Chapter 3. Solving Linear Equations

Ex. 3.8

Answer 1CU.

Consider the equation:

$$ax - y = az + w$$

The objective is to solve the equation for the variable *a*.

So, collect the terms containing the variable *a* on one side of the equation.

Subtract az from both sides of the equation and rewrite the equation as follows;

Collect the like terms together

$$ax - y = az + w$$
$$ax - y - az = az + w - az$$
$$ax - az - y = az - az + w$$

Use the reverse of distributive property to combine the like terms.

The reverse distributive property states that for any real numbers *a*, *b* and *c*;

$$ab - ac = a(b - c)$$

So, rewrite the equation as follows;

$$ax - az - y = az - az + w$$
$$a(x - z) - y = a(z - z) + w$$
$$a(x - z) - y = a \cdot 0 + w$$
$$a(x - z) - y = w$$

Add the variable *y* on both sides of the equation;

$$a(x - z) - y = w$$
$$a(x - z) - y + y = w + y$$
$$a(x - z) = w + y$$

Divide both sides of the equation by $(x - z)$;

Cancel the common factors

$$\frac{a(x - z)}{(x - z)} = \frac{w + y}{x - z}$$
$$a = \frac{w + y}{x - z}$$

Thus, the solution of the equation in terms of the variable *a* is $a = \frac{w + y}{x - z}$

Add the variable y on both sides of the equation;

$$a(x-z)-y=w$$
$$a(x-z)-y+y=w+y$$
$$a(x-z)=w+y$$

Divide both sides of the equation by $(x-z)$;

Cancel the common factors

$$\frac{a(x-z)}{(x-z)}=\frac{w+y}{x-z}$$
$$a=\frac{w+y}{x-z}$$

Thus, the solution of the equation in terms of the variable a is $a=\dfrac{w+y}{x-z}$

Therefore, list the steps used above as follows;

1. Subtract az from both sides of the equation and collect the like terms.
2. Use the reverse of distributive property to write $ax-az=a(x-z)$.
3. Add the variable y on both sides of the equation.
4. Divide both sides of the equation by $(x-z)$.

Answer 2CU.

Consider the following equation;

$$s=\frac{r}{t-2}$$

The objective is to find the possible values of the variable t.

The value for s is defined only if the denominator is non-zero.

Hence, s is defined for all the values of t for which the denominator is non-zero.

So equate the denominator to zero to find the values of t for which it becomes zero.

$$t-2=0$$

Add 2 on both sides of the equation;

$$t-2=0$$
$$t-2+2=0+2$$
$$t=2$$

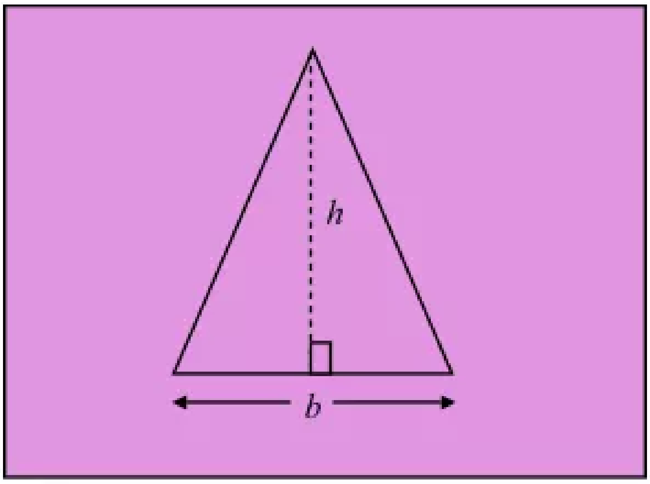
Thus, for $t=2$, the denominator is equal to zero.

Hence, except 2, for all other real values of t, the denominator is non-zero.

Therefore, in the expression $s=\dfrac{r}{t-2}$, t can be equal to $\boxed{\text{all real numbers except 2}}$.

Answer 3CU.

Draw the following triangle;



Write the formula for the area of the triangle with length of the base as *b* and height as *h*.

The formula is;

$$A = \frac{1}{2}bh$$

Here *A* is the area of the triangle.

The objective is to solve the formula for variable other than *A*.

So, solve the formula for the variable *h*.

Collect the terms containing the variable *h* on one side of the equation.

Multiply both sides of the equation by 2;

$$A = \frac{1}{2}bh$$

$$2 \cdot A = 2 \cdot \left(\frac{1}{2}bh\right)$$

$$2A = bh$$

Divide both sides of the equation by the variable *b*;

$$\frac{2A}{b} = \frac{bh}{b}$$

$$\frac{2A}{b} = h$$

$$h = \frac{2A}{b}$$

Therefore, the value of height of the triangle is $\boxed{h = \frac{2A}{b}}$.

Answer 4CU.

Consider the equation:

$-3x+b=6x$

The objective is to solve the equation for the variable *x*.

So, collect the terms containing the variable *x* on one side of the equation.

$-3x+b=6x$ Original equation

$-3x+b+3x=6x+3x$ Add $3x$ on both sides of the equation

$b=9x$ Collect the like terms together and combine them

$\frac{b}{9}=\frac{9x}{9}$ Divide both sides of the equation by 9;

$\frac{b}{9}=x$ Cancel the common factors

$x=\frac{b}{9}$ Rewrite the equation

Thus, the solution of the equation in terms of the variable *x* is $\boxed{x=\frac{b}{9}}$.

Answer 5CU.

Consider the equation:

$-5a+y=-54$

The objective is to solve the equation for the variable *a*.

So, collect the terms containing the variable *a* on one side of the equation.

$-5a+y=-54$
$-5a+y-y=-54-y$ Subtract y from both sides of the equation

$-5a=-54-y$ Simplify

$-5a=-(54+y)$ Write with negative sign outside the parenthesis

$\frac{-5a}{-5}=\frac{-(54+y)}{-5}$ Divide both sides of the equation by -5

$a=\frac{54+y}{5}$ Cancel the common factors

Thus, the solution of the equation in terms of the variable *a*, is $\boxed{a=\frac{54+y}{5}}$.

Answer 6CU.

Consider the equation:

$4z+b=2z+c$

The objective is to solve the equation for the variable *z*.

So, collect the terms containing the variable *z* on one side of the equation.

$4z+b=2z+c$ Original equation

$4z+b-2z=2z+c-2z$ Subtract $2z$ from both sides of the equation

$4z-2z+b=2z-2z+c$ Collect the like terms together and combine them

$2z+b=c$ Simplify

$2z+b-b=c-b$ Subtract the variable *b* from both sides

$2z=c-b$ Simplify

$\frac{2z}{2}=\frac{c-b}{2}$ Divide both sides of the equation by 2

$z=\frac{c-b}{2}$ Cancel the common factors

Thus, the solution of the equation in terms of the variable *z* is $\boxed{z=\frac{c-b}{2}}$.

Answer 7CU.

Consider the equation:

$\frac{y+a}{3}=c$

The objective is to solve the equation for the variable *y*.

So, collect the terms containing the variable *y* on one side of the equation.

$\frac{y+a}{3}=c$ Original equation

$3\cdot\frac{y+a}{3}=3\cdot c$ Multiply both sides of the equation by 3

$y+a=3c$ Cancel the common factors

$y+a-a=3c-a$ Subtract the variable *a* from both sides

$y=3c-a$ Simplify

Thus, the solution of the equation in terms of the variable *y* is $\boxed{y=3c-a}$.

Answer 8CU.

Consider the equation:

$$p = a(b+c)$$

The objective is to solve the equation for the variable *a*.

So, collect the terms containing the variable *a* on one side of the equation.

$p = a(b+c)$ Original equation

$\frac{p}{b+c} = \frac{a(b+c)}{b+c}$ Divide both sides of the equation by $(b+c)$

$\frac{p}{b+c} = a$ Cancel the common factors

$$a = \frac{p}{b+c}$$

Thus, the solution of the equation in terms of the variable *a*, is $\boxed{a = \frac{p}{b+c}}$.

Answer 9CU.

Consider the equation:

$mw - t = 2w + 5$

The objective is to solve the equation for the variable *w*.

So, collect the terms containing the variable *w* on one side of the equation.

$mw - t = 2w + 5$ Original equation

$mw - t - 2w = 2w + 5 - 2w$ Subtract $2w$ from both sides

$mw - 2w - t = 2w - 2w + 5$ Collect the like terms together

$w(m-2) - t = 2(w-w) + 5$ Use the reverse of distributive property

$w(m-2) - t = 5$ Simplify

$w(m-2) - t + t = 5 + t$ Add the variable *t* on both sides

$w(m-2) = 5 + t$ Simplify

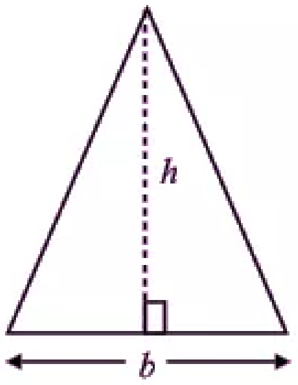
$\frac{w(m-2)}{m-2} = \frac{5+t}{m-2}$ Divide both sides of the equation by $(m-2)$

$w = \frac{5+t}{m-2}$ Cancel the common factors

Thus, the solution of the equation in terms of the variable *w* is $\boxed{w = \frac{5+t}{m-2}}$.

