{3}\\ &= 6\sqrt{3}+3\sqrt{7}-4\sqrt{3}\\ &= \boxed{2\sqrt{3}+3\sqrt{7}}\end{aligned}$$

Answer 4STP.

Consider the expression:

$$32{,}800{,}000$$

Now the number can be written in scientific form as follows:

$$32{,}800{,}000 = 3.2\times 10^7$$

Thus the value of n is 7.

Hence the correct option will be: **(C)**

Answer 4VC.

In a right angle triangle measure of the highest angle is 900. Therefore the longest side of the triangle will be the opposite side of the right angle which is called the hypotenuse of the right triangle.

Therefore the given statement is **true**.

Answer 5PT.

Consider the expression:

$$\sqrt{6}+\sqrt{\frac{2}{3}}$$

To simplify the expression follows the steps:

$$\begin{aligned}\sqrt{6}+\sqrt{\frac{2}{3}} &= \sqrt{6}+\frac{\sqrt{2}}{\sqrt{3}} \\ &= \frac{\sqrt{6}\sqrt{3}+\sqrt{2}}{\sqrt{3}} \\ &= \frac{\sqrt{18}+\sqrt{2}}{\sqrt{3}} \\ &= \frac{3\sqrt{2}+\sqrt{2}}{\sqrt{3}}\end{aligned}$$

$$\sqrt{6}+\sqrt{\frac{2}{3}} = \boxed{\frac{4\sqrt{2}}{3}}$$

Answer 5STP.

Consider the equation:

$$x^2+7x-18=0$$

To solve the equation for *x* follows the steps:

$$\begin{aligned}x^2+7x-18&=0 \\ x^2+9x-2x-18&=0 \\ x(x+9)-2(x+9)&=0 \\ (x+9)(x-2)&=0\end{aligned}$$

$$x=2,-9$$

Hence the correct option will be: **(A)**

Answer 5VC.

Consider the equation:

$$\sqrt{3x+19}=x+3$$

Now square both sides of the equation

$$\begin{aligned}\left(\sqrt{3x+19}\right)^2 &= (x+3)^2 \\ 3x+19 &= x^2+6x+9\end{aligned}$$

Therefore the given statement is **false**.

The correct statement will be:

After the first step in solving $\sqrt{3x+19}=x+3$, you would have $\boxed{3x+19=x^2+6x+9}$

Answer 6PT.

Consider the expression:

$$\sqrt{112x^4y^6}$$

To simplify the expression follows the steps:

$$\begin{aligned}\sqrt{112x^4y^6} &= \sqrt{16x^4y^6}\sqrt{7}\\ &= \sqrt{\left(4x^2y^3\right)^2}\sqrt{7}\\ &= \boxed{4x^2y^3\sqrt{7}} \qquad \text{Simplify}\end{aligned}$$

Answer 6STP.

Consider the function:

$$g = t^2 - t$$

It is given that the total numbers of games played by Metro League is 132. To find the numbers of participate team replace *g* by 132 as follows:

$$\begin{aligned}132 &= t^2 - t\\ t^2 - t - 132 &= 0\\ t^2 - 12t + 11t - 132 &= 0\\ t(t-12) + 11(t-12) &= 0\\ (t-12)(t+11) &= 0\\ t &= 12, -11\end{aligned}$$

Since *t* can't be negative, therefore omit $t = -11$.

Hence the correct option will be: **(B)**

Answer 6VC.

The right angle triangle is a triangle that has an angle of measure 90^0. The two sides that make the right angle are called the legs of the triangle.

Therefore the given statement is **true**.

Answer 7PT.

Consider the expression:

$$\sqrt{\frac{10}{3}} \cdot \sqrt{\frac{4}{30}}$$

To simplify the expression follows the steps:

$$\begin{aligned}\sqrt{\frac{10}{3}} \cdot \sqrt{\frac{4}{30}} &= \frac{\cancel{\sqrt{10}}}{\sqrt{3}} \cdot \frac{2}{\cancel{\sqrt{10}}\sqrt{3}}\\ &= \frac{2}{\sqrt{3}\sqrt{3}}\\ &= \boxed{\frac{2}{3}} \qquad \text{Simplify}\end{aligned}$$

Answer 7STP.

It is given that one leg of the right triangle is 4 inches longer than the other one. The measure of the hypotenuse is 20 inches.

Let the measure of the shorter leg is *x* inch and the measure of the other shorter leg is $x+4$ inch.

Use Pythagoras theorem as follows:

$$\begin{aligned} x^2+(x+4)^2 &= 20^2 \\ x^2+x^2+8x+16 &= 400 \\ 2x^2+8x+16-400 &= 0 \\ 2x^2+8x-384 &= 0 \\ x^2+4x-192 &= 0 \\ x^2+16x-12x-192 &= 0 \\ x(x+16)-12(x+16) &= 0 \\ (x+16)(x-12) &= 0 \end{aligned}$$

$$x=12,-16$$

Since distance can't be negative, therefore omit $x=-16$.

Hence the correct option will be: **(B)**

Answer 7VC.

Consider the radical expression:

$$\frac{2x\sqrt{3x}}{\sqrt{6y}}$$

The expression is in simplified form. Therefore it can't be simplified further.

Therefore the given statement is **true**.

Answer 8PT.

Consider the expression:

$$\sqrt{6}\left(4+\sqrt{12}\right)$$

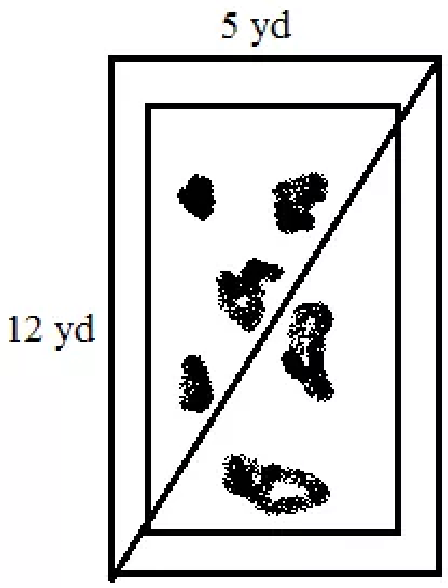
To simplify the expression follows the steps:

$$\begin{aligned} \sqrt{6}\left(4+\sqrt{12}\right) &= \sqrt{6}\cdot 4+\sqrt{6}\cdot\sqrt{12} \\ &= 4\sqrt{6}+\sqrt{6}\cdot\sqrt{4}\cdot\sqrt{3} \quad \text{Since } \sqrt{ab}=\sqrt{a}\sqrt{b} \\ &= 4\sqrt{6}+2\sqrt{18} \\ &= 4\sqrt{6}+2\sqrt{9\times 2} \end{aligned}$$

$$\sqrt{6}\left(4+\sqrt{12}\right)=\boxed{4\sqrt{6}+6\sqrt{2}}$$

Answer 8STP.

Consider the figure:



To find the distance between one corner of the garden to the opposite corner follows the steps:

Let *d* is the distance of the corner.

Use Pythagoras theorem for the right triangle as follows:

$$\begin{aligned} d^2 &= 12^2 + 5^2 \\ &= 144 + 25 \\ &= 169 \\ d &= \sqrt{169} \\ d &= 13 \end{aligned}$$

Hence the correct option will be: **(A)**

Answer 8VC.

The given measurements are:

25, 20 and 15

Now

$$25^2 = 625$$

And

$$\begin{aligned} 20^2 + 15^2 &= 400 + 225 \\ &= 625 \end{aligned}$$

Therefore

$$25^2 = 20^2 + 15^2$$

Thus 25,20 and 15 are the sides of a right triangle.

Hence the given statement is **true**.

Answer 9E.

Consider the expression:

$$\sqrt{\frac{60}{y^2}}$$

To simplify the expression follows the steps:

$$\sqrt{\frac{60}{y^2}} = \frac{\sqrt{60}}{\sqrt{y^2}} \qquad \text{Since } \sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

$$= \frac{\sqrt{4 \times 15}}{y}$$

$$= \frac{\sqrt{4}\sqrt{15}}{y}$$

$$= \boxed{\frac{2\sqrt{15}}{y}} \qquad \text{Simplify}$$

Answer 9PT.

Consider the expression:

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

To simplify the expression follows the steps:

$$\left(1-\sqrt{3}\right)\left(3+\sqrt{2}\right) = 1\left(3+\sqrt{2}\right) - \sqrt{3}\left(3+\sqrt{2}\right)$$

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

$$= \boxed{3+\sqrt{2}-3\sqrt{3}-\sqrt{6}}$$

Answer 9STP.

It is given that points in the coordinates plane are equidistant from the *x* and *y* axis.

The distance of the point from the origin is 5 units.

Let the coordinate of the point is: (x, y).

Therefore use distance formula as follows:

$$x^2 + y^2 = 5^2$$

And

$$|x| = |y|$$

Since $x^2 = |x|^2$, therefore

$$\begin{aligned} x^2 + x^2 &= 5^2 \\ 2x^2 &= 25 \\ x^2 &= \frac{25}{2} \\ x &= \pm\frac{5}{\sqrt{2}} \end{aligned}$$

Therefore $y = \pm\frac{5}{\sqrt{2}}$. Hence the points are

$$\left(\frac{5}{\sqrt{2}}, \frac{5}{\sqrt{2}}\right), \left(\frac{5}{\sqrt{2}}, -\frac{5}{\sqrt{2}}\right), \left(-\frac{5}{\sqrt{2}}, \frac{5}{\sqrt{2}}\right), \left(-\frac{5}{\sqrt{2}}, -\frac{5}{\sqrt{2}}\right)$$

Hence the correct option will be: **(D)**

Answer 10E.

Consider the expression:

$$\sqrt{44a^2b^2}$$

To simplify the expression follows the steps:

$$\begin{aligned} \sqrt{44a^2b^2} &= \sqrt{4a^2b^2}\sqrt{11} && \text{Since } \sqrt{ab} = \sqrt{a}\sqrt{b} \\ &= \sqrt{(2ab)^2}\sqrt{11} \\ &= \boxed{2ab\sqrt{11}} && \text{Simplify} \end{aligned}$$

Answer 10PT.

Consider the equation:

$$\sqrt{10x} = 20$$

To find the value of *x* follows the steps:

$$\sqrt{10x} = 20$$
$$\left(\sqrt{10x}\right)^2 = 20^2$$
$$10x = 400$$
$$x = \frac{400}{10} \qquad \text{Divide both sides by 10}$$
$$x = 40$$

Now check the solutions as follows:

$$\sqrt{10(40)} \stackrel{?}{=} 20$$
$$\sqrt{400} \stackrel{?}{=} 20$$
$$20 = 20$$

Thus the solution is: $\boxed{x = 20}$.

Answer 10STP.

Consider the line:

$$\frac{1}{2}y + \frac{3}{2}x + 4 = 0$$

To find the slope of the parallel lines follows the steps:

Write the equation in the slope intercept form as follows:

$$\frac{1}{2}y + \frac{3}{2}x + 4 = 0$$
$$\frac{1}{2}y = -\frac{1}{2}x - 4$$
$$y = -x - 8 \qquad \text{Multiply both sides by 2}$$

The slope of the line is -1. Therefore the slope of the line that is parallel to the given line is $\boxed{-1}$.

Answer 11E.

Consider the expression:

$$\left(3 - 2\sqrt{12}\right)^2$$

To simplify the expression follows the steps:

$$\left(3 - 2\sqrt{12}\right)^2 = 3^2 - 2\times 3\times\left(2\sqrt{12}\right) + \left(2\sqrt{12}\right)^2 \quad \text{Use } (a+b)^2 = a^2 + 2ab + b^2$$
$$= 9 - 12\sqrt{12} + 4\times 12$$
$$= 9 - 12\times 2\sqrt{3} + 48$$
$$= \boxed{57 - 24\sqrt{3}} \qquad \text{Simplify}$$

Answer 11PT.

