Chapter 1. Language of Algebra

Ex. 1.3

Answer 1CU.

<u>**The differences between "expression" and "an open sentence"**</u> :

An expression: The word expression is a term for any well-formed combination of mathematical symbols. An algebraic expression is only a phrase, not a whole sentence, so it can not contain an equality sign $(=)$.

Example: $x^3+x-4.$

An open sentences: A mathematical statement with one or more variables is called an open sentence. An open sentence (usually an equation or inequality) is described as "open" in the sense that its truth value are replaced with specific numbers, at which point the truth value can usually be determined (and hence the sentences are no longer regarded as "open").

Example: $3x-7=29,$ whose only solution for *x* is $12.$

Example: $4x+3>9,$ Whose solutions for *x* are all numbers greater than $\frac{3}{2}.$

Answer 1PQ.

The given algebraic expression is $x-20$

Then **verbal expression** is $\boxed{\text{"twenty less than } x\text{"}}.$

Answer 2CU.

Let an inequality is $x+1\geq 8,$

Now verify the solution set $\{8,9,10,11,...\}.$

That is

x	$x+1\geq 8$	**True or False?**
8	$8+1\overset{?}{\geq}8\Rightarrow 9\geq 8$	True
9	$9+1\overset{?}{\geq}8\Rightarrow 10\geq 8$	True
10	$10+1\overset{?}{\geq}8\Rightarrow 11\geq 8$	True

Hence **an inequality** $\boxed{x+1\geq 8},$ satisfied the solution set $\{8,9,10,11,...\}.$

Answer 2PQ.

The given algebraic expression is $5n+2$

Terms $5n$ means five times of *n*

Addition means increased by

Then **verbal expression** is $\boxed{\text{" five times of } n \text{ is increased by 2"}}$.

Answer 3CU.

An open sentence has at least one variable because it is neither true nor false until specific values are used for the variable.

Example: $3x-7=29,$ in which *x* is variable whose only solution is $12.$

That is, this open sentence $3x-7=29,$ is true only for $x=12.$

Answer 3PQ.

The given algebraic expression is a^3

Terms a^3 means three times multiplication of *a* that is *a* cubed

Then **verbal expression** is $\boxed{\text{" } a \text{ cubed"}}$.

Answer 4CU.

The given equation is $3x-7=29.$

Now replace *x* in $3x-7=29$ with each value in the replacement set $\{10,11,12,13,14,15\}.$

Then

x	$3x-7=29$	**True or False?**
10	$3(10)-7\overset{?}{=}29 \Rightarrow 23 \neq 29$	False
11	$3(11)-7\overset{?}{=}29 \Rightarrow 26 \neq 29$	False
12	$3(12)-7\overset{?}{=}29 \Rightarrow 29 = 29$	**True**
13	$3(13)-7\overset{?}{=}29 \Rightarrow 32 \neq 29$	False
14	$3(14)-7\overset{?}{=}29 \Rightarrow 35 \neq 29$	False
15	$3(15)-7\overset{?}{=}29 \Rightarrow 38 \neq 29$	False

Since $x=12$ makes the equation true, the solution of $3x-7=29$ is $12.$

Hence $\boxed{\text{"The solution set is } \{12\}\text{"}}$.

Answer 4PQ.

The given algebraic expression is $n^4 - 1$

Terms n^4 means *n* to the fourth power

Subtraction means decreased by

Then **verbal expression** is $\boxed{\text{"}n\text{ to the fourth power decreased by 1"}}$.

Answer 5CU.

The given equation is $12(x-8)=84.$

Now replace *x* in $12(x-8)=84$ with each value in the replacement set $\{10,11,12,13,14,15\}$.

Then

x	$12(x-8)=84$	**True or False?**
10	$12(10-8)\stackrel{?}{=}84 \Rightarrow 24 \neq 84$	False
11	$12(11-8)\stackrel{?}{=}29 \Rightarrow 36 \neq 84$	False
12	$12(12-8)\stackrel{?}{=}29 \Rightarrow 48 \neq 84$	False
13	$12(13-8)\stackrel{?}{=}84 \Rightarrow 60 \neq 84$	False
14	$12(14-8)\stackrel{?}{=}84 \Rightarrow 72 \neq 84$	False
15	$12(15-8)\stackrel{?}{=}84 \Rightarrow 84 = 84$	**True**

Since $x=15$ makes the equation true, the solution of $12(x-8)=84$ is $15.$

Hence $\boxed{\text{"The solution set is } \{15\}\text{"}}$.