Answer 10CU.

Consider the following triangle;



The objective is to find the area of the triangle with length of the base as 18 ft. and height 7 ft.

The formula for the area of the triangle with length of the base as *b* and height as *h* is;

$A = \frac{1}{2}bh$

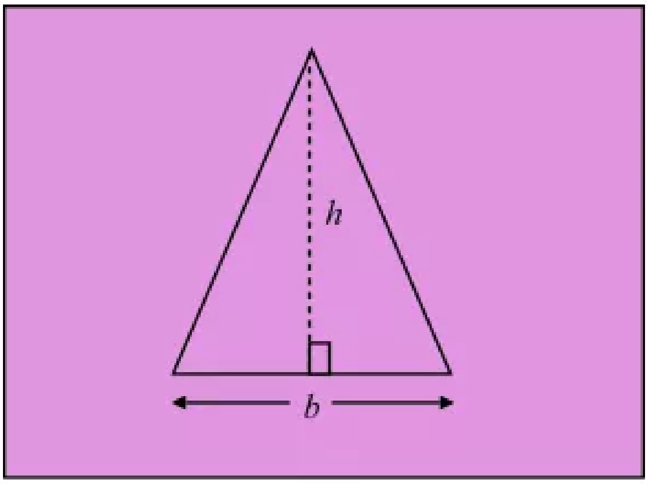
Here substitute 18 for *b* and 7 for *h* in the formula for area;

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2}\cdot 18 \cdot 7 \quad \text{Cancel the common factors} \\ &= 63 \end{aligned}$$

Therefore, the area of the required triangle is $\boxed{63 \text{ sq ft.}}$.

Answer 11CU.

Draw the following triangle;



Write the formula for the area of the triangle with length of the base as *b* and height as *h*.

The formula is;

$$A = \frac{1}{2}bh$$

Here *A* is the area of the triangle.

The objective is to solve the formula for variable *h*.

Collect the terms containing the variable *h* on one side of the equation.

Multiply both sides of the equation by 2;

$$A = \frac{1}{2}bh$$

$$2 \cdot A = 2 \cdot \left(\frac{1}{2}bh\right)$$

Use the distributive property for multiplication which states that;

For any three numbers *a*, *b* and *c*;

$$a(bc) = (ab)c$$

So, write the equation as follows;

Cancel the common factors

$$2 \cdot A = 2 \cdot \left(\frac{1}{2}bh\right)$$

$$2A = \left(2 \cdot \frac{1}{2}\right)bh$$

$$2A = bh$$

Divide both sides of the equation by the variable *b*;

Cancel the common factors

$$\frac{2A}{b}=\frac{bh}{b}$$

$$\frac{2A}{b}=h$$

$$h=\frac{2A}{b}$$

Therefore, the value of height of the triangle is $\boxed{h=\frac{2A}{b}}$.

Divide both sides of the equation by the variable *b*;

Cancel the common factors

$$\frac{2A}{b}=\frac{bh}{b}$$

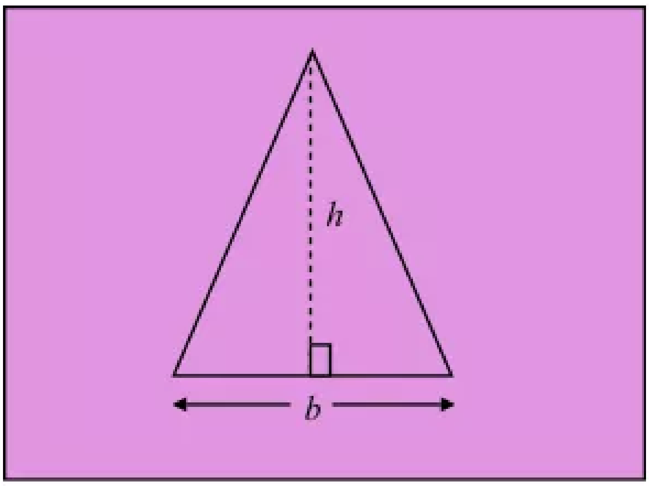
$$\frac{2A}{b}=h$$

$$h=\frac{2A}{b}$$

Therefore, the value of height of the triangle is $\boxed{h=\frac{2A}{b}}$.

Answer 12CU.

Draw the following triangle;



Write the formula for the area of the triangle with length of the base as *b* and height as *h*.

The formula is;

$$A = \frac{1}{2}bh$$

Here *A* is the area of the triangle.

The objective is to find the height of the triangle with area 28 sq. ft. and length of the base as 8 ft.

So, solve the formula for variable *h*.

Thus, the value of height of the triangle is $h = \frac{2A}{b}$.

To find the height of the triangle with area 28 sq. ft. and length of the base as 8 ft, substitute 28 for *A* and 8 for *b*;

Cancel the common factors

$$\begin{aligned} h &= \frac{2A}{b} \\ &= \frac{2(28)}{8} \\ &= 7 \end{aligned}$$

Therefore, the height of the required triangle is $\boxed{7\text{ feet}}$.

To find the height of the triangle with area 28 sq. ft. and length of the base as 8 ft, substitute 28 for *A* and 8 for *b*;

Cancel the common factors

$$\begin{aligned} h &= \frac{2A}{b} \\ &= \frac{2(28)}{8} \\ &= 7 \end{aligned}$$

Therefore, the height of the required triangle is $\boxed{7\text{ feet}}$.

Answer 13PA.

Write the following original equation;

$$5g + h = g$$

The objective is to solve the equation for the variable *g*.

So, collect the terms containing the variable *g* on one side of the equation.

Subtract g from both sides of the equation and rewrite the equation as follows;

Collect the like terms together and combine them

$$\begin{aligned} 5g + h &= g \\ 5g + h - g &= g - g \\ 5g - g + h &= g - g \\ 4g + h &= 0 \end{aligned}$$

Subtract h from both sides of the equation;

Simplify the equation

Cancel the common factors

$$4g + h = 0$$
$$4g + h - h = 0 - h$$
$$4g = -h$$

Divide both sides of the equation by 4;

$$\frac{4g}{4} = \frac{-h}{4}$$
$$g = \frac{-h}{4}$$
$$g = -\frac{h}{4}$$

Therefore, the solution of the equation in terms of the variable g is $\boxed{g = -\frac{h}{4}}$.

Answer 14PA.

Consider the following original equation;

$$8t - r = 12t$$

The objective is to solve the equation for the variable t.

So, collect the terms containing the variable t on one side of the equation.

Subtract $8t$ from both sides of the equation and rewrite the equation as follows;

Collect the like terms together and combine them

$$8t - r = 12t$$
$$8t - r - 8t = 12t - 8t$$
$$8t - 8t - r = 12t - 8t$$
$$-r = 4t$$

Divide both sides of the equation by 4;

$$\frac{-r}{4} = \frac{4t}{4}$$
$$\frac{-r}{4} = t$$
$$t = -\frac{r}{4}$$

Thus, the solution of the equation in terms of the variable t is $\boxed{t = -\frac{r}{4}}$.

Answer 15PA.

Consider the following original equation;

$$y = mx + b$$

The objective is to solve the equation for the variable m.

So, collect the terms containing the variable m on one side of the equation.

Subtract b from both sides of the equation and rewrite the equation as follows;

Collect the like terms together and combine them

$$y = mx + b$$
$$y - b = mx + b - b$$
$$y - b = mx$$
$$mx = y - b$$

Divide both sides of the equation by x;

$$\frac{mx}{x} = \frac{y-b}{x}$$
$$m = \frac{y-b}{x}$$

Thus, the solution of the equation in terms of the variable m is $\boxed{m = \frac{y-b}{x}}$.

Answer 16PA.

Consider the following original equation;

$$v = r + at$$

The objective is to solve the equation for the variable a.

So, collect the terms containing the variable a on one side of the equation.

Subtract r from both sides of the equation and rewrite the equation as follows;

Collect the like terms together and combine them

$$v = r + at$$
$$v - r = r + at - r$$
$$v - r = r - r + at$$
$$v - r = at$$

Divide both sides of the equation by t;

Cancel the common factors

$$\frac{v-r}{t}=\frac{at}{t}$$
$$\frac{v-r}{t}=a$$
$$a=\frac{v-r}{t}$$

Thus, the solution of the equation in terms of the variable a, is $\boxed{a=\frac{v-r}{t}}$.

Answer 17PA.

Consider the following original equation;

$$3y+z=am-4y$$

The objective is to solve the equation for the variable y.

So, collect the terms containing the variable y on one side of the equation.

Add $4y$ on both sides of the equation;

Collect the like terms together and combine them

$$3y+z=am-4y$$
$$3y+z+4y=am-4y+4y$$
$$3y+4y+z=am-4y+4y$$
$$7y+z=am$$

Subtract z from both sides of the equation and rewrite the equation as follows;

Collect the like terms together and combine them

$$7y+z=am$$
$$7y+z-z=am-z$$
$$7y=am-z$$

Divide both sides of the equation by 7;

Cancel the common factors

$$\frac{7y}{7}=\frac{am-z}{7}$$
$$y=\frac{am-z}{7}$$

Thus, the solution of the equation in terms of the variable y is $\boxed{y=\frac{am-z}{7}}$.