Consider the equation:

$$\sqrt{4s}+1=11$$

To find the value of *x* follows the steps:

$$\sqrt{4s}+1=11$$
$$\left(\sqrt{4s}\right)^2=10^2$$
$$4s=100$$
$$s=\frac{100}{4} \qquad \text{Divide both sides by 4}$$
$$s=25$$

Now check the solutions as follows:

$$\sqrt{4(25)}+1 \stackrel{?}{=} 11$$
$$\sqrt{100}+1 \stackrel{?}{=} 11$$
$$11=11$$

Thus the solution is: $\boxed{s=25}$.

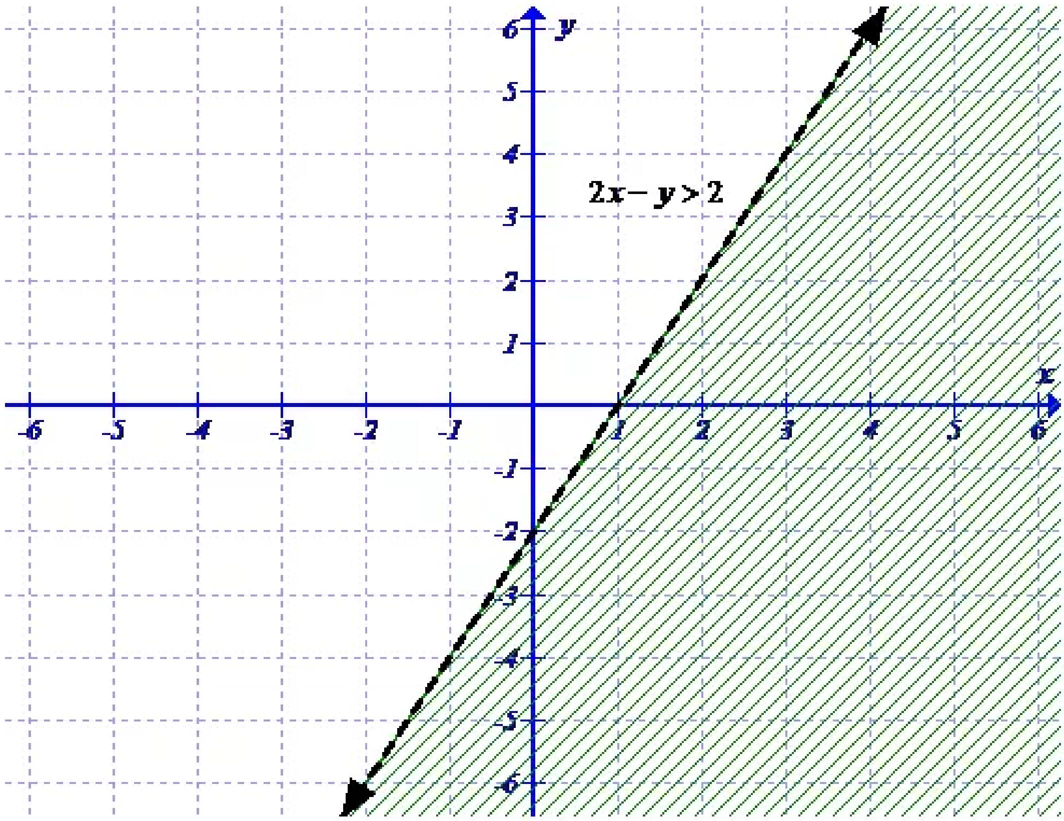
Answer 11STP.

Consider the inequalities:

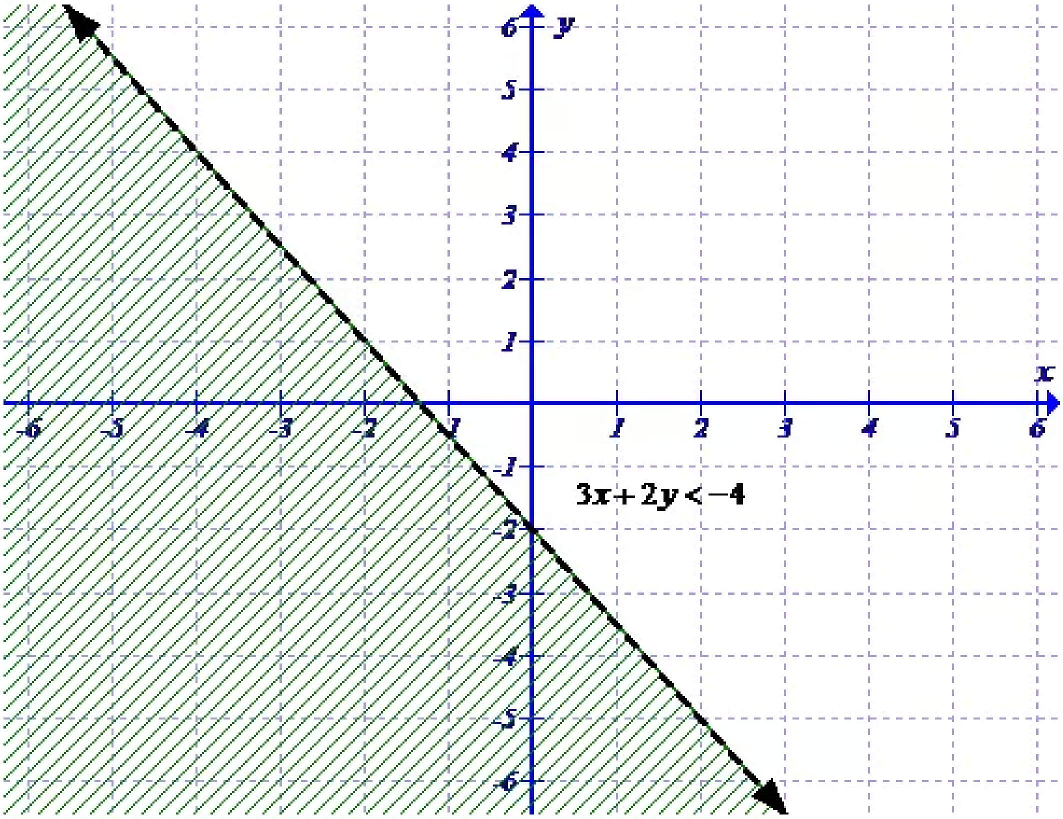
$$2x-y>2$$
$$3x+2y<-4$$

To graph the solution set of the inequalities follows the steps:

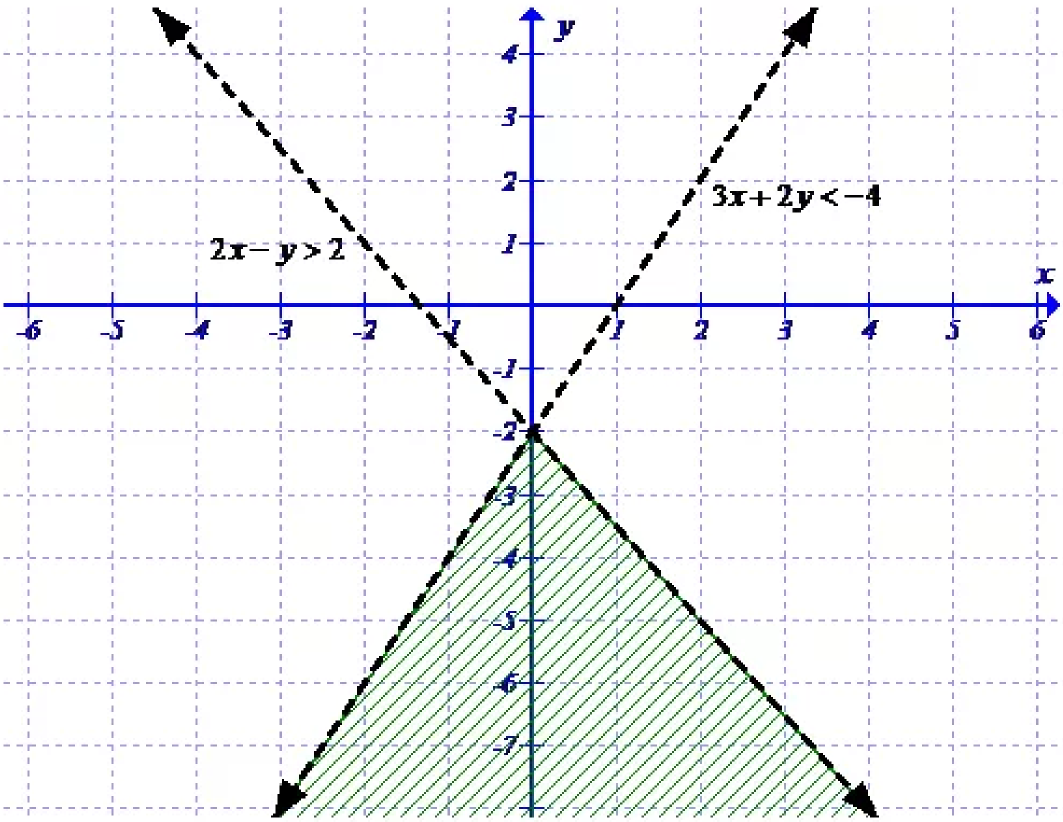
First graph the inequality $2x-y>2$ as follows:



Now graph the inequality $3x + 2y < -4$ as follows:



Thus the solution set for the inequalities can be drawn as follows:



Answer 12E.

Consider the expression:

$$\frac{9}{3+\sqrt{2}}$$

To simplify the expression follows the steps:

$$\frac{9}{3+\sqrt{2}}=\frac{9\left(3-\sqrt{2}\right)}{\left(3+\sqrt{2}\right)\left(3-\sqrt{2}\right)} \qquad \begin{bmatrix}\text{Multiply both numerator and} \\ \text{denominator by } 3-\sqrt{2}\end{bmatrix}$$

$$=\frac{9\left(3-\sqrt{2}\right)}{3^2-\left(\sqrt{2}\right)^2}$$

$$=\boxed{\frac{27-9\sqrt{2}}{7}} \qquad \text{Simplify}$$

Answer 12PT.

Consider the equation:

$$\sqrt{4x+1}=5$$

To find the value of *x* follows the steps:

$$\sqrt{4x+1}=5$$

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

$$4x+1=25$$

$$4x=24$$

$$x=\frac{24}{4} \qquad \text{Divide both sides by 4}$$

$$=6$$

Now check the solutions as follows:

$$\sqrt{4(6)+1} \stackrel{?}{=} 5$$

$$\sqrt{25} \stackrel{?}{=} 5$$

$$5=5 \qquad \text{true}$$

Thus the solution is: $\boxed{x=6}$.

Answer 12STP.

It is given that the sum of the two numbers is 66 and second number is 18 more than the half of the first.

Let the two numbers are x and y.

Therefore

$$x + y = 66 \qquad ......(1)$$

$$y = \frac{x}{2} + 18 \qquad ......(2)$$

Now replace $y = \frac{x}{2} + 18$ in the equation (1) as follows:

$$x + \frac{x}{2} + 18 = 66$$
$$\frac{3x}{2} = 66 - 18$$
$$\frac{3x}{2} = 48$$
$$3x = 96$$
$$x = \frac{96}{3}$$
$$x = 24$$

The second integer is: $y = \frac{24}{2} + 18$ or $y = 30$.

Therefore the two numbers are $\boxed{24 \text{ and } 30}$.

Answer 13E.