Answer 5PQ.

The given expression is $6(9)-2(8+5).$

Now evaluate it using order of operation rules.

Then, get

$$6(9)-2(8+5) \qquad \text{(Original expression)}$$

$$=54-2(13) \qquad \left(\begin{array}{l}\text{Simplify the brackets that is}\\ \text{multiply 6 and 9 and}\\ \text{add 8 and 5}\end{array}\right)$$

Hence solution is $\boxed{6(9)-2(8+5)=28}$.

The given equation is $x+\frac{2}{5}=1\frac{3}{20}$.

Now simplifying the equation, get

$$x+\frac{2}{5}=\frac{23}{20}.$$

Now replace x in $x+\frac{2}{5}=\frac{23}{20}$ with each value in the replacement set $\left\{\frac{1}{4},\frac{1}{2},\frac{3}{4},1,1\frac{1}{4}\right\}$.

Then

The equation is $x+\frac{2}{5}=\frac{23}{20}$, now for $x=\frac{1}{4}$

Taking the left hand side

$$\begin{aligned}\text{L.H.S.} &= x+\frac{2}{5}\\ &=\frac{1}{4}+\frac{2}{5} \qquad (\text{putting the value of } x)\\ &=\frac{1\times5+2\times4}{4\times5}\\ &=\frac{13}{20}\end{aligned}$$

$$\Rightarrow \frac{13}{20}\neq\frac{23}{20}$$
$$\text{L.H.S.}\neq\text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

x	$x+\frac{2}{5}=\frac{23}{20}$	**True or False?**
$\frac{1}{4}$	$\frac{1}{4}+\frac{2}{5}\stackrel{?}{=}\frac{23}{20}\Rightarrow\frac{13}{20}\neq\frac{23}{20}$	False
$\frac{1}{2}$	$\frac{1}{2}+\frac{2}{5}\stackrel{?}{=}\frac{23}{20}\Rightarrow\frac{9}{10}\neq\frac{23}{20}$	False
$\frac{3}{4}$	$\frac{3}{4}+\frac{2}{5}\stackrel{?}{=}\frac{23}{20}\Rightarrow\frac{23}{20}=\frac{23}{20}$	**True**
1	$1+\frac{2}{5}\stackrel{?}{=}\frac{23}{20}\Rightarrow\frac{7}{5}\neq\frac{23}{20}$	False
$1\frac{1}{4}$	$\frac{5}{4}+\frac{2}{5}\stackrel{?}{=}\frac{23}{20}\Rightarrow\frac{33}{20}\neq\frac{23}{20}$	False

Since $x=\frac{3}{4}$ makes the equation true, the solution of $x+\frac{2}{5}=1\frac{3}{20}$ is $\frac{3}{4}$.

Hence $\boxed{\text{"The solution set is } \left\{\frac{3}{4}\right\}\text{"}}$.

Answer 6PQ.

The given expression is $4\left[2+(18\div 9)^3\right]$.

Now evaluate it using order of operation rules.

Then, get

$$\begin{aligned}
&4\left[2+(18\div 9)^3\right] && \text{(Original expression)}\\
&=4\left[2+(2)^3\right] && \text{(Simplify the brackets that is divide 18 by 9)}\\
&=4[2+8] && \text{(Simplify the power)}\\
&=4(10) && \text{(Simplify the brackets that is add 2 by 8)}\\
&=40 && \text{(multiply 4 and 10)}
\end{aligned}$$

Hence solution is $\boxed{4\left[2+(18\div 9)^3\right]=40}$.

Answer 7CU.

The given equation is $7\cdot 2(x+2)=25\cdot 92$.

Now replace x in $7\cdot 2(x+2)=25\cdot 92$ with each value in the replacement set $\{1\cdot 2, 1\cdot 4, 1\cdot 6, 1\cdot 8\}$.