Answer 18PA.

Consider the following original equation;

$9a - 2b = c + 4a$

The objective is to solve the equation for the variable *a*.

So, collect the terms containing the variable *a* on one side of the equation.

Subtract $4a$ from both sides of the equation and rewrite the equation as follows;

Collect the like terms together and combine them

$$\begin{aligned} 9a - 2b &= c + 4a \\ 9a - 2b - 4a &= c + 4a - 4a \\ 9a - 4a - 2b &= c + 4a - 4a \\ 5a - 2b &= c \end{aligned}$$

Add $2b$ on both sides of the equation;

Simplify the equation

$$\begin{aligned} 5a - 2b &= c \\ 5a - 2b + 2b &= c + 2b \\ 5a &= c + 2b \end{aligned}$$

Divide both sides of the equation by 5;

Cancel the common factors

$$\begin{aligned} \frac{5a}{5} &= \frac{c + 2b}{5} \\ a &= \frac{c + 2b}{5} \end{aligned}$$

Thus, the solution of the equation in terms of the variable *a*, is $\boxed{a = \frac{c + 2b}{5}}$.

Answer 19PA.

Consider the following original equation;

$km + 5x = 6y$

The objective is to solve the equation for the variable *m*.

So, collect the terms containing the variable *m* on one side of the equation.

Subtract $5x$ from both sides of the equation and rewrite the equation as follows;

Collect the like terms together and combine them

$$\begin{aligned} km + 5x &= 6y \\ km + 5x - 5x &= 6y - 5x \\ km &= 6y - 5x \end{aligned}$$

Divide both sides of the equation by k;

$$\frac{km}{k} = \frac{6y-5x}{k}$$
$$m = \frac{6y-5x}{k}$$

Thus, the solution of the equation in terms of the variable *m* is $\boxed{m = \frac{6y-5x}{k}}$.

Answer 20PA.

Consider the following original equation;

$$4b - 5 = -t$$

The objective is to solve the equation for the variable *b*.

So, collect the terms containing the variable *b* on one side of the equation.

Subtract 5 from both sides of the equation and rewrite the equation as follows;

Collect the like terms together and combine them

$$4b - 5 = -t$$
$$4b - 5 + 5 = -t + 5$$
$$4b = 5 - t$$

Divide both sides of the equation by 4;

$$\frac{4b}{4} = \frac{5-t}{4}$$
$$b = \frac{5-t}{4}$$

Therefore, the solution of the equation in terms of the variable *b* is $\boxed{b = \frac{5-t}{4}}$.

Answer 21PA.

Consider the equation $\frac{3ax-n}{5} = -4$.

Multiply both sides of the equation by 5,

$$\frac{3ax-n}{5} = -4$$
$$5 \cdot \frac{3ax-n}{5} = 5 \cdot (-4)$$
$$3ax - n = -20$$

Add n on both sides of the equation and rewrite the equation as follows,

$$3ax - n = -20$$
$$3ax - n + n = -20 + n$$
$$3ax = n - 20$$

Divide both sides of the equation by $3a$;

$$\frac{3ax}{3a} = \frac{n-20}{3a}$$
$$x = \frac{n-20}{3a}$$

Thus, the solution of the equation in terms of the variable *x* is $\boxed{x = \frac{n-20}{3a}}$.

Answer 22PA.

Consider the equation $\frac{5x+y}{a} = 2$.

Multiply both sides of the equation by *a* and rewrite the equation as follows,

$$\frac{5x+y}{a} = 2$$
$$a \cdot \frac{5x+y}{a} = a \cdot 2 \quad \left(\begin{array}{l}\text{multiply with } a \text{ on both sides} \\ \text{and simplify}\end{array}\right)$$
$$5x + y = 2a$$

Divide both sides of the equation by 2;

$$\frac{5x+y}{2} = \frac{2a}{2}$$
$$\frac{5x+y}{2} = a$$
$$a = \frac{5x+y}{2}$$

Thus, the solution of the equation in terms of the variable *a*, is $\boxed{a = \frac{5x+y}{2}}$.

Answer 23PA.

Consider the equation $\frac{by+2}{3}=c$.

Multiply both sides of the equation by 3;

$$\frac{by+2}{3}=c$$
$$3\cdot\frac{by+2}{3}=3\cdot c \quad \left(\begin{array}{l}\text{Multiply with 3 on both sides}\\ \text{and simplify}\end{array}\right)$$
$$by+2=3c$$

Subtract 2 from both sides of the equation and rewrite the equation as follows,

$$by+2=3c$$
$$by+2-2=3c-2 \quad (\text{Simplify})$$
$$by=3c-2$$

Divide both sides of the equation by b,

$$\frac{by}{b}=\frac{3c-2}{b}$$
$$y=\frac{3c-2}{b}$$

Thus, the solution of the equation in terms of the variable y is $\boxed{y=\frac{3c-2}{b}}$.

Answer 24PA.

Consider the equation $\frac{6c-t}{7}=b$.

Multiply both sides of the equation by 7,

$$\frac{6c-t}{7}=b$$
$$7\cdot\frac{6c-t}{7}=7\cdot b \quad \left(\begin{array}{l}\text{Multiply with 7 on both sides}\\ \text{and simplify}\end{array}\right)$$
$$6c-t=7b$$

Add t on both sides of the equation and rewrite the equation as follows;

$$6c-t=7b$$
$$6c-t+t=7b+t \quad (\text{Add } t \text{ on both sides})$$
$$6c=7b+t$$

Divide both sides of the equation by 6;

$$\frac{6c}{6}=\frac{7b+t}{6} \quad (\text{Simplify})$$
$$c=\frac{7b+t}{6}$$

Thus, the solution of the equation in terms of the variable c is $\boxed{c=\frac{7b+t}{6}}$.

Answer 25PA.

Consider the equation $c = \frac{3}{4}y + b$.

Subtract b from both sides of the equation and rewrite the equation as follows;

$$c = \frac{3}{4}y + b$$
$$c - b = \frac{3}{4}y + b - b \qquad (\text{Substract } b \text{ on both sides})$$
$$c - b = \frac{3}{4}y$$
$$\frac{3}{4}y = c - b$$

Multiply both sides of the equation by $\frac{4}{3}$,

$$\frac{3}{4}y = c - b$$
$$\frac{4}{3}\cdot\frac{3}{4}y = \frac{4}{3}\cdot(c - b) \qquad (\text{Simplify})$$
$$y = \frac{4(c - b)}{3}$$

Thus, the solution of the equation in terms of the variable *y* is $\boxed{y = \frac{4(c-b)}{3}}$.

Answer 26PA.

Consider the equation $\frac{3}{5}m + a = b$.

Subtract a from both sides of the equation and rewrite the equation as follows;

$$\frac{3}{5}m + a = b$$
$$\frac{3}{5}m + a - a = b - a \qquad (\text{Subtract } a \text{ on both sides})$$
$$\frac{3}{5}m = b - a$$

Multiply both sides of the equation by $\frac{5}{3}$,

$$\frac{3}{5}m = b - a$$
$$\frac{5}{3}\cdot\frac{3}{5}m = \frac{5}{3}\cdot(b - a) \qquad (\text{Simplify})$$
$$m = \frac{5(b - a)}{3}$$

Thus, the solution of the equation in terms of the variable *m* is $\boxed{m = \frac{5(b-a)}{3}}$.

Answer 27PA.

Consider the equation $S = \frac{n}{2}(A+t)$.

Multiply both sides of the equation by $\frac{2}{n}$;

$$S = \frac{n}{2}(A+t)$$
$$\frac{2}{n}\cdot S = \frac{2}{n}\cdot\frac{n}{2}(A+t) \qquad \text{(Simplify)}$$
$$\frac{2S}{n} = A+t$$

Subtract t from both sides of the equation and rewrite the equation as follows,

$$\frac{2S}{n} = A+t$$
$$\frac{2S}{n} - t = A+t-t \qquad (\text{subtract } t \text{ on both sides})$$
$$\frac{2S}{n} - t = A$$
$$A = \frac{2S}{n} - t$$

Rationalize the denominator and write the value of *A* as follows,

$$A = \frac{2S}{n} - t$$
$$= \frac{2S - nt}{n}$$

Thus, the solution of the equation in terms of the variable *A* is $\boxed{A = \frac{2S-nt}{n}}$.

Answer 28PA.

Consider the equation $p(t+1) = -2$.

Divide both sides of the equation by p,

$$p(t+1) = -2$$
$$\frac{p(t+1)}{p} = \frac{-2}{p} \qquad (\text{Divide by } p \text{ on both sides})$$
$$t+1 = \frac{-2}{p}$$

Subtract 1 from both sides of the equation and rewrite the equation as follows,

$$t+1 = \frac{-2}{p}$$
$$t+1-1 = \frac{-2}{p} - 1 \qquad (\text{Subtract } t \text{ on both sides})$$
$$t = \frac{-2}{p} - 1$$

Rationalize the denominator and write the value of t as follows,

$$\begin{aligned} t &= \frac{-2}{p} - 1 \\ &= \frac{-2-p}{p} \\ &= \frac{-(2+p)}{p} \qquad \text{(Simplify)} \\ &= -\frac{p+2}{p} \end{aligned}$$

Thus, the solution of the equation in terms of the variable t is $\boxed{t = -\frac{p+2}{p}}$.