Consider the expression:

$$\frac{2\sqrt{7}}{3\sqrt{5} + 5\sqrt{3}}$$

To simplify the expression follows the steps:

$$\frac{2\sqrt{7}}{3\sqrt{5} + 5\sqrt{3}} = \frac{2\sqrt{7}\left(3\sqrt{5} - 5\sqrt{3}\right)}{\left(3\sqrt{5} + 5\sqrt{3}\right)\left(3\sqrt{5} - 5\sqrt{3}\right)} \qquad \left[\begin{array}{l}\text{Multiply both numerator and} \\ \text{denominator by } 3\sqrt{5} - 5\sqrt{3}\end{array}\right]$$

$$= \frac{2\sqrt{7}\left(3\sqrt{5} - 5\sqrt{3}\right)}{\left(3\sqrt{5}\right)^2 - \left(5\sqrt{3}\right)^2}$$

$$= \frac{2\sqrt{7}\left(3\sqrt{5} - 5\sqrt{3}\right)}{9(5) - 25(3)}$$

$$= \frac{10\sqrt{7}\sqrt{3} - 6\sqrt{7}\sqrt{5}}{30}$$

$$= \boxed{\frac{5\sqrt{35} - 3\sqrt{21}}{15}} \qquad \text{Simplify}$$

Answer 13PT.

Consider the equation:

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

To find the value of *x* follows the steps:

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

Now check the solutions as follows:

Check for $x=-2$

$$-2 \stackrel{?}{=} \sqrt{-6(-2)-8}$$
$$-2 \stackrel{?}{=} \sqrt{4}$$
$$-2=2 \qquad \text{false}$$

Check for $x=-5$

$$-4 \stackrel{?}{=} \sqrt{-6(-4)-8}$$
$$-4 \stackrel{?}{=} \sqrt{16}$$
$$-4=4 \qquad \text{false}$$

Thus the equation has **no solution**.

Answer 13STP.

Consider the function:

$$h(t)=-16t^2+v_0t+h_0$$

Now it is given that $h_0=100$ and $v_0=60$. Therefore replacing these values in the given function as follows:

$$h(t)=-16t^2+60t+100$$
$$0=-16t^2+60t+100 \quad \text{In the ground } h(t)=0$$
$$0=-4t^2+15t+25$$
$$0=-4t^2+20t-5t+25$$
$$0=-4t(t-5)-5(t-5)$$
$$0=(t-5)(-4t-5)$$
$$t=5,-\frac{5}{4}$$

Since time can't be negative, therefore after $\boxed{\text{5 second}}$ the ball will reach the ground.

Answer 14E.

Consider the expression:

$$\frac{\sqrt{3a^3b^4}}{\sqrt{8ab^{10}}}$$

To simplify the expression follows the steps:

$$\begin{aligned}\frac{\sqrt{3a^3b^4}}{\sqrt{8ab^{10}}} &= \frac{\sqrt{a^2b^4}\sqrt{3a}}{\sqrt{4b^{10}}\sqrt{2a}} && \left[\begin{array}{l}\text{Multiply both numerator and}\\ \text{denominator by } 3\sqrt{5}-5\sqrt{3}\end{array}\right]\\ &= \frac{ab^2\sqrt{3a}}{2b^5\sqrt{2a}}\\ &= \boxed{\frac{a\sqrt{3a}}{2b^3\sqrt{2a}}} && \text{Simplify}\end{aligned}$$

Answer 14PT.

Consider the equation:

$$x=\sqrt{5x+14}$$

To find the value of *x* follows the steps:

$$\begin{aligned}x &= \sqrt{5x+14}\\ x^2 &= \left(\sqrt{5x+14}\right)^2\\ x^2 &= 5x+14\\ x^2-5x-14 &= 0\\ (x-7)(x+2) &= 0\\ x &= -2,7\end{aligned}$$

Now check the solutions as follows:

Check for $x=-2$

$$\begin{aligned}-2 &\overset{?}{=} \sqrt{5(-2)+14}\\ -2 &\overset{?}{=} \sqrt{4}\\ -2 &= 2 && \text{false}\end{aligned}$$

Check for $x=7$

$$\begin{aligned}7 &\overset{?}{=} \sqrt{5(7)+14}\\ 7 &\overset{?}{=} \sqrt{49}\\ 7 &= 7 && \text{true}\end{aligned}$$

Thus the solution is: $\boxed{x=7}$.

Answer 14STP.

Consider the equation:

$$x^2 - 8x + 6 = 0$$

To solve the equation for *x* follows the steps:

$$\begin{aligned} x^2 - 8x + 6 &= 0 \\ x &= \frac{8 \pm \sqrt{(-8)^2 - 4 \cdot 1 \cdot 6}}{2 \cdot 1} \\ &= \frac{8 \pm \sqrt{40}}{2} \\ &= \frac{8 \pm 2\sqrt{10}}{2} \\ &= 4 \pm \sqrt{10} \\ &= 4 \pm 3.16 \\ x &= \boxed{7.16, 0.84} \end{aligned}$$

Answer 15E.

Consider the expression:

$$2\sqrt{3} + 8\sqrt{5} - 3\sqrt{5} + 3\sqrt{3}$$

To simplify the expression follows the steps:

$$\begin{aligned} 2\sqrt{3} + 8\sqrt{5} - 3\sqrt{5} + 3\sqrt{3} &= \left(2\sqrt{3} + 3\sqrt{3}\right) + \left(8\sqrt{5} - 3\sqrt{5}\right) \\ &= \boxed{5\sqrt{3} + 5\sqrt{5}} \quad \text{Adding the like terms} \end{aligned}$$

Answer 15PT.

Consider the equation:

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

To find the value of *x* follows the steps:

$$\begin{aligned} \sqrt{4x - 3} &= 6 - x \\ \left(\sqrt{4x - 3}\right)^2 &= (6 - x)^2 \\ 4x - 3 &= 36 - 12x + x^2 \\ x^2 - 12x + 36 - 4x + 3 &= 0 \\ x^2 - 16x + 39 &= 0 \\ (x - 13)(x - 3) &= 0 \\ x &= 3, 13 \end{aligned}$$

Now check the solutions as follows:

Check for $x = 3$

$$\sqrt{4(3)-3} \overset{?}{=} 6-3$$
$$\sqrt{9} \overset{?}{=} 3$$
$$3 = 3 \qquad \text{true}$$

Check for $x = 13$

$$\sqrt{4(13)-3} \overset{?}{=} 6-13$$
$$\sqrt{49} \overset{?}{=} -7$$
$$7 = -7 \qquad \text{false}$$

Thus the solution is: $\boxed{x = 3}$.

Answer 15STP.

Consider the expression:

$$\sqrt[3]{3\sqrt{81}}$$

To simplify the expression follows the steps:

$$\begin{aligned}\sqrt[3]{3\sqrt{81}} &= \left(3\sqrt{81}\right)^{\frac{1}{3}}\\ &= \left(3\sqrt{9^2}\right)^{\frac{1}{3}}\\ &= (3\times 9)^{\frac{1}{3}}\\ &= \left(3^3\right)^{\frac{1}{3}}\end{aligned}$$

$$\sqrt[3]{3\sqrt{81}} = \boxed{3}$$

Answer 16E.

Consider the expression:

$$2\sqrt{6}-\sqrt{48}$$

To simplify the expression follows the steps:

$$\begin{aligned}2\sqrt{6}-\sqrt{48} &= 2\sqrt{6}-\sqrt{16\times 3}\\ &= \boxed{2\sqrt{6}-4\sqrt{3}} \qquad \text{Simplify}\end{aligned}$$

Answer 16PT.

It is given that *c* is the measure of the hypotenuse of a right triangle while *a* and *b* are the legs of the triangle.

The Pythagoras theorem for right triangle is given as:

$$c^2 = a^2 + b^2$$

Here $a = 8, b = 10, c = ?$.

Thus use Pythagoras theorem to find the missing value as follows:

$$\begin{aligned} c^2 &= a^2 + b^2 \\ c^2 &= 8^2 + 10^2 \\ c^2 &= 64 + 100 \\ &= 164 \\ c &= \sqrt{164} \\ c &= \boxed{12.81} \end{aligned}$$

Answer 16STP.

Consider the expression:

$$\left(x^{\frac{3}{2}}\right)^{\frac{4}{3}}\left(\frac{\sqrt{x}}{x}\right)$$

To simplify the expression follows the steps:

$$\begin{aligned} \left(x^{\frac{3}{2}}\right)^{\frac{4}{3}}\left(\frac{\sqrt{x}}{x}\right) &= x^{\frac{3}{2}\times\frac{4}{3}}\left(\frac{\sqrt{x}}{x}\right) \\ &= x^2\left(\frac{\sqrt{x}}{x}\right) \\ &= x\left(\sqrt{x}\right) \\ &= x\left(x\right)^{\frac{1}{2}} \end{aligned}$$

$$\left(x^{\frac{3}{2}}\right)^{\frac{4}{3}}\left(\frac{\sqrt{x}}{x}\right) = \boxed{x^{\frac{3}{2}}}$$

Answer 17E.

Consider the expression:

$$4\sqrt{27}+6\sqrt{48}$$

To simplify the expression follows the steps:

$$\begin{aligned}4\sqrt{27}+6\sqrt{48} &= 4\sqrt{9\times3}+6\sqrt{16\times3}\\ &= 4\times3\sqrt{3}+6\times4\sqrt{3}\\ &= 12\sqrt{3}+24\sqrt{3}\\ &= \boxed{36\sqrt{3}} \qquad \text{Simplify}\end{aligned}$$

Answer 17PT.

It is given that c is the measure of the hypotenuse of a right triangle while a and b are the legs of the triangle.

The Pythagoras theorem for right triangle is given as:

$$c^2=a^2+b^2$$

Here $a=6\sqrt{2}, c=12, b=?$.

Thus use Pythagoras theorem to find the missing value as follows:

$$\begin{aligned}c^2 &= a^2+b^2\\ b^2 &= c^2-a^2\\ b^2 &= 12^2-\left(6\sqrt{2}\right)^2\\ &= 144-72\\ b &= \sqrt{72}\\ b &= \boxed{8.49}\end{aligned}$$

Answer 17STP.

It is given that the area of the rectangle is 64 and the length and breadth are $\frac{x^3}{x+1}$ and $\frac{x+1}{x}$.

Therefore

$$\begin{aligned}\frac{x^3}{x+1}\times\frac{x+1}{x} &= 64\\ x^2 &= 64\\ x &= \pm 8\end{aligned}$$

Since distance can't be negative, therefore $x=-8$ can be omits. Hence the value is $\boxed{x=8}$

Answer 18E.

Consider the expression:

$$4\sqrt{7k}-7\sqrt{7k}+2\sqrt{7k}$$

To simplify the expression follows the steps:

$$\begin{aligned} 4\sqrt{7k}-7\sqrt{7k}+2\sqrt{7k} &= \left(4\sqrt{7k}-7\sqrt{7k}\right)+2\sqrt{7k} \\ &= -3\sqrt{7k}+2\sqrt{7k} \\ &= \boxed{-\sqrt{7k}} \qquad \text{Simplify} \end{aligned}$$

Answer 18PT.

It is given that *c* is the measure of the hypotenuse of a right triangle while *a* and *b* are the legs of the triangle.

The Pythagoras theorem for right triangle is given as:

$$c^2=a^2+b^2$$

Here $b=13, c=17, a=?$.

Thus use Pythagoras theorem to find the missing value as follows:

$$\begin{aligned} c^2 &= a^2+b^2 \\ a^2 &= c^2-b^2 \\ a^2 &= 17^2-13^2 \\ &= 289-169 \\ a &= \sqrt{120} \\ a &= \boxed{10.95} \end{aligned}$$

Answer 18STP.

It is given that the rectangle is $5\sqrt{7}+\sqrt{3}$ centimeter long and $7\sqrt{7}-2\sqrt{3}$ centimeter wide.

The perimeter of the rectangle will be:

$$\begin{aligned} P &= 2\left[5\sqrt{7}+\sqrt{3}+7\sqrt{7}-2\sqrt{3}\right] \text{ cm} \\ &= 2\left[12\sqrt{7}-\sqrt{3}\right] \text{ cm} \\ &= \boxed{24\sqrt{7}-2\sqrt{3}\text{ cm}} \end{aligned}$$

The area of the rectangle will be:

$$\begin{aligned} P &= \left(5\sqrt{7}+\sqrt{3}\right)\left(7\sqrt{7}-2\sqrt{3}\right)\text{cm}^2 \\ &= 35\times 7-10\sqrt{21}+7\sqrt{21}-2\times 3 \text{ cm}^2 \\ &= \boxed{239-3\sqrt{21} \text{ cm}^2} \end{aligned}$$

Answer 19E.