Then

The equation is $7\cdot 2(x+2)=25\cdot 92$, now for $x=1\cdot 2$

Taking the left hand side

$$\begin{aligned}
\text{L.H.S.} &= 7\cdot 2(x+2)\\
&= 7\cdot 2(1\cdot 2+2) && \text{(putting the value of } x\text{)}\\
&= 7\cdot 2(3\cdot 2)\\
&= 23\cdot 04
\end{aligned}$$

$$\Rightarrow 23\cdot 04 \neq 25\cdot 92$$
$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

x	$7\cdot 2(x+2)=25\cdot 92$	**True or False?**
$1\cdot 2$	$7\cdot 2(1\cdot 2+2)\stackrel{?}{=}25\cdot 92 \Rightarrow 23\cdot 04 \neq 25\cdot 92$	False
$1\cdot 4$	$7\cdot 2(1\cdot 4+2)\stackrel{?}{=}25\cdot 92 \Rightarrow 24\cdot 48 \neq 25\cdot 92$	False
$1\cdot 6$	$7\cdot 2(1\cdot 6+2)\stackrel{?}{=}25\cdot 92 \Rightarrow 25\cdot 92 = 25\cdot 92$	**True**
$1\cdot 8$	$7\cdot 2(1\cdot 8+2)\stackrel{?}{=}25\cdot 92 \Rightarrow 27\cdot 36 \neq 25\cdot 92$	False

Since $x=1\cdot 6$ makes the equation true, the solution of $7\cdot 2(x+2)=25\cdot 92$ is $1\cdot 6$.

Hence $\boxed{\text{"The solution set is } \{1\cdot 6\}\text{"}}$.

Answer 7PQ.

The given expression is $9(3)-4^2+6^2\div 2$.

Now evaluate it using order of operation rules.

Then, get

$$\begin{aligned}
&9(3)-4^2+6^2\div 2 && \text{(Original expression)}\\
&=27-16+36\div 2 && \text{(Simplify the powers)}\\
&=27-16+18 && \text{(Divide 36 by 2)}\\
&=45-16 && \text{(Add 27 and 18)}\\
&=29 && \text{(Subtract 16 from 45)}
\end{aligned}$$

Hence solution is $\boxed{9(3)-4^2+6^2\div 2=29}$.

Answer 8CU.

Definition (Algebraic equation): An algebraic equation is an equation of the form,

$$P=Q$$

where P and Q are polynomials with coefficients in some field.

Order of operations: "Operations" mean things like add, subtract, multiply, divide, squaring etc.

Now way to simplify algebraic equation

- Do things in Brackets first.
- Orders (i.e. Powers and square roots etc.),
- Multiply and divide before addition and subtraction (left to right)

The given equation is $4(6)+3=x$.

Now solve it for *x*, that is find the value of *x*.

Then using order of operation rule, get

$$\begin{aligned}
&4(6)+3=x && \text{(Write original equation)}\\
&24+3=x && \text{(Simplify the bracket)}\\
&27=x && \text{(Simplify addtion)}
\end{aligned}$$

Hence $\boxed{x=27}$.

Answer 8PQ.

The given expression is $\frac{(5-2)^2}{3(4\times 2-7)}$.

Now evaluate it using order of operation rules.

Then, get

$$\begin{aligned}
&\frac{(5-2)^2}{3(4\times 2-7)} && (\text{Original expression})\\
&=\frac{(3)^2}{3(8-7)} && \begin{pmatrix}\text{Subtract 2 from 5 in numerator}\\ \text{Multiply 4 and 2 in denominator}\end{pmatrix}\\
&=\frac{9}{3(1)} && \begin{pmatrix}\text{simplify the power in numerator}\\ \text{Subtract 7 from 8 in denominator}\end{pmatrix}\\
&=3 && (\text{Divide 9 by 3})
\end{aligned}$$

Hence solution is $\boxed{\frac{(5-2)^2}{3(4\times 2-7)}=3}$.

Answer 9CU.

Definition (Algebraic equation): An algebraic equation is an equation of the form

$$P=Q$$

where P and Q are polynomials with coefficients in some field.