Answer 29PA.

Consider the equation $at + b = ar - c$.

Subtract ar from both sides of the equation and rewrite the equation as follows,

$$\begin{aligned} at + b &= ar - c \\ at + b - ar &= ar - c - ar \qquad \text{(arrange all like terms one side)} \\ at - ar + b &= ar - ar - c \end{aligned}$$

The reverse distributive property states that for any real numbers a, b and c;

$$ab - ac = a(b - c)$$

So, rewrite the equation as follows;

$$\begin{aligned} at - ar + b &= ar - ar - c \\ a(t-r) + b &= a(r-r) - c \\ a(t-r) + b &= a \cdot 0 - c \qquad (\text{Since } a \cdot 0 = 0) \\ a(t-r) + b &= -c \end{aligned}$$

Subtract the variable b from both sides of the equation,

$$\begin{aligned} a(t-r) + b &= -c \\ a(t-r) + b - b &= -c - b \qquad \text{(Simplify)} \\ a(t-r) &= -(c+b) \end{aligned}$$

Divide both sides of the equation by $(t-r)$;

$$\begin{aligned} \frac{a(t-r)}{t-r} &= \frac{-(c+b)}{t-r} \qquad (\text{Divide by } (t-r) \text{ on both sides}) \\ a &= \frac{c+b}{-(t-r)} \\ a &= \frac{c+b}{r-t} \end{aligned}$$

Thus, the solution of the equation in terms of the variable a, is $\boxed{a = \frac{c+b}{r-t}}$.

Answer 30PA.

Consider the equation $2g-m=5-gh$.

Add gh on both sides of the equation and rewrite the equation as follows,

$$2g-m=5-gh$$
$$2g-m+gh=5-gh+gh$$
$$2g+gh-m=5-gh+gh$$

The reverse distributive property states that for any real numbers *a*, *b* and *c*,

$$ab-ac=a(b-c)$$

So, rewrite the equation as follows,

$$2g+gh-m=5-gh+gh$$
$$g(2+h)-m=5+h(g-g)$$
$$g(2+h)-m=5+h\cdot 0 \qquad (\text{Since } h\cdot 0=0)$$
$$g(2+h)-m=5$$

Add the variable *m* on both sides of the equation;

$$g(2+h)-m=5$$
$$g(2+h)-m+m=5+m$$
$$g(2+h)=5+m$$

Divide both sides of the equation by $(2+h)$.

$$\frac{g(2+h)}{2+h}=\frac{5+m}{2+h} \qquad (\text{Divide by } (2+h) \text{ on both sides})$$
$$g=\frac{5+m}{2+h}$$

Thus, the solution of the equation in terms of the variable *g* is $\boxed{g=\frac{5+m}{2+h}}$.

Answer 31PA.

The statement suggests that the sum of a number *r* and six is equal to five less than the number *t*.

The objective is to solve the equation for *t*.

Write the sentence in its mathematical equivalent.

The mathematical equivalent of the sentence, 'five less than *t*', is $t-5$.

Similarly the sentence, '*r* plus six' or 'sum of *r* and six', in mathematical form is $r+6$.

So, write the full sentence as a mathematical equation as follows;

$$t-5=r+6$$

Thus, the required equation is $\boxed{t-5=r+6}$.

Solve the equation $t-5=r+6$ for the variable *t*.

So, collect the terms containing the variable *t* on one side of the equation.

Add 5 on both sides of the equation and rewrite the equation as follows;

Combine the like terms

$$\begin{aligned} t-5&=r+6 \\ t-5+5&=r+6+5 \\ t&=r+11 \end{aligned}$$

Therefore, the solution of the equation in terms of the variable *t* is $\boxed{t=r+11}$.

Answer 32PA.

The statement suggests that the sum of six times a number *q* and one is equal to twice a number *p* less than 5.

The objective is to solve the equation for *p*.

Write the sentence in its mathematical equivalent.

Twice a number *p* is $2p$.

The mathematical equivalent of the sentence, 'five minus twice a number *p*', is $5-2p$.

Six times a number *q* is $6q$.

Similarly the sentence, 'six times a number *q* plus 1', in mathematical form is $6q+1$.

So, write the full sentence as a mathematical equation as follows;

$$5-2p=6q+1$$

Thus, the required equation is $\boxed{5-2p=6q+1}$.

Solve the equation $5-2p=6q+1$ for the variable *p*.

So, collect the terms containing the variable *p* on one side of the equation.

Subtract 5 from both sides of the equation and rewrite the equation as follows;

Collect and combine the like terms

$$\begin{aligned} 5-2p&=6q+1 \\ 5-2p-5&=6q+1-5 \\ 5-5-2p&=6q+1-5 \\ -2p&=6q-4 \end{aligned}$$

Divide both sides of the equation by -2;

Cancel the common factors

$$\begin{aligned} \frac{-2p}{-2}&=\frac{6q-4}{-2} \\ p&=-\frac{6q-4}{2} \end{aligned}$$

Therefore, the solution of the equation in terms of the variable *p* is $\boxed{p=-\frac{6q-4}{2}}$.

Answer 33PA.

The statement suggests that five eights of a number *x* is equal to one half of a number *y* plus three.

The objective is to solve the equation for *y*.

Write the sentence in its mathematical equivalent.

Five eights of a number *x* is $\frac{5}{8}x$.

One half of a number *y* is $\frac{1}{2}y$.

The mathematical equivalent of the sentence, 'three more than one half of a number *y*', is equal to $\frac{1}{2}y+3$.

So, write the full sentence as a mathematical equation as follows;

$$\frac{5}{8}x=\frac{1}{2}y+3$$

Thus, the required equation is $\boxed{\frac{5}{8}x=\frac{1}{2}y+3}$.

Solve the equation $\frac{5}{8}x=\frac{1}{2}y+3$ for the variable *y*.

So, collect the terms containing the variable *y* on one side of the equation.

Subtract 3 from both sides of the equation and rewrite the equation as follows;

Collect and combine the like terms

$$\frac{5}{8}x=\frac{1}{2}y+3$$
$$\frac{5}{8}x-3=\frac{1}{2}y+3-3$$
$$\frac{5}{8}x-3=\frac{1}{2}y$$

Multiply both sides of the equation by 2;

$$\frac{5}{8}x-3=\frac{1}{2}y$$
$$2\cdot\left(\frac{5}{8}x-3\right)=2\cdot\frac{1}{2}y$$

Use the distributive property to open the parenthesis.

The distributive property states that for any real numbers *a*, *b* and *c*;

$$a(b \pm c) = a \cdot b \pm a \cdot c$$

So, rewrite the equation as follows;

Cancel the common factors

$$2 \cdot \left(\frac{5}{8}x - 3\right) = 2 \cdot \frac{1}{2}y$$

$$2 \cdot \frac{5}{8}x - 2 \cdot 3 = y$$

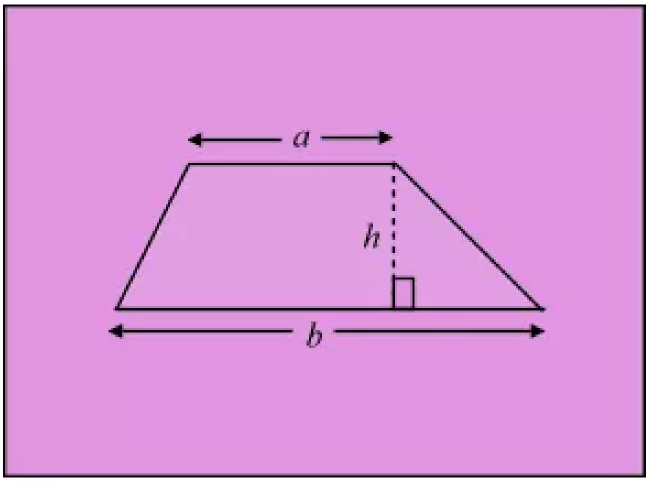
$$\frac{5}{4}x - 6 = y$$

$$y = \frac{5}{4}x - 6$$

Therefore, the solution of the equation in terms of the variable *y* is $\boxed{y = \frac{5}{4}x - 6}$.

Answer 34PA.

Draw the following trapezoid;



Write the formula for the area of the trapezoid with length of the parallel sides as *a* and *b* and height as *h*.

The formula is;

$$A = \frac{1}{2}(a + b)h$$

Here *A* is the area of the trapezoid.

The objective is to solve the formula for variable *h*.

Collect the terms containing the variable h on one side of the equation.