Consider the expression:

$$5\sqrt{18}-3\sqrt{112}-3\sqrt{98}$$

To simplify the expression follows the steps:

$$\begin{aligned}5\sqrt{18}-3\sqrt{112}-3\sqrt{98} &= 5\sqrt{9\times 2}-3\sqrt{16\times 7}-3\sqrt{49\times 2}\\ &= 5(3)\sqrt{2}-3(4)\sqrt{7}-3(7)\sqrt{2}\\ &= 15\sqrt{2}-12\sqrt{7}-21\sqrt{2}\\ &= \boxed{-6\sqrt{2}-12\sqrt{7}} \qquad \text{Simplify}\end{aligned}$$

Answer 19PT.

Consider the two points:

$$(4,7),(4,-2)$$

Therefore the distance between the two points will be:

$$\begin{aligned}d &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}\\ &= \sqrt{(4-4)^2+(-2-7)^2}\\ &= \sqrt{0^2+(-9)^2}\\ &= \sqrt{81}\\ d &= \boxed{9.00} \qquad \text{Rounding to the nearest hundredth}\end{aligned}$$

Answer 20E.

Consider the expression:

$$\sqrt{8}+\sqrt{\frac{1}{8}}$$

To simplify the expression follows the steps:

$$\begin{aligned}\sqrt{8}+\sqrt{\frac{1}{8}} &= \sqrt{4\times 2}+\frac{1}{\sqrt{4\times 2}}\\ &= 2\sqrt{2}+\frac{1}{2\sqrt{2}}\\ &= \frac{8+1}{2\sqrt{2}} \qquad \text{Taking LCM}\\ &= \boxed{\frac{9\sqrt{2}}{4}} \qquad \text{Simplify}\end{aligned}$$

Answer 20PT.

Consider the two points:

$(-1,1),(1,-5)$

Therefore the distance between the two points will be:

$$\begin{aligned} d &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} \\ &= \sqrt{(1-(-1))^2+(-5-1)^2} \\ &= \sqrt{2^2+(-6)^2} \\ &= \sqrt{40} \\ d &= \boxed{6.32} \quad \text{Rounding to the nearest hundredth} \end{aligned}$$

Answer 20STP.

Consider the two points:

$(-5,-8)$ and $(9,1)$

The distance between the two points is:

$$\begin{aligned} d &= \sqrt{(9-(-5))^2+(1-(-8))^2} \\ &= \sqrt{14^2+9^2} \\ &= \sqrt{196+81} \\ &= \sqrt{277} \\ d &= \boxed{16.64} \end{aligned}$$

It is given that each grid unit is 0.13 mile. Therefore the distance between the houses is:

$$\begin{aligned} d &= 16.64 \times 0.13 \text{ mi} \\ &= \boxed{2.1632 \text{ mi}} \end{aligned}$$

The distance between $(-5,-8)$ and $(-1,5)$ is:

$$\begin{aligned} d_1 &= \sqrt{(-5-(-1))^2+(-8-5)^2} \\ &= \sqrt{(-4)^2+(-13)^2} \\ &= \sqrt{185} \end{aligned}$$

The distance between $(9,1)$ and $(-1,5)$ is:

$$\begin{aligned} d_2 &= \sqrt{(9-(-1))^2+(1-5)^2} \\ &= \sqrt{10^2+(-4)^2} \\ &= \sqrt{116} \end{aligned}$$

Therefore the **Sophie** house is close to the **Bakery.**

Answer 21E.

Consider the expression:

$$\sqrt{2}\left(3+3\sqrt{3}\right)$$

To simplify the expression follows the steps:

$$\begin{aligned}\sqrt{2}\left(3+3\sqrt{3}\right) &= \sqrt{2}\cdot 3+\sqrt{2}\cdot 3\sqrt{3} && \text{Using distributive property}\\ &= 3\sqrt{2}+3\sqrt{2}\sqrt{6} \\ &= \boxed{3\sqrt{2}+3\sqrt{6}} && \text{Simplify}\end{aligned}$$

Answer 21PT.

Consider the two points:

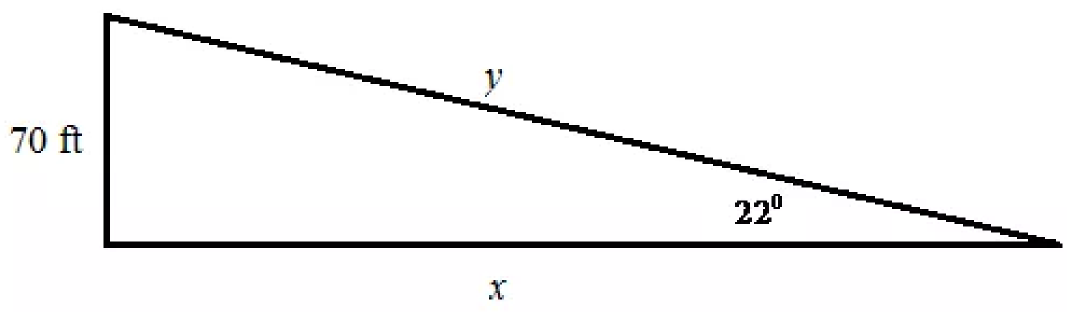
$$(-9,2),(21,7)$$

Therefore the distance between the two points will be:

$$\begin{aligned}d &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}\\ &= \sqrt{(21-(-9))^2+(7-2)^2}\\ &= \sqrt{30^2+5^2}\\ &= \sqrt{925}\\ d &= \boxed{30.41} && \text{Rounding to the nearest hundredth}\end{aligned}$$

Answer 21STP.

Consider the figure:



To find the distance between the cliffs from the Janelle follows the steps:

$$\begin{aligned}\sin 22^0 &= \frac{70}{y}\\ y &= \frac{70}{\sin 22^0}\\ y &= \boxed{186.86\text{ ft}}\end{aligned}$$

When the diver enters in the water the distance between the diver and Janelle follows the steps:

$$\tan 22^0 = \frac{70}{x}$$

$$x = \frac{70}{\tan 22^0}$$

$$x = \boxed{173.26 \text{ ft}}$$

Answer 22E.

Consider the expression:

$$\sqrt{5}\left(2\sqrt{5}-\sqrt{7}\right)$$

To simplify the expression follows the steps:

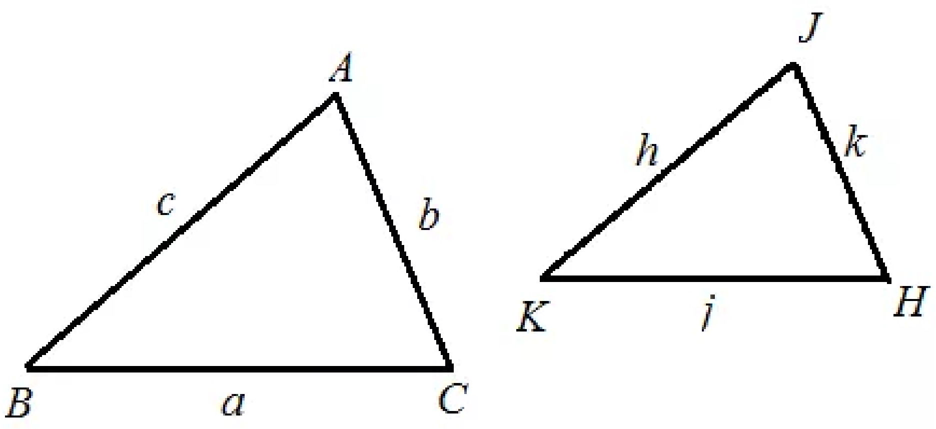
$$\sqrt{5}\left(2\sqrt{5}-\sqrt{7}\right) = \sqrt{5}\cdot 2\sqrt{5} - \sqrt{5}\cdot\sqrt{7} \quad \text{Using distributive property}$$

$$= 2(5) - \sqrt{35}$$

$$= \boxed{10-\sqrt{35}} \quad \text{Simplify}$$

Answer 22PT.

Consider the two similar triangles:



Since *ABC* and *JKH* are similar triangles, therefore

$$\frac{a}{j} = \frac{b}{k} = \frac{c}{h}$$

Here it is given that

$$c = 20, h = 15, k = 16, j = 12$$

Now

$$\frac{a}{j} = \frac{c}{h}$$

$$\frac{a}{12} = \frac{20}{15}$$

$$a = \frac{\cancel{12}^4 \times \cancel{20}^4}{\cancel{15}_{\cancel{5}}}$$

$$a = \boxed{16}$$

And

$$\frac{b}{k} = \frac{c}{h}$$

$$\frac{b}{16} = \frac{20}{15}$$

$$a = \frac{16 \times \cancel{20}^4}{\cancel{15}_3}$$

$$a = \boxed{\frac{64}{3}}$$

Answer 23E.

Consider the expression:

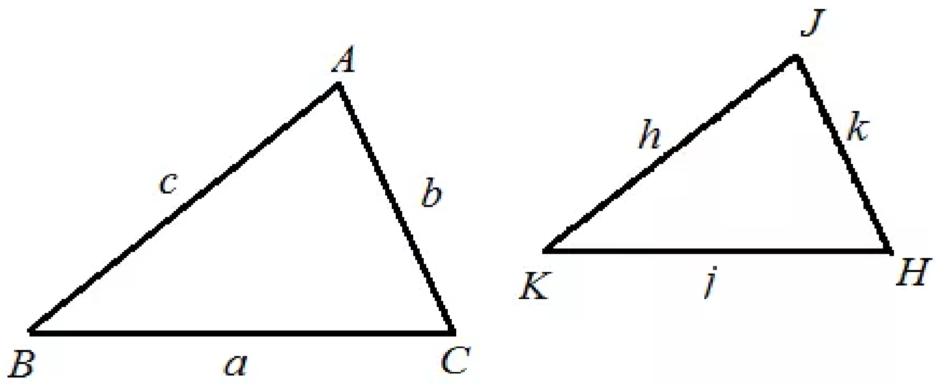
$$\left(\sqrt{3} - \sqrt{2}\right)\left(2\sqrt{2} + \sqrt{3}\right)$$

To simplify the expression follows the steps:

$$\begin{aligned}
\left(\sqrt{3} - \sqrt{2}\right)\left(2\sqrt{2} + \sqrt{3}\right) &= \sqrt{3}\left(2\sqrt{2} + \sqrt{3}\right) - \sqrt{2}\left(2\sqrt{2} + \sqrt{3}\right) \quad \text{Distributive Law} \\
&= \sqrt{3} \cdot 2\sqrt{2} + \sqrt{3} \cdot \sqrt{3} - \sqrt{2} \cdot 2\sqrt{2} - \sqrt{2} \cdot \sqrt{3} \\
&= 2\sqrt{6} + 3 - 4 - \sqrt{6} \\
&= \boxed{-1 + \sqrt{6}} \quad \text{Simplify}
\end{aligned}$$

Answer 23PT.

Consider the two similar triangles:



Since *ABC* and *JKH* are similar triangles, therefore

$$\frac{a}{j} = \frac{b}{k} = \frac{c}{h}$$

Here it is given that

$$c = 12, b = 13, a = 6, h = 10$$

Now

$$\frac{a}{j}=\frac{c}{h}$$

$$\frac{6}{j}=\frac{12}{10}$$

$$j=\frac{\cancel{6}\times\cancel{10}^{5}}{\cancel{12}_{6}}$$

$$j=\boxed{5}$$

And

$$\frac{b}{k}=\frac{c}{h}$$

$$\frac{13}{k}=\frac{12}{10}$$

$$k=\frac{13\times\cancel{10}^{5}}{\cancel{12}_{6}}$$

$$k=\boxed{\frac{65}{6}}$$

Answer 24E.