Order of operations: "Operations" mean things like add, subtract, multiply, divide, squaring etc.

Now way to simplify algebraic equation

- Do things in Brackets first.
- Orders (i.e. Powers and square roots etc.),
- Multiply and divide before addition and subtraction (left to right)

The given equation is $w=\frac{14-8}{2}$.

Now solve it for *w*, that is find the value of *w*.

Then using order of operations rule, get

$$\begin{aligned}
w&=\frac{(14-8)}{2} && (\text{Write original equation})\\
w&=\frac{6}{2} && (\text{Simplify substraction})\\
w&=3 && (\text{Simplify division})
\end{aligned}$$

Hence $\boxed{w=3}$.

Answer 9PQ.

The given expression is $\frac{5a^2+c-2}{6+b}$.

Now evaluate it using order of operation rules.

Then, get

$$\begin{aligned}
&\frac{5a^2+c-2}{6+b} && \text{(Original expression)}\\
&=\frac{5(4)^2+10-2}{6+5} && \text{(Putting the given values of } a, b \text{ and } c\text{)}\\
&=\frac{5(16)+10-2}{6+5} && \text{(simplify the power in numerator)}\\
&=\frac{80+10-2}{11} && \left(\begin{array}{l}\text{simplify the bracket in numerator}\\ \text{add 6 and 5 in denominator}\end{array}\right)\\
&=\frac{90-2}{11} && \text{(add 80 and 10 in numerator)}\\
&=\frac{88}{11} && \text{(Subtract 2 from 90)}\\
&=8 && \text{(Divide 88 by 11)}
\end{aligned}$$

Hence solution is $\boxed{\frac{5a^2+c-2}{6+b}=8}$.

Answer 10CU.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $24-2x \geq 13$.

Now replace *x* in $24-2x \geq 13$ with each value in the replacement set $\{0,1,2,3,4,5,6\}$.

Then

The inequality is $24-2x \geq 13$, now for $x=0$

Taking the left hand side

$$\begin{aligned}
\text{L.H.S.} &= 24-2x\\
&= 24-2(0) && \text{(putting the value of } x\text{)}\\
&= 24\\
\Rightarrow 24 &\geq 13
\end{aligned}$$

Similarly putting the remaining values of replacement set in the inequality, get

x	$24-2x \geq 13$	**True or False?**
0	$24-2(0)\overset{?}{\geq}13 \Rightarrow 24 \geq 13$	True
1	$24-2(1)\overset{?}{\geq}13 \Rightarrow 22 \geq 13$	True
2	$24-2(2)\overset{?}{\geq}13 \Rightarrow 20 \geq 13$	True
3	$24-2(3)\overset{?}{\geq}13 \Rightarrow 18 \geq 13$	True
4	$24-2(4)\overset{?}{\geq}13 \Rightarrow 16 \geq 13$	True
5	$24-2(5)\overset{?}{\geq}13 \Rightarrow 14 \geq 13$	True
6	$24-2(6)\overset{?}{\geq}13 \Rightarrow 12 \geq 13$	False

Since $x=0,1,2,3,4,5$ make the equation true,

Hence the solution set for inequality $24-2x \geq 13$ is $\boxed{\{0,1,2,3,4,5\}}$.

Answer 10PQ.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $2n^2+3\le 75.$

Now replace *n* in $2n^2+3\le 75$ with each value in the replacement set $\{4,5,6,7,8,9\}$.

Then

The inequality is $2n^2+3\le 75$ now for $n=4$

Taking the left hand side

$$\begin{aligned}
\text{L.H.S.} &= 2n^2+3 \\
&= 2(4)^2+3 && (\text{putting the value of } n) \\
&= 2(16)+3 && (\text{Simplifying power}) \\
&= 32+3 && (\text{Multiply 16 and 2}) \\
&= 35 && (\text{Add 32 and 3}) \\
\Rightarrow 35 &\le 75
\end{aligned}$$