Multiply both sides of the equation by 2;

$$A=\frac{1}{2}(a+b)h$$
$$2\cdot A=2\cdot\left(\frac{1}{2}(a+b)h\right)$$

Use the distributive property for multiplication which states that;

For any three numbers a, b and c;

$$a(bc)=(ab)c$$

So, write the equation as follows;

Cancel the common factors

$$2\cdot A=2\cdot\left(\frac{1}{2}(a+b)h\right)$$
$$2A=\left(2\cdot\frac{1}{2}\right)(a+b)h$$
$$2A=(a+b)h$$

Divide both sides of the equation by $(a+b)$;

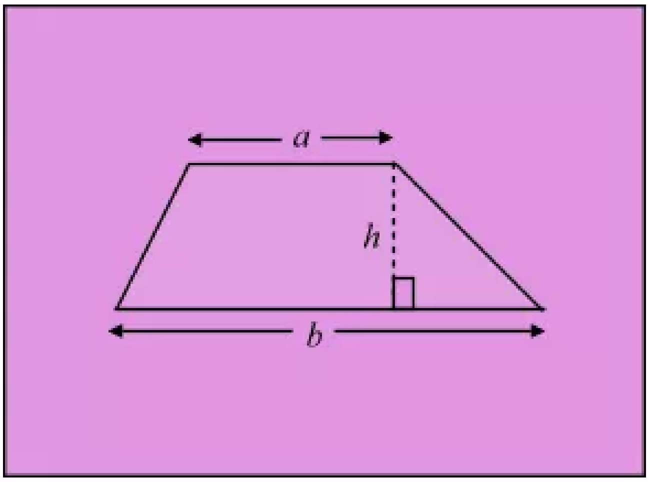
Cancel the common factors

$$\frac{2A}{a+b}=\frac{(a+b)h}{a+b}$$
$$\frac{2A}{a+b}=h$$
$$h=\frac{2A}{a+b}$$

Therefore, the value of height h, of the trapezoid with parallel sides a and b is $\boxed{h=\frac{2A}{a+b}}$.

Answer 35PA.

Draw the following trapezoid;



Write the formula for the area of the trapezoid with length of the parallel sides as *a* and *b* and height as *h*.

The formula is;

$$A = \frac{1}{2}(a+b)h$$

Here *A* is the area of the trapezoid.

The objective is to find the height of the trapezoid with area 60 sq. m. and lengths of the bases (parallel sides) as 8m and 12m.

So, solve the formula for variable *h*.

Collect the terms containing the variable *h* on one side of the equation.

Multiply both sides of the equation by 2;

$$A = \frac{1}{2}(a+b)h$$
$$2 \cdot A = 2 \cdot \left(\frac{1}{2}(a+b)h\right)$$

Use the distributive property for multiplication which states that;

For any three numbers *a*, *b* and *c*;

$$a(bc) = (ab)c$$

So, write the equation as follows;

Cancel the common factors

$$2 \cdot A = 2 \cdot \left(\frac{1}{2}(a+b)h\right)$$
$$2A = \left(2 \cdot \frac{1}{2}\right)(a+b)h$$
$$2A = (a+b)h$$

Divide both sides of the equation by $(a+b)$;

Cancel the common factors

$$\frac{2A}{a+b} = \frac{(a+b)h}{a+b}$$
$$\frac{2A}{a+b} = h$$
$$h = \frac{2A}{a+b}$$

Thus, the value of height *h*, of the trapezoid with parallel sides *a* and *b* is $h = \frac{2A}{a+b}$.

To find the height of the trapezoid with area 60 sq. m. and lengths of the bases (parallel sides) as 8m and 12m substitute 60 for *A*, 8 for *a* and 12 for *b* in the formula that gives the height of the trapezoid;

Simplify the expression

$$\begin{aligned} h &= \frac{2A}{a+b} \\ &= \frac{2(60)}{8+12} \\ &= \frac{120}{20} \\ &= 6 \end{aligned}$$

Therefore, the height of the required trapezoid is $\boxed{6 \text{ meters}}$.

Answer 36PA.

Write the following formula used to find the keyboarding speeds;

$$s = \frac{w-10e}{m}$$

Here the variables *s*, *w*, *e* and *m* represent the following;

The speed in words per minute is *s*.

The number of words typed is *w*.

The number of errors is *e* and,

The number minutes typed is *m*.

The objective is to solve the formula for variable *e*.

Collect the terms containing the variable *e* on one side of the equation.

Multiply both sides of the equation by *m*;

Cancel the common factors

$$\begin{aligned} s &= \frac{w-10e}{m} \\ m \cdot s &= m \cdot \frac{w-10e}{m} \\ ms &= w-10e \end{aligned}$$

Add $10e$ to both sides of the equation;

Combine the like terms

$$\begin{aligned} ms &= w-10e \\ ms+10e &= w-10e+10e \\ ms+10e &= w \end{aligned}$$

Subtract the term ms from both sides of the equation;

Combine the like terms

$$\begin{aligned} ms+10e &= w \\ ms+10e-ms &= w-ms \\ ms-ms+10e &= w-ms \\ 10e &= w-ms \end{aligned}$$

Divide both sides of the equation by 10;

Cancel the common factors

$$\frac{10e}{10} = \frac{w - ms}{10}$$
$$e = \frac{w - ms}{10}$$

Therefore, the required formula that gives the expression for the variable *e* is $\boxed{e = \frac{w - ms}{10}}$.

Answer 37PA.

Write the following formula used to find the keyboarding speeds;

$$s = \frac{w - 10e}{m}$$

Here the variables *s*, *w*, *e* and *m* represent the following;

The speed in words per minute is *s*.

The number of words typed is *w*.

The number of errors is *e* and,

The number minutes typed is *m*.

The objective is to find the errors made by a person *M* if his speed of typing is 76 words per minute and he typed 410 words in 5 minutes.

So, solve the formula for variable *e*.

Collect the terms containing the variable *e* on one side of the equation.

Multiply both sides of the equation by *m*;

Cancel the common factors

$$s = \frac{w - 10e}{m}$$
$$m \cdot s = m \cdot \frac{w - 10e}{m}$$
$$ms = w - 10e$$

Add $10e$ to both sides of the equation;

Combine the like terms

$$ms = w - 10e$$
$$ms + 10e = w - 10e + 10e$$
$$ms + 10e = w$$

Subtract the term ms from both sides of the equation;

Combine the like terms

$$ms + 10e = w$$
$$ms + 10e - ms = w - ms$$
$$ms - ms + 10e = w - ms$$
$$10e = w - ms$$

Divide both sides of the equation by 10;

Cancel the common factors

$$\frac{10e}{10} = \frac{w - ms}{10}$$
$$e = \frac{w - ms}{10}$$

Thus, the required formula that gives the expression for the variable *e* is $e = \frac{w - ms}{10}$.

To find the errors made by a person *M* if his speed of typing is 76 words per minute and he typed 410 words in 5 minutes;

Substitute 410 for *w*, 5 for *m* and 76 for *s* in the formula $e = \frac{w - ms}{10}$;

$$\begin{aligned} e &= \frac{w - ms}{10} \\ &= \frac{410 - 5(76)}{10} \\ &= \frac{410 - 380}{10} \\ &= 3 \end{aligned}$$

Therefore, Mr. *M* made $\boxed{3}$ typing errors.

Answer 38PA.

Write the following formula for the amount of pressure exerted by a heel of a shoe on the floor;

$$P = \frac{1.2W}{H^2}$$

Here the variables *P*, *W*and *H* represent the following;

The pressure in pounds per square inch is *P*.

The weight of the person with the shoe, in pounds is *W*.

The width of the heel of the shoe in inches is *H*.

The objective is to solve the formula for variable *W*.

Collect the terms containing the variable *W* on one side of the equation.

Multiply both sides of the equation by H^2;

Cancel the common factors

$$P = \frac{1.2W}{H^2}$$

$$H^2 \cdot P = H^2 \cdot \frac{1.2W}{H^2}$$

$$H^2 P = 1.2W$$

$$1.2W = H^2 P$$

Divide both sides of the equation by 1.2;

Cancel the common factors

$$\frac{1.2W}{1.2} = \frac{H^2 P}{1.2}$$

$$W = \frac{H^2 P}{1.2}$$

Therefore, the required formula that gives the expression for the variable *W* is $\boxed{W = \frac{H^2 P}{1.2}}$

Answer 39PA.

Write the following formula for the amount of pressure exerted by a heel of a shoe on the floor;

$$P = \frac{1.2W}{H^2}$$

Here the variables *P*, *W* and *H* represent the following;

The pressure in pounds per square inch is *P*.

The weight of the person with the shoe, in pounds is *W*.

The width of the heel of the shoe in inches is *H*.

The objective is to find the weight of the person wearing a shoe with heel 3 inches wide that exerts a pressure of 30 pounds per square inch on the ground.

So, solve the formula for variable *W*.

Collect the terms containing the variable *W* on one side of the equation.

Multiply both sides of the equation by H^2;

Cancel the common factors

$$P = \frac{1.2W}{H^2}$$
$$H^2 \cdot P = H^2 \cdot \frac{1.2W}{H^2}$$
$$H^2 P = 1.2W$$
$$1.2W = H^2 P$$

Divide both sides of the equation by 1.2;

Cancel the common factors

$$\frac{1.2W}{1.2} = \frac{H^2 P}{1.2}$$
$$W = \frac{H^2 P}{1.2}$$

Therefore, the required formula that gives the expression for the variable *W* is $W = \frac{H^2 P}{1.2}$.