Consider the expression:

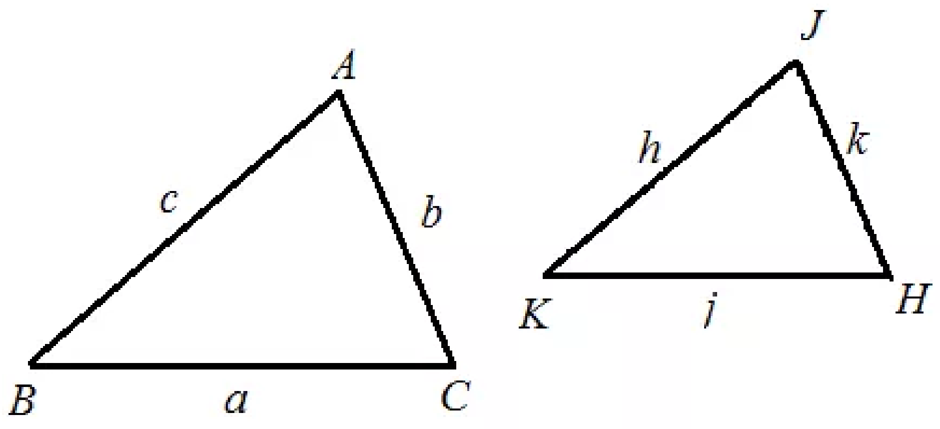
$$\left(6\sqrt{5}+2\right)\left(3\sqrt{2}+\sqrt{5}\right)$$

To simplify the expression follows the steps:

$$\begin{aligned}\left(6\sqrt{5}+2\right)\left(3\sqrt{2}+\sqrt{5}\right)&=6\sqrt{5}\left(3\sqrt{2}+\sqrt{5}\right)-2\left(3\sqrt{2}+\sqrt{5}\right) &&\text{Distributive Law}\\&=6\sqrt{5}\cdot3\sqrt{2}+6\sqrt{5}\cdot\sqrt{5}-2\cdot3\sqrt{2}-2\cdot\sqrt{5}\\&=18\sqrt{5}+30-6\sqrt{2}-2\sqrt{5}\\&=\boxed{30+16\sqrt{5}-6\sqrt{2}} &&\text{Simplify}\end{aligned}$$

Answer 24PT.

Consider the two similar triangles:



Since *ABC* and *JKH* are similar triangles, therefore

$$\frac{a}{j} = \frac{b}{k} = \frac{c}{h}$$

Here it is given that

$$k = 5, c = 6.5, b = 7.5, a = 4,5$$

Now

$$\frac{a}{j} = \frac{b}{k}$$

$$\frac{4.5}{j} = \frac{7.5}{5}$$

$$j = \frac{\cancel{4.5}^{3} \times \cancel{5}}{\cancel{7.5}_{\cancel{5}}}$$

$$j = \boxed{3}$$

And

$$\frac{c}{h} = \frac{b}{k}$$

$$\frac{6.5}{h} = \frac{7.5}{5}$$

$$h = \frac{\cancel{6.5}^{13} \times \cancel{5}}{\cancel{7.5}_{\cancel{15}_{3}}}$$

$$h = \boxed{\frac{13}{3}}$$

Answer 25E.

Consider the equation:

$$10+2\sqrt{b}=0$$

To solve the equation follows the steps:

$$10+2\sqrt{b}=0$$
$$2\sqrt{b}=-10$$
$$\sqrt{b}=-5$$
$$\left(\sqrt{b}\right)^2=(-5)^2 \qquad \text{Squaring both sides}$$
$$b=25$$

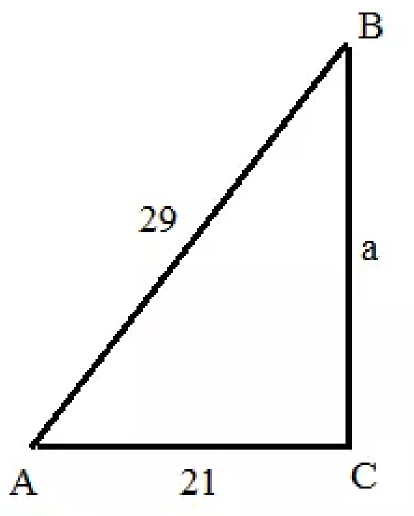
Check the solution as follows:

$$10+2\sqrt{25}\ \overset{?}{=}\ 0$$
$$10+2(5)\ \overset{?}{=}\ 0$$
$$10=0 \qquad \text{False}$$

Thus the equation has **no solution**.

Answer 25PT.

Consider the triangle:



Use Pythagoras theorem to find the value of *a* as follows:

$$\begin{aligned} a^2 &= 29^2 - 21^2 \\ &= 841 - 441 \\ &= 400 \\ a &= \boxed{20} \end{aligned}$$

Use trigonometric ratio to find the angles as follows:

$$\begin{aligned} \sin A &= \frac{20}{29} \\ A &= \sin^{-1}\left(\frac{20}{29}\right) \\ &= \boxed{44^0} \end{aligned}$$

And

$$\begin{aligned} \sin B &= \frac{21}{29} \\ B &= \sin^{-1}\left(\frac{21}{29}\right) \\ &= \boxed{46^0} \end{aligned}$$

Answer 26E.

Consider the equation:

$$\sqrt{a+4} = 6$$

To solve the equation follows the steps:

$$\begin{aligned} \sqrt{a+4} &= 6 \\ a+4 &= 6^2 && \text{Squaring both sides} \\ a+4 &= 36 \\ a &= 36-4 && \text{Subtract 4 from both sides} \\ a &= 32 \end{aligned}$$

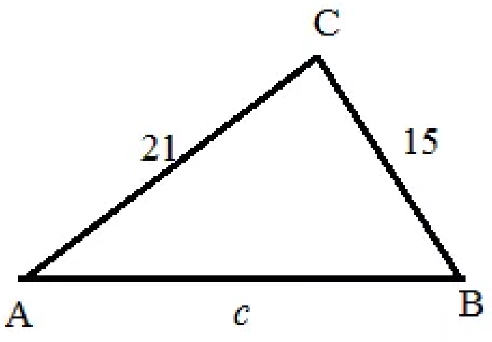
Check the solution as follows:

$$\begin{aligned} \sqrt{32+4} &\overset{?}{=} 6 \\ \sqrt{36} &\overset{?}{=} 6 \\ 6 &= 6 && \text{true} \end{aligned}$$

Thus the solution is: $\boxed{a = 32}$.

Answer 26PT.

Consider the triangle:



Use Pythagoras theorem to find the value of *a* as follows:

$$c^2 = 21^2 + 15^2$$
$$= 441 + 225$$
$$= 676$$
$$c = \boxed{26}$$

Use trigonometric ratio to find the angles as follows:

$$\sin A = \frac{15}{26}$$
$$A = \sin^{-1}\left(\frac{15}{26}\right)$$
$$= \boxed{36^0}$$

And

$$\sin B = \frac{21}{26}$$
$$B = \sin^{-1}\left(\frac{21}{26}\right)$$
$$= \boxed{54^0}$$

Answer 27E.

Consider the equation:

$$\sqrt{7x-1} = 5$$

To solve the equation follows the steps:

$$\sqrt{7x-1} = 5$$
$$7x-1 = 5^2 \qquad \text{Squaring both sides}$$
$$7x-1 = 25$$
$$7x = 26 \qquad \text{Add 1 to both sides}$$
$$x = \frac{26}{7}$$

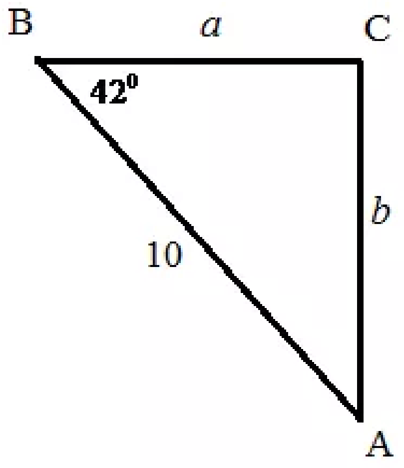
Check the solution as follows:

$$\sqrt{7\left(\frac{26}{7}\right)-1} \stackrel{?}{=} 5$$
$$\sqrt{26-1} \stackrel{?}{=} 5$$
$$5 = 5 \qquad \text{true}$$

Thus the solution is: $\boxed{x = \frac{26}{7}}$.

Answer 27PT.

Consider the triangle:



Use trigonometric ratio to find the side *b* as follows:

$$\sin 42 = \frac{b}{10}$$
$$b = 10\sin 42^0$$
$$= \boxed{6.69}$$

To find the value of *a* as follows:

$$\cos 42 = \frac{a}{10}$$
$$a = 10\cos 42^0$$
$$= \boxed{7.43}$$

Since the sum of the measure of angle *A* and *B* is 90^0, therefore the measure of the angle *A* is:

$$A = 90^0 - 42^0$$
$$= \boxed{48^0}$$

Answer 28E.

Consider the equation:

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

To solve the equation follows the steps:

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

$$\sqrt{\frac{4a}{3}}=2 \qquad \text{Squaring both sides}$$

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

$$4a=12$$

$$a=\frac{12}{4} \qquad \text{Divide both sides by 4}$$

$$=3$$

Check the solution as follows:

$$\sqrt{\frac{4\times 3}{3}}-2 \stackrel{?}{=} 0$$

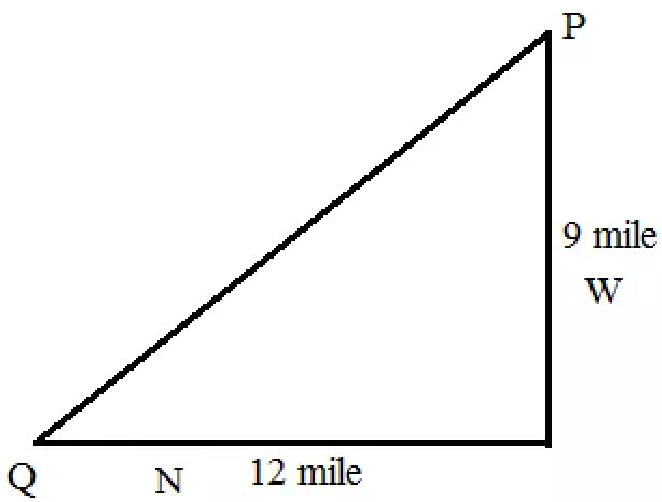
$$\sqrt{4}-2 \stackrel{?}{=} 0$$

$$0=0 \qquad \text{true}$$

Thus the solution is: $\boxed{a=3}$.

Answer 28PT.

Consider the distance that the hiker has covered:



Since it forms a right triangle, therefore the distance covered by the hiker will give the hypotenuse of the triangle.

The legs of the triangle are 9 mi and 12 mi.

Thus the distance covered by the hiker is:

$$d=\sqrt{9^2+12^2}\ \text{mi}$$

$$=\sqrt{81+144}\ \text{mi}$$

$$=\sqrt{225}\ \text{mi}$$

$$=\boxed{15\ \text{mi}}$$

Answer 29E.

Consider the equation:

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

To solve the equation follows the steps:

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

$$\left(\sqrt{x+4}\right)^2 = (x-8)^2 \qquad \text{Squaring both sides}$$

$$x+4 = x^2-16x+64$$

$$x^2-16x-x+64-4=0$$

$$x^2-17x+60=0$$

$$(x-5)(x-12)=0$$

$$x=5,12$$

Check the solution as follows:

For $x=5$

$$\sqrt{5+4} \stackrel{?}{=} 5-8$$

$$3=-3 \qquad \text{false}$$

For $x=12$

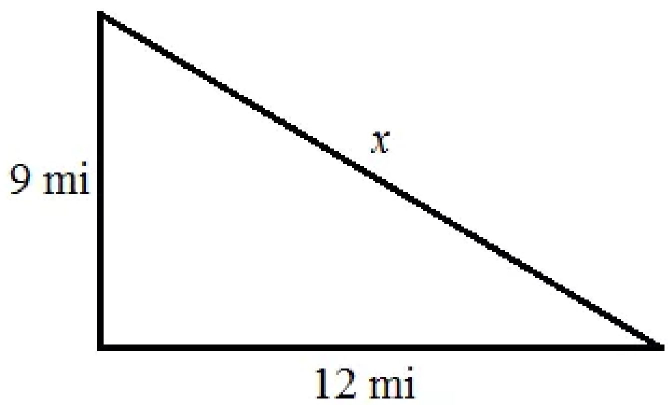
$$\sqrt{12+4} \stackrel{?}{=} 12-8$$

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

Thus the solution is: $\boxed{x=12}$.