To find the weight of the person wearing a shoe with heel 3 inches wide that exerts a pressure of 30 pounds per square inch on the ground;

Substitute 3 for *H* and 30 for *P* in the formula $W = \frac{H^2 P}{1.2}$;

$$\begin{aligned} W &= \frac{H^2 P}{1.2} \\ &= \frac{(3)^2 \cdot 30}{1.2} \\ &= \frac{9 \cdot 30}{1.2} \\ &= 225 \end{aligned}$$

Therefore, the weight of the person wearing a shoe with heel 3 inches wide that exerts a pressure of 30 pounds per square inch on the ground is $\boxed{225 \text{ pounds}}$.

Answer 40PA.

Write the following formula that expresses the mass ratio of a rocket in terms of the mass of its structure, the mass of the fuel and the mass of the payload;

$$R = \frac{S+F+P}{S+P}$$

Here the variables *S*, *F*, *P* and *R* represent the following;

The mass ratio of the rocket is *R*.

The mass of the structure of the rocket is *S*.

The mass of the fuel is *F* and,

The mass of the payload is *P*.

tructure The objective is to find the mass of the fuel to be loaded in the rocket with its basic s and payload having mass 900 grams and mass ratio 6.

So, solve the formula for variable *F*.

Collect the terms containing the variable *F* on one side of the equation.

Multiply both sides of the equation by $S+P$;

Cancel the common factors

$$R = \frac{S+F+P}{S+P}$$

$$(S+P)\cdot R = (S+P)\cdot\frac{S+F+P}{S+P}$$

$$(S+P)\cdot R = S+F+P$$

$$(S+P)\cdot R = S+P+F$$

Subtract $(S+P)$ from both sides of the equation;

Cancel the like terms with opposite signs

Multiply the terms inside the bracket by negative sign

$$(S+P)\cdot R = S+P+F$$

$$(S+P)\cdot R-(S+P) = S+P+F-(S+P)$$

$$(S+P)\cdot R-(S+P) = S+P+F-S-P$$

$$(S+P)\cdot R-(S+P) = F$$

Use reverse of distributive property here.

The reverse of distributive property states that for any real numbers *a*, *b* and *c*;

$$a \cdot b \pm a \cdot c = a \cdot (b \pm c)$$

So, rewrite the equation as follows;

$$\begin{aligned} (S+P)\cdot R-(S+P) &= F \\ (S+P)\cdot R-(S+P)\cdot 1 &= F \\ (S+P)\cdot(R-1) &= F \\ F &= (S+P)\cdot(R-1) \end{aligned}$$

Therefore, the required formula that gives the expression for the variable *F* is $F=(S+P)\cdot(R-1)$.

To find the mass of the fuel to be loaded in the rocket with its basic structure and payload having mass 900 grams and mass ratio 6;

Substitute 900 for *S* and *P*, and 6 for *R* in the formula $F=(S+P)\cdot(R-1)$;

$$\begin{aligned} F &= (S+P)\cdot(R-1) \\ &= (900+900)\cdot(6-1) \\ &= 1800\cdot 5 \\ &= 9000 \end{aligned}$$

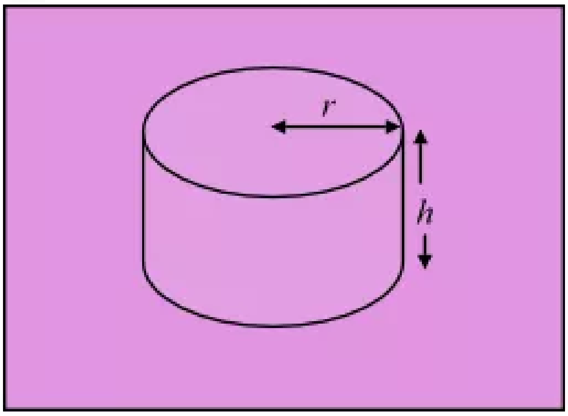
Therefore, the mass of the fuel to be loaded in the rocket with its basic structure and payload having mass 900 grams and mass ratio 6 is $\boxed{9000 \text{ grams or } 9 \text{ kilograms}}$.

Answer 41PA.

The ice-cream container is cylindrical in shape.

Hence, volume of the ice-cream in the container is equal to the volume of the container.

Draw the following diagram;



The figure shows a cylinder with radius of the base as *r* and height *h*.

Suppose volume of the cylinder is *V* then;

$$V=\pi r^2 h$$

The objective is to find the height of a cylindrical container with volume 5453 cu. cm. and diameter of the base as 20 cm.

So, solve the formula for variable *h*.

Collect the terms containing the variable h on one side of the equation.

Divide both sides of the equation by πr^2;

Cancel the common factors

$$V = \pi r^2 h$$
$$\frac{V}{\pi r^2} = \frac{\pi r^2 h}{\pi r^2}$$
$$\frac{V}{\pi r^2} = h$$
$$h = \frac{V}{\pi r^2}$$

Therefore, the required formula that gives the expression for the variable h is $h = \frac{V}{\pi r^2}$.

The base of the cylindrical container is a circle.

The diameter of the base of the container is 20 cm.

Diameter of a circle is twice the radius.

Thus, the radius of the base of the container is half the diameter.

Suppose the radius of the base of the container is r.

So, calculate the radius of the base as follows;

$$\begin{aligned} r &= \frac{20}{2} \\ &= 10 \text{ cm} \end{aligned}$$

To find the height of a cylindrical container with volume 5453 cu. cm. and diameter of the base as 20 cm;

Substitute 5453 for V and 10 for r in the formula $h = \frac{V}{\pi r^2}$;

$$\begin{aligned} h &= \frac{V}{\pi r^2} \\ &= \frac{5453}{\pi (10)^2} \\ &= \frac{5453}{100\pi} \end{aligned}$$

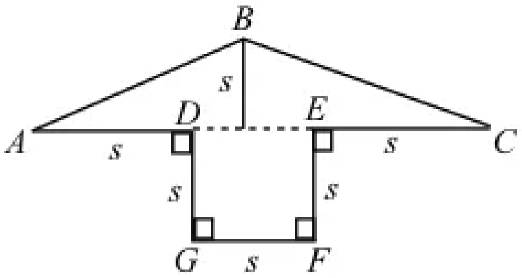
Use the value of π as 3.14

$$\begin{aligned} h &= \frac{5453}{100\pi} \\ &= \frac{5453}{100(3.14)} \\ &= \frac{5453}{314} \\ &\approx 17.4 \end{aligned}$$

Therefore, the height of a cylindrical container with volume 5453 cu. cm. and diameter of the base as 20 cm is approximately $\boxed{17.4 \text{ cm}}$.

Answer 42PA.

Draw the following diagram and label it;



The diagram shows an arrow made up of a triangle and a square.

The triangle is *ABC* with base *AC* and height *s*.

The square is *DEFG* with length of each side measuring *s*.

The objective is to find the area of the arrow.

The arrow is made up of triangle *ABC* and square *DEFG*. Hence, the area of the arrow is the sum of the areas of the triangle and the square.

So, find the area of triangle *ABC* and square *DEFG*.

Area of a triangle with base *b* and height *h* is given by;

$$A = \frac{1}{2}bh$$

The base of the triangle in the arrow is *AC*.

Write the length of segment *AC* as follows;

$$AC = AD + DE + EC$$

From figure;

$$AD = EC = s$$

Segment *DE* is one of the sides of the square *DEFG* with side *s*.

Hence, $DE = s$

Substitute *s* for *AD*, *DE* and *EC* and find length of *AC* as follows;

$$\begin{aligned} AC &= AD + DE + EC \\ &= s + s + s \\ &= 3s \end{aligned}$$

Thus, base of the triangle *ABC* is $3s$.

The height of the triangle is also *s*.

Substitute $3s$ for base *b* and *s* for height *h* in the formula for area of the triangle;

$$\begin{aligned} A(\triangle ABC) &= \frac{1}{2}bh \\ &= \frac{1}{2}(3s)\cdot s \\ &= \frac{3}{2}s^2 \end{aligned}$$

Thus, area of the triangle *ABC* is $\frac{3}{2}s^2$.

The length of the side of the square is *s*.

The area of a square with side *x* is x^2.

Hence, the area of the square *DEFG* with side *s* is s^2.

That is;

$$A(\square DEFG) = s^2$$

The area of the arrow is equal to the area of the triangle *ABC* plus the area of the square *DEFG*.

So, calculate the area of the arrow as follow;

$$\begin{aligned} \text{Required Area} &= A(\triangle ABC) + A(\square DEFG) \\ &= \frac{3}{2}s^2 + s^2 \\ &= \frac{3s^2 + 2s^2}{2} \\ &= \frac{5}{2}s^2 \end{aligned}$$

Therefore, the area of the arrow is $\boxed{\frac{5}{2}s^2}$.

Answer 44PA.

Write the following equation;

$$2x + y = 5$$

The objective is to find the value of $4x$.

Collect all the terms containing *x* on one side of the equation.

So, subtract y from both sides of the equation and rewrite the equation as follows;

Combine the like terms

$$\begin{aligned} 2x + y &= 5 \\ 2x + y - y &= 5 - y \\ 2x &= 5 - y \end{aligned}$$

Multiply both sides of the equation by 2;

$$\begin{aligned} 2x &= 5 - y \\ 2 \cdot 2x &= 2 \cdot (5 - y) \end{aligned}$$

Use the distributive property to open the parenthesis.