Answer 29PT.

Consider the figure:



Since the hiker journey forms a right triangle with legs 9 and 12 miles respectively, therefore the length of the hypotenuse will give the distance from her camp.

Thus use Pythagoras theorem as follows:

$$x^2 = 9^2+12^2$$

$$= 81+144$$

$$x = \sqrt{225}$$

$$= 15$$

Therefore the hiker travels a distance of **15 miles** from her camp.

Answer 30E.

Consider the equation:

$$\sqrt{3x-14}+x=6$$

To solve the equation follows the steps:

$$\begin{aligned} \sqrt{3x-14}+x&=6 \\ \left(\sqrt{3x-14}\right)^2&=(6-x)^2 && \text{Squaring both sides} \\ 3x-14&=36-12x+x^2 \\ x^2-12x+36-3x+14&=0 \\ x^2-15x+50&=0 \\ (x-5)(x-10)&=0 \\ x&=5,10 \end{aligned}$$

Check the solution as follows:

For $x=5$

$$\begin{aligned} \sqrt{3(5)-14}+5 &\stackrel{?}{=} 6 \\ 6&=6 \quad \text{true} \end{aligned}$$

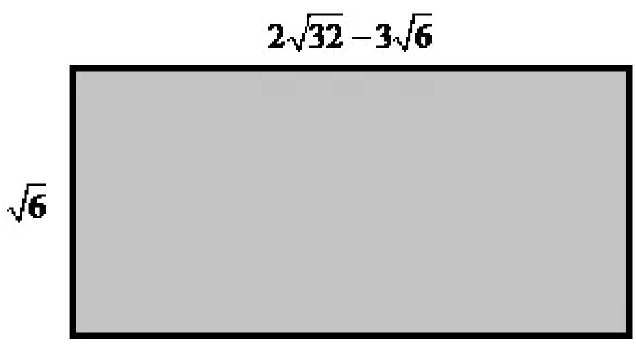
For $x=10$

$$\begin{aligned} \sqrt{3(10)-14}+5 &\stackrel{?}{=} 6 \\ 4+5 &\stackrel{?}{=} 6 \\ 9&=6 \quad \text{false} \end{aligned}$$

Thus the solution is: $\boxed{x=5}$.

Answer 30PT.

Consider the figure:



From the given figure the area of the rectangle can be found as follows:

$$\begin{aligned} A&=\sqrt{6}\left(2\sqrt{32}-3\sqrt{6}\right) \\ &=2\sqrt{6}\sqrt{32}-3\sqrt{6}\sqrt{6} && \text{Use distributive property} \\ &=2\sqrt{192}-3(6) \\ &=2\sqrt{64}\sqrt{3}-18 \\ A&=\boxed{16\sqrt{3}-18} && \text{Simplify} \end{aligned}$$

Therefore the correct option is: **(B)**

Answer 31E.

It is given that *c* is the measure of the hypotenuse of a right triangle while *a* and *b* are the legs of the triangle.

The Pythagoras theorem for right triangle is given as:

$$c^2 = a^2 + b^2$$

Here $a = 30, b = 16, c = ?$.

Thus use Pythagoras theorem to find the missing value as follows:

$$\begin{aligned} c^2 &= a^2 + b^2 \\ c^2 &= 30^2 + 16^2 \\ &= 900 + 256 \\ &= 1156 \\ c &= \boxed{34} \end{aligned}$$

Answer 32E.

It is given that *c* is the measure of the hypotenuse of a right triangle while *a* and *b* are the legs of the triangle.

The Pythagoras theorem for right triangle is given as:

$$c^2 = a^2 + b^2$$

Here $a = 6, b = 10, c = ?$.

Thus use Pythagoras theorem to find the missing value as follows:

$$\begin{aligned} c^2 &= a^2 + b^2 \\ c^2 &= 6^2 + 10^2 \\ &= 36 + 100 \\ &= 136 \\ &= \sqrt{136} \\ c &= \boxed{11.66} \end{aligned}$$

Answer 33E.

It is given that *c* is the measure of the hypotenuse of a right triangle while *a* and *b* are the legs of the triangle.

The Pythagoras theorem for right triangle is given as:

$$c^2 = a^2 + b^2$$

Here $a = 10, b = ?, c = 15$.

Thus use Pythagoras theorem to find the missing value as follows:

$$\begin{aligned} c^2 &= a^2 + b^2 \\ 15^2 &= 10^2 + b^2 \\ b^2 &= 225 - 100 \\ &= 125 \\ &= \sqrt{125} \\ b &= \boxed{11.18} \end{aligned}$$

Answer 34E.

It is given that *c* is the measure of the hypotenuse of a right triangle while *a* and *b* are the legs of the triangle.

The Pythagoras theorem for right triangle is given as:

$$c^2 = a^2 + b^2$$

Here $a = ?, b = 4, c = 56$.

Thus use Pythagoras theorem to find the missing value as follows:

$$\begin{aligned} c^2 &= a^2 + b^2 \\ 56^2 &= a^2 + 4^2 \\ a^2 &= 3136 - 16 \\ &= 3120 \\ &= \sqrt{3120} \\ a &= \boxed{55.86} \end{aligned}$$

Answer 35E.

It is given that *c* is the measure of the hypotenuse of a right triangle while *a* and *b* are the legs of the triangle.

The Pythagoras theorem for right triangle is given as:

$$c^2 = a^2 + b^2$$

Here $a = 18, b = ?, c = 30$.

Thus use Pythagoras theorem to find the missing value as follows:

$$\begin{aligned} c^2 &= a^2 + b^2 \\ 30^2 &= 18^2 + b^2 \\ b^2 &= 900 - 324 \\ &= 576 \\ &= \sqrt{576} \\ b &= \boxed{24.00} \end{aligned}$$

Answer 36E.

It is given that *c* is the measure of the hypotenuse of a right triangle while *a* and *b* are the legs of the triangle.

The Pythagoras theorem for right triangle is given as:

$$c^2 = a^2 + b^2$$

Here $a = 1.2, b = 1.6, c = ?$.

Thus use Pythagoras theorem to find the missing value as follows:

$$\begin{aligned} c^2 &= a^2 + b^2 \\ c^2 &= 1.2^2 + 1.6^2 \\ c^2 &= 1.44 + 2.56 \\ &= 4.00 \\ &= \sqrt{4.00} \\ c &= \boxed{2.00} \end{aligned}$$

Answer 37E.

Consider the measures:

9, 16, 20

The Pythagoras theorem for right triangle is given as:

$c^2 = a^2 + b^2$ where *c* is the hypotenuse and *a* and *b* are the legs of the right triangle.

The given measure will be for right triangle if the sum of the squares of two smaller sides is equal to the square of the larger side.

Now

$$\begin{aligned} 9^2 + 16^2 &= 81 + 256 \\ &= 337 \end{aligned}$$

And

$$20^2 = 400$$

Since $9^2 + 16^2 \neq 20^2$, therefore the given measures of the sides doesn't form a right triangle.

Answer 38E.

Consider the measures:

20, 21, 29

The Pythagoras theorem for right triangle is given as:

$c^2 = a^2 + b^2$ where *c* is the hypotenuse and *a* and *b* are the legs of the right triangle.

The given measure will be for right triangle if the sum of the squares of two smaller sides is equal to the square of the larger side.

Now

$$\begin{aligned} 20^2 + 21^2 &= 400 + 441 \\ &= 841 \end{aligned}$$

And

$$29^2 = 841$$

Since $20^2 + 21^2 = 29^2$, therefore the given measures of the sides **form a right triangle**.

Answer 39E.

Consider the measures:

9, 40, 41

The Pythagoras theorem for right triangle is given as:

$c^2 = a^2 + b^2$ where *c* is the hypotenuse and *a* and *b* are the legs of the right triangle.

The given measure will be for right triangle if the sum of the squares of two smaller sides is equal to the square of the larger side.

Now

$$\begin{aligned} 9^2 + 40^2 &= 81 + 1600 \\ &= 1681 \end{aligned}$$

And

$$41^2 = 1681$$

Since $9^2 + 40^2 = 41^2$, therefore the given measures of the sides **form a right triangle**.

Answer 40E.

Consider the measures:

$$18, \sqrt{24}, 30$$

The Pythagoras theorem for right triangle is given as:

$c^2 = a^2 + b^2$ where *c* is the hypotenuse and *a* and *b* are the legs of the right triangle.

The given measure will be for right triangle if the sum of the squares of two smaller sides is equal to the square of the larger side.

Now

$$\begin{aligned} 18^2 + \left(\sqrt{24}\right)^2 &= 324 + 24 \\ &= 348 \end{aligned}$$

And

$$30^2 = 900$$

Since $18^2 + \left(\sqrt{24}\right)^2 \neq 30^2$, therefore the given measures of the sides **doesn't form a right triangle**.

Answer 41E.

Consider the two points:

$$(9,-2),(1,13)$$

Therefore the distance between the two points will be:

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(1-9)^2 + (13-(-2))^2} \\ &= \sqrt{(-8)^2 + 15^2} \\ &= \sqrt{64 + 225} \\ d &\approx \boxed{17.00} \qquad \text{Rounding to the nearest hundredth} \end{aligned}$$

Answer 42E.

Consider the two points:

$$(4,2),(7,9)$$

Therefore the distance between the two points will be:

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(7-4)^2 + (9-2)^2} \\ &= \sqrt{3^2 + 7^2} \\ &= \sqrt{9 + 49} \\ &= \sqrt{58} \\ d &\approx \boxed{7.62} \qquad \text{Rounding to the nearest hundredth} \end{aligned}$$

Answer 43E.

Consider the two points:

$$(4,-6),(-2,7)$$

Therefore the distance between the two points will be:

$$\begin{aligned} d &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} \\ &= \sqrt{(-2-4)^2+(7-(-6))^2} \\ &= \sqrt{(-6)^2+13^2} \\ &= \sqrt{36+169} \\ &= \sqrt{205} \\ d &\approx \boxed{14.32} \qquad \text{Rounding to the nearest hundredth} \end{aligned}$$

Answer 44E.

Consider the two points:

$$(2\sqrt{5},9),(4\sqrt{5},3)$$

Therefore the distance between the two points will be:

$$\begin{aligned} d &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} \\ &= \sqrt{(4\sqrt{5}-2\sqrt{5})^2+(3-9)^2} \\ &= \sqrt{(2\sqrt{5})^2+(-6)^2} \\ &= \sqrt{20+36} \\ &= \sqrt{56} \\ d &\approx \boxed{7.48} \qquad \text{Rounding to the nearest hundredth} \end{aligned}$$

Answer 45E.

Consider the two points:

$$(4,8),(-7,12)$$

Therefore the distance between the two points will be:

$$\begin{aligned} d &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} \\ &= \sqrt{(-7-4)^2+(12-8)^2} \\ &= \sqrt{(-11)^2+4^2} \\ &= \sqrt{121+16} \\ &= \sqrt{137} \\ d &\approx \boxed{11.70} \qquad \text{Rounding to the nearest hundredth} \end{aligned}$$

Answer 46E.

Consider the two points:

$$(-2,6),(5,11)$$

Therefore the distance between the two points will be:

$$\begin{aligned} d &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} \\ &= \sqrt{(5-2)^2+(11-6)^2} \\ &= \sqrt{3^2+5^2} \\ &= \sqrt{9+25} \\ &= \sqrt{34} \\ d &\approx \boxed{5.83} \qquad \text{Rounding to the nearest hundredth} \end{aligned}$$

Answer 47E.

Consider the two points:

$$(-3,2),(1,a);d=5$$

Therefore the distance between the two points will be:

$$\begin{aligned} \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} &= d \\ \sqrt{(1-(-3))^2+(a-2)^2} &= 5 \\ 4^2+(a-2)^2 &= 25 \\ 16+a^2-4a+4 &= 25 \\ a^2-4a+20-25 &= 0 \\ a^2-4a-5 &= 0 \\ (a-5)(a+1) &= 0 \\ a &= 5,-1 \end{aligned}$$

Therefore the values of a are $\boxed{5,-1}$.

Answer 48E.

Consider the two points:

$$(1,1),(4,a);d=5$$

Therefore the distance between the two points will be:

$$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}=d$$
$$\sqrt{(4-1)^2+(a-1)^2}=5$$
$$3^2+(a-1)^2=25$$
$$9+a^2-2a+1=25$$
$$a^2-2a+10-25=0$$
$$a^2-2a-15=0$$
$$(a-5)(a+3)=0$$
$$a=5,-3$$

Therefore the values of *a* are $\boxed{5,-3}$.

Answer 49E.

Consider the two points:

$$(6,-2),(5,a);d=\sqrt{145}$$

Therefore the distance between the two points will be:

$$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}=d$$
$$\sqrt{(5-6)^2+(a+2)^2}=\sqrt{145}$$
$$(-1)^2+(a+2)^2=145$$
$$1+a^2+4a+4=145$$
$$a^2+4a+5-145=0$$
$$a^2+4a-140=0$$
$$(a+14)(a-10)=0$$
$$a=10,-14$$

Therefore the values of *a* are $\boxed{10,-14}$.

Answer 50E.

Consider the two points:

$(5,-2),(a,-3);d=\sqrt{170}$

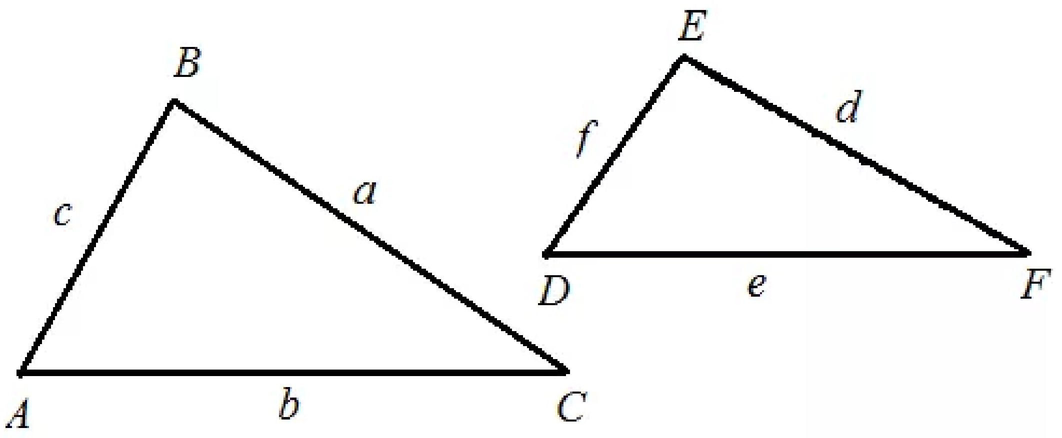
Therefore the distance between the two points will be:

$$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}=d$$
$$\sqrt{(a-5)^2+(-3+2)^2}=\sqrt{170}$$
$$(a-5)^2+(-1)^2=170$$
$$a^2-10a+25+1=170$$
$$a^2-10a+26-170=0$$
$$a^2-10a-144=0$$
$$(a-18)(a+8)=0$$
$$a=18,-8$$

Therefore the values of *a* are $\boxed{18,-8}$.

Answer 51E.

Consider the similar triangles:



Here it is given $c=16,b=12,a=10,f=9$

Since *ABC* and *DEF* are similar triangles, therefore

$$\frac{a}{d}=\frac{b}{e}=\frac{c}{f}$$

Now

$$\frac{a}{d}=\frac{c}{f}$$

$$\frac{10}{d}=\frac{16}{9}$$

$$d=\frac{90}{16}$$

$$=\boxed{\frac{45}{8}}$$

And

$$\frac{b}{e}=\frac{c}{f}$$

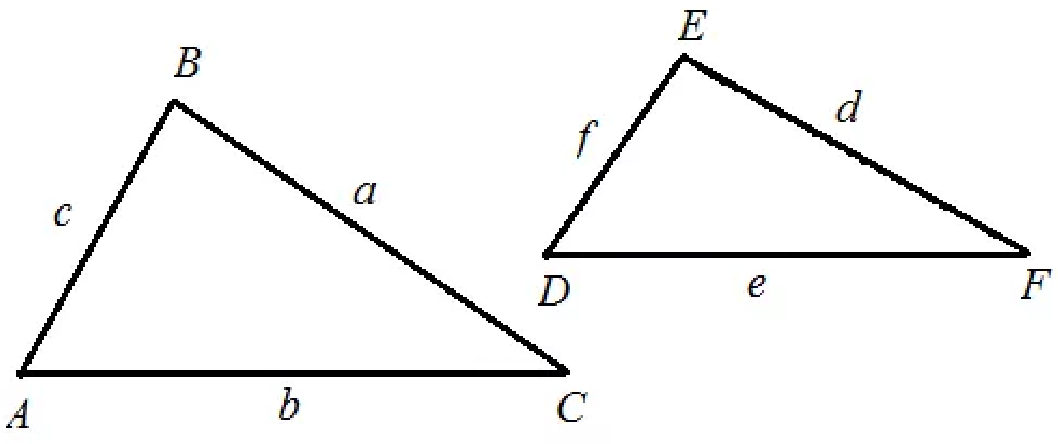
$$\frac{12}{e}=\frac{16}{9}$$

$$e=\frac{\cancel{12}^{3}\times 9}{\cancel{16}_{4}}$$

$$=\boxed{\frac{27}{4}}$$

Answer 52E.

Consider the similar triangles:



Here it is given $a=8, c=10, b=6, f=12$

Since *ABC* and *DEF* are similar triangles, therefore

$$\frac{a}{d}=\frac{b}{e}=\frac{c}{f}$$

Now

$$\frac{a}{d} = \frac{c}{f}$$

$$\frac{8}{d} = \frac{10}{12}$$

$$d = \frac{\cancel{8}^{4} \times 12}{\cancel{10}_{5}}$$

$$= \boxed{\frac{48}{5}}$$

And

$$\frac{b}{e} = \frac{c}{f}$$

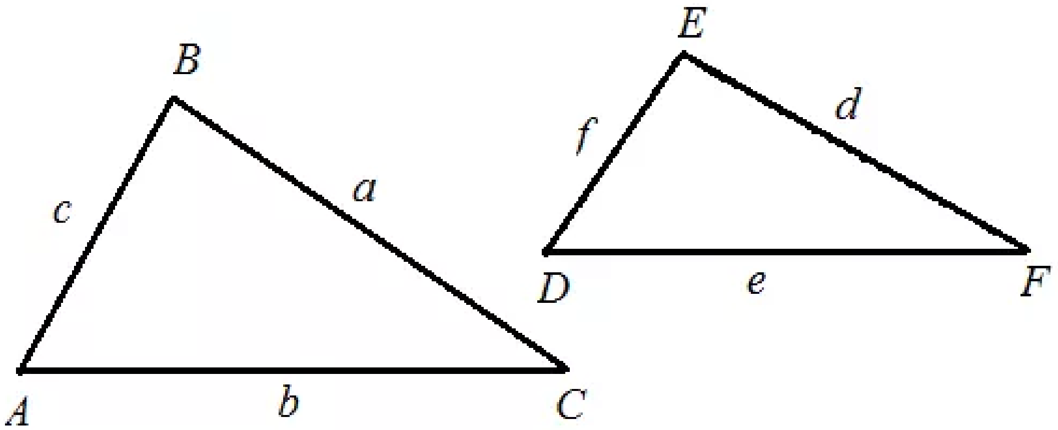
$$\frac{6}{e} = \frac{10}{12}$$

$$e = \frac{\cancel{12}^{6} \times 6}{\cancel{10}_{5}}$$

$$= \boxed{\frac{36}{5}}$$

Answer 53E.

Consider the similar triangles:



Here it is given $c = 12, f = 9, a = 8, e = 11$

Since *ABC* and *DEF* are similar triangles, therefore

$$\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$$

Now

$$\frac{a}{d}=\frac{c}{f}$$

$$\frac{8}{d}=\frac{12}{9}$$

$$d=\frac{\cancel{8}^{2}\times\cancel{9}^{3}}{\cancel{12}_{\cancel{3}}}$$

$$=\boxed{6}$$

And

$$\frac{b}{e}=\frac{c}{f}$$

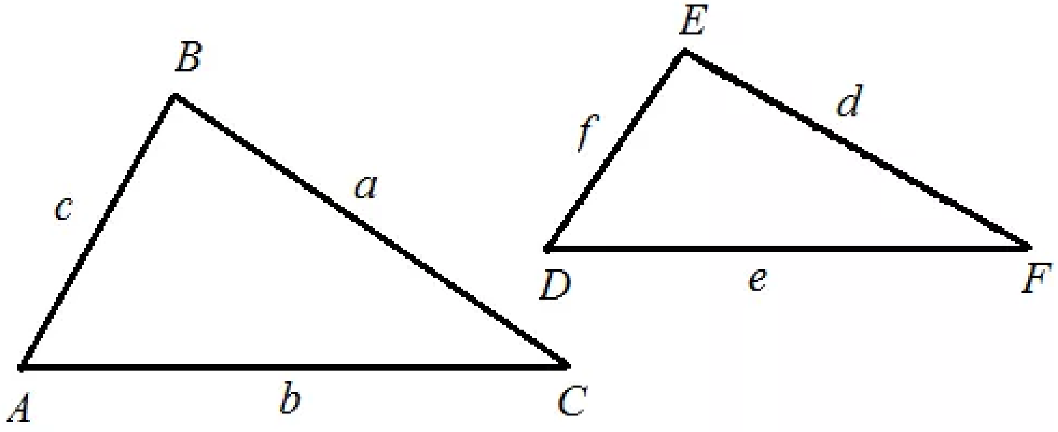
$$\frac{b}{11}=\frac{12}{9}$$

$$b=\frac{\cancel{12}^{4}\times 11}{\cancel{9}_{3}}$$

$$=\boxed{\frac{44}{3}}$$

Answer 54E.