The distributive property states that for any real numbers *a*, *b* and *c*;

$$a \cdot (b \pm c) = a \cdot b \pm a \cdot c$$

Thus, rewrite the equation using distributive property as follows;

Multiply

$$\begin{aligned} 2 \cdot 2x &= 2 \cdot (5 - y) \\ 4x &= 2 \cdot 5 - 2 \cdot y \\ 4x &= 10 - 2y \end{aligned}$$

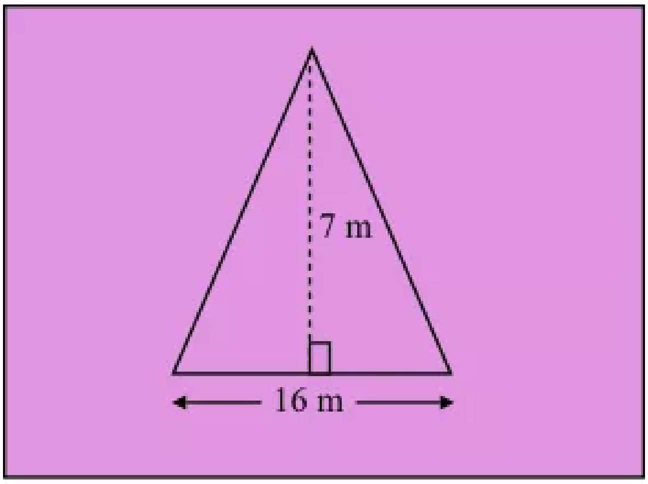
So, the value of $4x$ is $10 - 2y$.

This value is listed in option B.

Therefore, choose option $\boxed{\text{B}}$.

Answer 45PA.

Draw the following diagram;



The length of the base of the triangle is 16 m and its height is 7 m.

The objective is to find the area of the triangle.

Area of a triangle with length of the base *b* and height *h* is given by;

$$A = \frac{1}{2}bh$$

The triangle in the diagram above has a base with length 16 m and height 7 m.

So, substitute 16 for base *b* and 7 for height *h* in the formula for area of the triangle;

$$\begin{aligned} \text{Area} &= \frac{1}{2}bh \\ &= \frac{1}{2}\cdot 16\cdot 7 \\ &= 56 \text{ sq. m.} \end{aligned}$$

Thus, area of the triangle is 56 sq. m.

This answer is listed in option C.

Therefore, choose the option $\boxed{\text{C}}$.

Answer 46MYS.

The price of the camera is $85.00

The discount on the original price is 20%.

The objective is to find the price of the camera after discount.

The price of the camera after discount is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 20% of the original price of the camera.

So calculate 20% of $85.00

Do the following calculation for discount;

$$\begin{aligned} 20\% \text{ of } 85 &= \frac{20}{100}\times 85 \\ &= 17 \end{aligned}$$

Thus, the discount on the original price of the camera is $17.00

Subtract the discount price from the original price of the camera.

New price = Original price − discount

So, calculate the discounted price as follows;

$$\begin{aligned}\text{Discounted price} &= 85 - 17\\ &= 68\end{aligned}$$

Therefore, the price of the camera after discount is $\boxed{\$68.00}$.

Answer 47MYS.

The price of the scarf is \$15.00

The discount on the original price is 35%.

The objective is to find the price of the scarf after discount.

The price of the scarf after discount is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 35% of the original price of the scarf.

So calculate 35% of \$15.00

Do the following calculation for discount;

$$\begin{aligned}35\% \text{ of } 15 &= \frac{35}{100} \times 15\\ &= 5.25\end{aligned}$$

Thus, the discount on the original price of the scarf is \$5.25

Subtract the discount price from the original price of the scarf.

New price = Original price − discount

So, calculate the discounted price as follows;

$$\begin{aligned}\text{Discounted price} &= 15.00 - 5.25\\ &= 9.75\end{aligned}$$

Therefore, the price of the scarf after discount is $\boxed{\$9.75}$.

Answer 48MYS.

The price of the television is \$299.00

The discount on the original price is 15%.

The objective is to find the price of the television after discount.

The price of the television after discount is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 15% of the original price of the television.

So calculate 15% of \$299.00

Do the following calculation for discount;

$$\begin{aligned} 15\% \text{ of } 299 &= \frac{15}{100} \times 299 \\ &= 44.85 \end{aligned}$$

Thus, the discount on the original price of the television is \$44.85

Subtract the discount price from the original price of the television.

New price = Original price − discount

So, calculate the discounted price as follows;

$$\begin{aligned} \text{Discounted price} &= 299.00 - 44.85 \\ &= 254.15 \end{aligned}$$

Therefore, the price of the television after discount is $\boxed{\$254.15}$.

Answer 49MYS.

Write the following proportion;

$$\frac{2}{9} = \frac{5}{a}$$

The objective is to find the value of the variable *a*.

Cross multiply the terms;

$$\begin{aligned} \frac{2}{9} &= \frac{5}{a} \\ 2 \cdot a &= 5 \cdot 9 \end{aligned}$$

Carry out the multiplication and write the equation in terms of *a* as follows;

$$\begin{aligned} 2 \cdot a &= 5 \cdot 9 \\ 2a &= 45 \end{aligned}$$

Divide both sides of the equations by 2;

$$\begin{aligned} \frac{2a}{2} &= \frac{45}{2} \\ a &= 22.5 \end{aligned}$$

Therefore, the value of the variable in the proportion is $\boxed{a = 22.5}$.

Answer 50MYS.

Write the following proportion;

$$\frac{15}{32}=\frac{t}{8}$$

The objective is to find the value of the variable *t*.

Cross multiply the terms;

$$\frac{15}{32}=\frac{t}{8}$$
$$15\cdot 8=t\cdot 32$$

Carry out the multiplication and write the equation in terms of *t* as follows;

$$15\cdot 8=t\cdot 32$$
$$120=32t$$

Divide both sides of the equations by 32;

$$\frac{120}{32}=\frac{32t}{32}$$
$$3.75=t$$
$$t=3.75$$

Therefore, the value of the variable in the proportion is $\boxed{t=3.75}$.

Answer 51MYS.

Write the following proportion;

$$\frac{x+1}{8}=\frac{3}{4}$$

The objective is to find the value of the variable *x*.

Cross multiply the terms;

$$\frac{x+1}{8}=\frac{3}{4}$$
$$(x+1)\cdot 4=3\cdot 8$$

Use the distributive property which states that for any real numbers *a*, *b* and *c*;

$$(a+b)\cdot c=a\cdot c+b\cdot c$$

Carry out the multiplication and write the equation in terms of *x* as follows;

$$(x+1)\cdot 4=3\cdot 8$$
$$x\cdot 4+1\cdot 4=3\cdot 8$$
$$4x+4=24$$

Subtract 4 from both sides of the equation;

Combine the like terms

$$4x+4=24$$
$$4x+4-4=24-4$$
$$4x=20$$

Divide both sides of the equations by 4;

$$\frac{4x}{4}=\frac{20}{4}$$
$$x=5$$

Therefore, the value of the variable in the proportion is $\boxed{x=5}$.

Answer 52MYS.

Write the following numbers;

$$\frac{1}{4},\sqrt{\frac{1}{4}},0.\overline{5},0.2$$

The objective is to arrange the numbers from smallest to largest.

Express each number in decimal form.

$$\frac{1}{4}=0.25$$
$$\sqrt{\frac{1}{4}}=\sqrt{0.25}$$
$$=0.50$$

Write the numbers $0.\overline{5}$ and 0.2;

$$0.\overline{5}=0.555555...$$
$$=0.5\overline{5}$$
$$0.2=0.20$$

Compare the decimals as follows;

$$0.20<0.25<0.50<0.5\overline{5}$$

Therefore, write the respective fractions in the order smallest to greatest as;

$$\boxed{0.2,\frac{1}{4},\sqrt{\frac{1}{4}},0.\overline{5}}$$

Answer 53MYS.

Write the following numbers;

$$\sqrt{5}, 3, \frac{2}{3}, 1.1$$

The objective is to arrange the numbers from smallest to largest.

Express each number in decimal form.

$$\sqrt{5} = 2.2360679...$$
$$\approx 2.2$$
$$\frac{2}{3} = 0.6666666...$$
$$= 0.\overline{6}$$

Write the numbers $3 \text{ and } 1.1$;

$$3 = 3.0$$
$$1.1 = 1.1$$

Compare the decimals as follows;

$$0.\overline{6} < 1.1 < 2.2 < 3.0$$

Therefore, write the respective fractions in the order smallest to greatest as;

$$\boxed{\frac{2}{3}, 1.1, \sqrt{5}, 3}$$

Answer 54MYS.

Write the following expression;

$$2.18 + (-5.62)$$

The objective is to find the sum.

Observe that one of the numbers is positive and the other negative.

To add a positive and a negative number, find the difference between the absolute values of the numbers and place the sign of the number that has greater absolute value.

The absolute value of a number *a* is denoted by $|a|$ and is defined as;

$$|a| = a \quad \text{if } a \geq 0$$
$$= -a \quad \text{if } a < 0$$

So, find the absolute values of the numbers $2.18 \text{ and } -5.62$ as follows;

Product of two negative signs is positive

$$|2.18| = 2.18$$
$$|-5.62| = -(-5.62)$$
$$= 5.62$$

So, find the difference as follows;

$$5.62 - 2.18 = 3.44$$

Write the sign of the number that has greater absolute value.