Consider the similar triangles:



Here it is given $b=20, d=7, f=6, c=15$

Since *ABC* and *DEF* are similar triangles, therefore

$$\frac{a}{d}=\frac{b}{e}=\frac{c}{f}$$

Now

$$\frac{a}{d}=\frac{c}{f}$$

$$\frac{a}{7}=\frac{15}{6}$$

$$a=\frac{\cancel{15}^{5}\times 7}{\cancel{6}_{2}}$$

$$=\boxed{\frac{35}{2}}$$

And

$$\frac{b}{e}=\frac{c}{f}$$

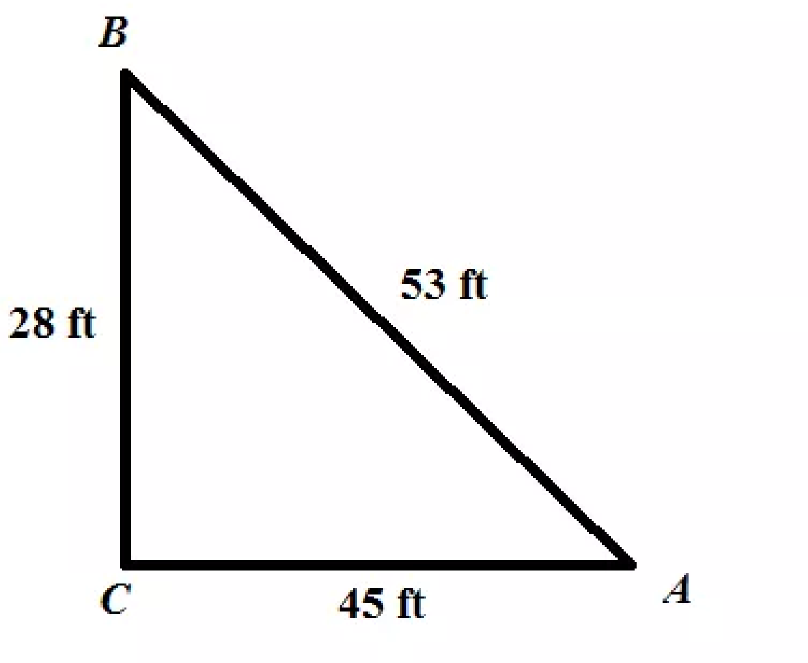
$$\frac{20}{e}=\frac{15}{6}$$

$$e=\frac{\cancel{20}^{4}\times \cancel{6}^{2}}{\cancel{15}_{\cancel{3}}}$$

$$=\boxed{8}$$

Answer 55E.

Consider the figure below:



Write the trigonometric ratio for cosine function

$$\cos B=\frac{\text{adjacent leg}}{\text{hypotenuse}}$$

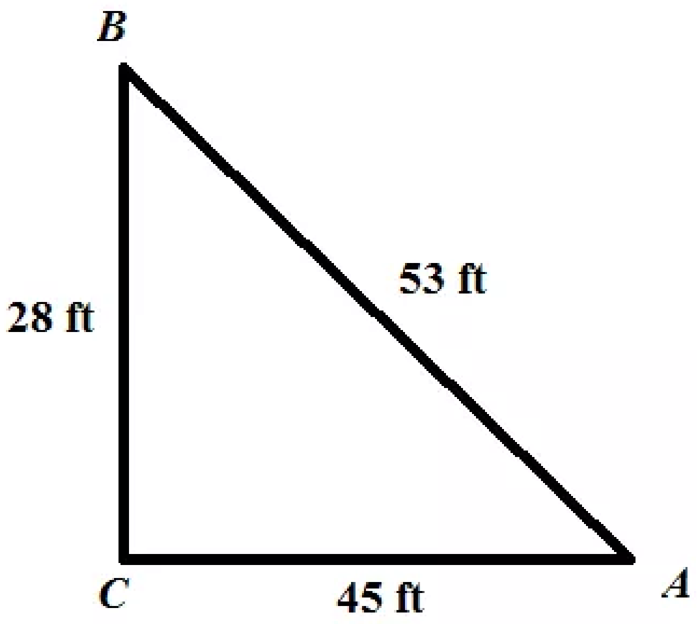
$$=\frac{BC}{AB}$$

$$=\frac{28}{53}$$

$$=\boxed{0.5283}$$

Answer 56E.

Consider the figure below:

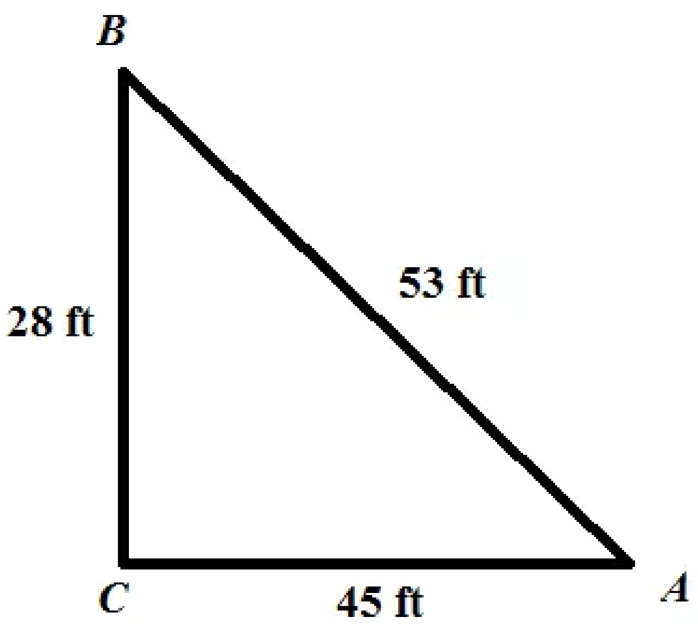


Write the trigonometric ratio for tangent function

$$\begin{aligned}\tan A &= \frac{\text{opposite leg}}{\text{adjacent leg}} \\ &= \frac{BC}{AC} \\ &= \frac{28}{45} \\ &= \boxed{0.6222}\end{aligned}$$

Answer 57E.

Consider the figure below:

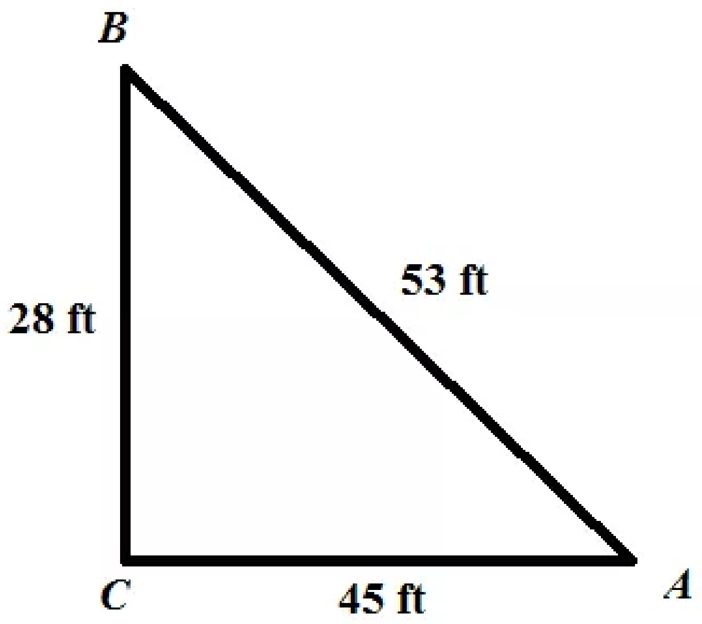


Write the trigonometric ratio for sine function

$$\sin B = \frac{\text{opposite leg}}{\text{hypotenuse}}$$
$$= \frac{AC}{BC}$$
$$= \frac{45}{53}$$
$$= \boxed{0.8490}$$

Answer 58E.

Consider the figure below:

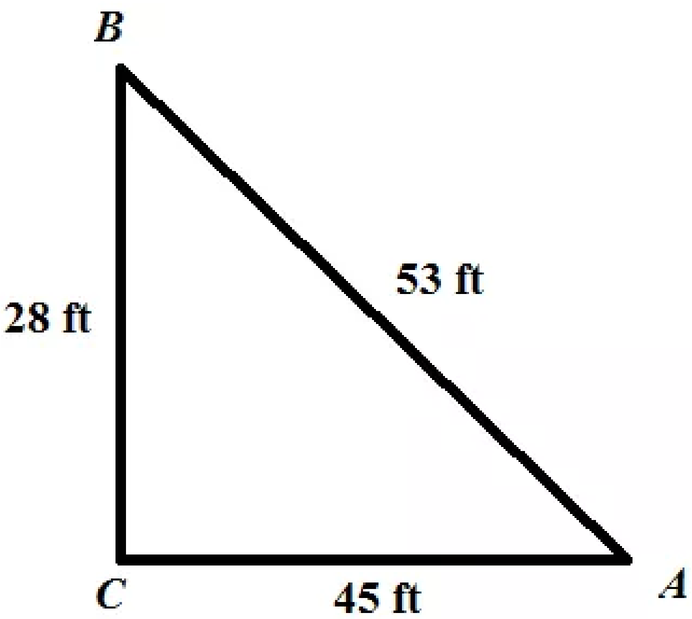


Write the trigonometric ratio for cosine function

$$\cos A = \frac{\text{adjacent leg}}{\text{hypotenuse}}$$
$$= \frac{AC}{AB}$$
$$= \frac{45}{53}$$
$$= \boxed{0.8490}$$

Answer 59E.

Consider the figure below:

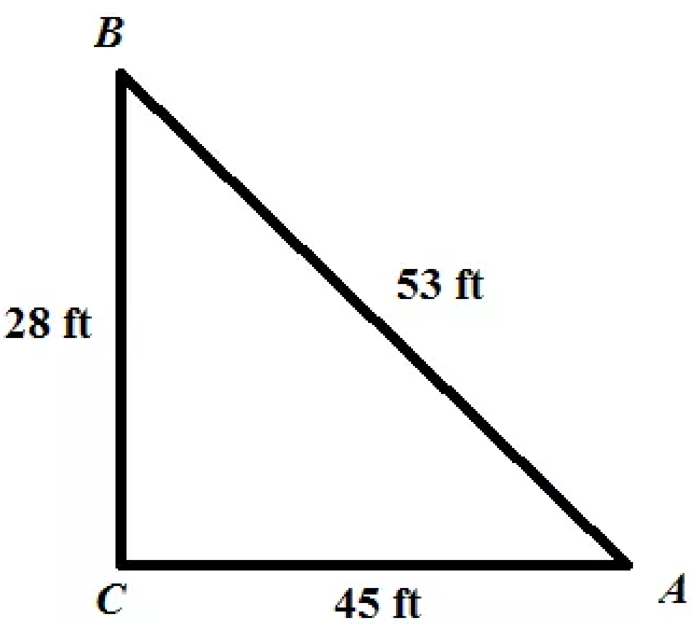


Write the trigonometric ratio for tangent function

$$\begin{aligned}\tan B &= \frac{\text{opposite leg}}{\text{adjacent leg}} \\ &= \frac{AC}{BC} \\ &= \frac{45}{28} \\ &= \boxed{1.6071}\end{aligned}$$

Answer 60E.

Consider the figure below:



Write the trigonometric ratio for sine function

$$\sin A = \frac{\text{opposite leg}}{\text{hypotenuse}}$$
$$= \frac{BC}{AB}$$
$$= \frac{28}{53}$$
$$= \boxed{0.5283}$$

Answer 61E.

Consider the equation is

$\tan M = 0.8043$

Using Non graphing Scientific Calculator

KEYSTROKE: $\boxed{\tan^{-1}}$ 0.8043 $\boxed{=}$ 38.80

Therefore, the measure of the angle nearest to degree is $\boxed{M = 39^0}$.

Answer 62E.

Consider the equation is

$\sin T = 0.1212$

Answer 63E.

Consider the equation is

$\cos B = 0.9781$

Using Non graphing Scientific Calculator

KEYSTROKE: $\boxed{\cos^{-1}}$ 0.9781 $\boxed{=}$ 12.01

Therefore, the measure of the angle nearest to degree is $\boxed{B = 12^0}$.

Answer 64E.

Consider the equation is

$\cos F = 0.7443$

Using Non graphing Scientific Calculator

KEYSTROKE: $\boxed{\cos^{-1}}$ 0.7443 $\boxed{=}$ 41.90

Therefore, the measure of the angle nearest to degree is $\boxed{F = 42^0}$.

Answer 65E.

Consider the equation is

$$\sin A = 0.4540$$

Using Non graphing Scientific Calculator

KEYSTROKE: $\boxed{\sin^{-1}}$ 0.4540 $\boxed{=}$ 27.00

Therefore, the measure of the angle nearest to degree is $\boxed{A = 27^0}$.

Answer 66E.

Consider the equation is

$$\tan Q = 5.9080$$

Using Non graphing Scientific Calculator

KEYSTROKE: $\boxed{\tan^{-1}}$ 5.9080 $\boxed{=}$ 80.39

Therefore, the measure of the angle nearest to degree is $\boxed{Q = 80^0}$.