The number -5.62 has greater absolute value. Hence place a negative sign in the result.

Therefore, the sum $2.18 + (-5.62)$ is $\boxed{-3.44}$.

Answer 55MYS.

Write the following expression;

$$-\frac{1}{2}-\left(-\frac{3}{4}\right)$$

The objective is to find the difference.

To find the difference of two numbers, add the additive inverse of the number to be subtracted.

Additive inverse of a number is the same number with an opposite sign.

Hence, the additive inverse of the number $-\frac{3}{4}$ is $\frac{3}{4}$.

So, rewrite the expression as follows;

$$-\frac{1}{2}-\left(-\frac{3}{4}\right)=-\frac{1}{2}+\frac{3}{4}$$

To add a positive and a negative number, find the difference between the absolute values of the numbers and place the sign of the number that has greater absolute value.

The absolute value of a number a is denoted by $|a|$ and is defined as;

$$\begin{aligned}|a| &= a \quad \text{if } a \geq 0 \\ &= -a \quad \text{if } a < 0\end{aligned}$$

So, find the absolute values of the numbers $-\frac{1}{2}$ and $\frac{3}{4}$ as follows;

Product of two negative signs is positive

$$\begin{aligned}\left|-\frac{1}{2}\right| &= -\left(-\frac{1}{2}\right) \\ &= \frac{1}{2} \\ \left|\frac{3}{4}\right| &= \frac{3}{4}\end{aligned}$$

So, find the difference as follows;

$$\begin{aligned}\frac{3}{4}-\frac{1}{2} &= \frac{3-2}{4} \\ &= \frac{1}{4}\end{aligned}$$

Write the sign of the number that has greater absolute value.

The number $\frac{3}{4}$ has greater absolute value. Hence place a positive sign in the result.

Therefore, the difference $-\frac{1}{2}-\left(-\frac{3}{4}\right)$ is $\boxed{\frac{1}{4}}$.

Answer 56MYS.

Write the following expression;

$$-\frac{2}{3}-\frac{2}{5}$$

The objective is to find the difference.

To find the difference of two numbers, add the additive inverse of the number to be subtracted.

Additive inverse of a number is the same number with an opposite sign.

Hence, the additive inverse of the number $\frac{2}{5}$ is $-\frac{2}{5}$.

So, rewrite the expression as follows;

$$-\frac{2}{3}-\frac{2}{5}=-\frac{2}{3}+\left(-\frac{2}{5}\right)$$

To add two negative numbers, find the sum of the absolute values of the numbers and place a negative sign.

The absolute value of a number *a* is denoted by $|a|$ and is defined as;

$$\begin{aligned} |a| &= a \quad \text{if } a \geq 0 \\ &= -a \quad \text{if } a < 0 \end{aligned}$$

So, find the absolute values of the numbers $-\frac{2}{3}$ and $-\frac{2}{5}$ as follows;

Product of two negative signs is positive

$$\begin{aligned} \left|-\frac{2}{3}\right| &= -\left(-\frac{2}{3}\right) \\ &= \frac{2}{3} \end{aligned}$$

$$\begin{aligned} \left|-\frac{2}{5}\right| &= -\left(-\frac{2}{5}\right) \\ &= \frac{2}{5} \end{aligned}$$

Find the sum as follows;

Rationalize the denominators

$$\begin{aligned} \frac{2}{3}+\frac{2}{5} &= \frac{10+6}{3\cdot 5} \\ &= \frac{16}{15} \end{aligned}$$

Place a negative sign in the result.

Therefore, the difference $-\frac{2}{3}-\frac{2}{5}$ is $\boxed{-\frac{16}{15}}$.

Answer 57MYS.

Write the following statement;

$$mnp = 1mnp$$

The statement illustrates that the number multiplied by 1 is the number itself.

This relates to the multiplicative identity property of real numbers.

The multiplicative identity property of real numbers states that;

'Any real number multiplied by the number 1 is the number itself. The number 1 is called the multiplicative identity.'

Therefore, the statement $mnp = 1mnp$ illustrates the $\boxed{\text{multiplictive identity property}}$.

Answer 58MYS.

Write the following statement;

$$\text{If } 6 = 9 - 3 \text{ then } 9 - 3 = 6$$

The statement illustrates that if one number *a*, is equal to other number *b* then the other number *b* is equal to the number *a*.

This relates to the symmetric property of real numbers.

The symmetric property of real numbers states that for any two real numbers *a* and *b*;

$$\text{If } a = b \text{ then } b = a$$

Therefore, the statement $\text{If } 6 = 9 - 3 \text{ then } 9 - 3 = 6$ illustrates the $\boxed{\text{symmetric property}}$.

Answer 59MYS.

Write the following statement;

$$32 + 21 = 32 + 21$$

The statement illustrates that a number is equal to itself.

This relates to the reflexive property of real numbers.

The reflexive property of real numbers states that for any real number *a*;

$$a = a$$

Therefore, the statement $32 + 21 = 32 + 21$ illustrates the $\boxed{\text{reflexive property}}$.

Answer 60MYS.

Write the following statement;

$$8+(3+9)=8+12$$

The sum, $3+9=12$.

So, the number 12 is substituted in place of $3+9$ in the expression $8+(3+9)=8+12$.

This relates to the substitution property of real numbers.

The substitution property of real numbers states that if $x=y$ then *x* can be substituted by *y* in any expression containing *x*.

Therefore, the statement $8+(3+9)=8+12$ illustrates the $\boxed{\text{substitution property}}$.

Answer 61MYS.

Write the following expression;

$$6(2-t)$$

The objective is to simplify the expression.

Use the distributive property to open the parenthesis.

The distributive property states that for any real numbers *a*, *b* and *c*;

$$a(b\pm c)=a\cdot b\pm a\cdot c$$

So, rewrite the expression using the property as follows;

$$\begin{aligned} 6(2-t) &= 6\cdot 2-6\cdot t \\ &= 12-6t \end{aligned}$$

Therefore, the required expression is $\boxed{12-6t}$.

Answer 62MYS.

Write the following expression;

$$(5+2m)3$$

The objective is to simplify the expression.

Use the distributive property to open the parenthesis.

The distributive property states that for any real numbers *a*, *b* and *c*;

$$(a\pm b)c=a\cdot c\pm b\cdot c$$

So, rewrite the expression using the property as follows;

$$\begin{aligned} (5+2m)3 &= 5\cdot 3+2m\cdot 3 \\ &= 15+6m \end{aligned}$$

Therefore, the required expression is $\boxed{15+6m}$.

Answer 63MYS.

Write the following expression;

$$-7(3a+b)$$

The objective is to simplify the expression.

Use the distributive property to open the parenthesis.

The distributive property states that for any real numbers *a*, *b* and *c*;

$$a(b\pm c)=a\cdot b\pm a\cdot c$$

So, rewrite the expression using the property as follows;

Product of a negative sign with positive sign is negative

$$\begin{aligned}-7(3a+b)&=-7\cdot 3a+(-7)\cdot b\\&=-7\cdot 3a-7\cdot b\\&=-21a-7b\end{aligned}$$

Therefore, the required expression is $\boxed{-21a-7b}$.

Answer 64MYS.

Write the following expression;

$$\frac{2}{3}(6h-9)$$

The objective is to simplify the expression.

Use the distributive property to open the parenthesis.

The distributive property states that for any real numbers *a*, *b* and *c*;

$$a(b\pm c)=a\cdot b\pm a\cdot c$$

So, rewrite the expression using the property as follows;

Cancel the common factors

$$\begin{aligned}\frac{2}{3}(6h-9)&=\frac{2}{3}\cdot 6h-\frac{2}{3}\cdot 9\\&=2\cdot 2h-2\cdot 3\\&=4h-6\end{aligned}$$

Therefore, the required expression is $\boxed{4h-6}$.

Answer 65MYS.

Write the following expression;

$$-\frac{3}{5}(15-5t)$$

The objective is to simplify the expression.

Use the distributive property to open the parenthesis.

The distributive property states that for any real numbers *a*, *b* and *c*;

$$a(b \pm c) = a \cdot b \pm a \cdot c$$

So, rewrite the expression using the property as follows;

Product of a negative sign with negative sign is positive

Cancel the common factors

$$\begin{aligned} -\frac{3}{5}(15-5t) &= -\frac{3}{5} \cdot 15 - \left(-\frac{3}{5}\right) \cdot 5t \\ &= -3 \cdot 3 + 3 \cdot t \\ &= -9 + 3t \end{aligned}$$

Therefore, the required expression is $\boxed{-9+3t}$.

Answer 66MYS.

Write the following expression;

$$0.25(6p+12)$$

The objective is to simplify the expression.

Use the distributive property to open the parenthesis.

The distributive property states that for any real numbers *a*, *b* and *c*;

$$a(b \pm c) = a \cdot b \pm a \cdot c$$

So, rewrite the expression using the property as follows;

$$\begin{aligned} 0.25(6p+12) &= (0.25) \cdot 6p + (0.25) \cdot 12 \\ &= 1.5p + 3 \end{aligned}$$

Therefore, the required expression is $\boxed{1.5p+3}$.