Similarly putting the remaining values of replacement set in the inequality, get

n	$2n^2+3\le 75$	**True or False?**
4	$2(4)^2+3\overset{?}{\le}75\Rightarrow 35\le 75$	True
5	$2(5)^2+3\overset{?}{\le}75\Rightarrow 53\le 75$	True
6	$2(6)^2+3\overset{?}{\le}75\Rightarrow 75\le 75$	True
7	$2(7)^2+3\overset{?}{\le}75\Rightarrow 101\le 75$	False
8	$2(8)^2+3\overset{?}{\le}75\Rightarrow 131\le 75$	False
9	$2(9)^2+3\overset{?}{\le}75\Rightarrow 165\le 75$	False

Since $x=4,5,6$ make the inequality true,

Hence the solution set for inequality $2n^2+3\le 75$ is $\boxed{\{4,5,6\}}$.

Answer 11CU.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $3(12-x)-2 \le 28.$

Now replace x in $3(12-x)-2 \le 28$ with each value in the replacement set $\{1\cdot 5, 2, 2\cdot 5, 3\}$.

Then

An inequality is $3(12-x)-2 \le 28,$ now for $x=0$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= 3(12-x)-2 \\ &= 3(12-1\cdot 5)-2 \qquad \text{(putting the value of } x) \\ &= 3(10\cdot 5)-2 \\ \Rightarrow 29\cdot 5 &\not\le 28 \end{aligned}$$

Similarly putting the remaining values of replacement set in the inequality, get

x	$3(12-x)-2 \le 28$	**True or False?**
$1\cdot 5$	$3(12-1\cdot 5)-2 \overset{?}{\le} 28 \Rightarrow 29\cdot 5 \le 28$	False
2	$3(12-2)-2 \overset{?}{\le} 28 \Rightarrow 28 \le 28$	True
$2\cdot 5$	$3(12-2\cdot 5)-2 \overset{?}{\le} 28 \Rightarrow 26\cdot 5 \le 28$	True
3	$3(12-3)-2 \overset{?}{\le} 28 \Rightarrow 25 \le 28$	True

Since $x = 2, 2\cdot 5, 3$ make the equation true,

Hence the solution set for inequality $3(12-x)-2 \le 28$ is $\boxed{\{2, 2\cdot 5, 3\}}$.

Answer 14PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given equation is $b-12=9$.

Now replace b in $b-12=9$ with each value in the replacement set $\{12,17,18,21,25\}$.

Then

The equation is $b-12=9$, now for $b=12$

Taking the left hand side

$$\begin{aligned}\text{L.H.S.} &= b-12 \\ &= 12-12 \qquad \text{(putting the value of } b\text{)} \\ &= 0 \\ \Rightarrow 0 &\neq 9\end{aligned}$$

$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

b	$b-12=9$	**True or False?**
12	$12-12\stackrel{?}{=}9 \Rightarrow 0\neq 9$	False
17	$17-12\stackrel{?}{=}9 \Rightarrow 5\neq 9$	False
18	$18-12\stackrel{?}{=}9 \Rightarrow 6\neq 9$	False
21	$21-12\stackrel{?}{=}9 \Rightarrow 9=9$	True
25	$25-12\stackrel{?}{=}9 \Rightarrow 13\neq 9$	False

Since $b=21$ makes the equation true,

Hence the solution set for equation $b-12=9$ is $\boxed{\{21\}}$.

Answer 15PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given equation is $34-b=22$.

Now replace b in $34-b=22$ with each value in the replacement set $\{12,17,18,21,25\}$.

Then

The equation is $34-b=22$, now for $b=12$

Taking the left hand side

$$\begin{aligned}\text{L.H.S.} &= 34-b \\ &= 34-12 \qquad\qquad (\text{putting the value of } b) \\ &= 22 \\ &= \text{R.H.S.}\end{aligned}$$

$$\text{L.H.S.} = \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

b	$34-b=22$	**True or False?**
12	$34-12\stackrel{?}{=}22 \Rightarrow 22=22$	True
17	$34-17\stackrel{?}{=}22 \Rightarrow 17\neq 22$	False
18	$34-18\stackrel{?}{=}22 \Rightarrow 16\neq 22$	False
21	$34-21\stackrel{?}{=}22 \Rightarrow 13\neq 22$	False
25	$34-25\stackrel{?}{=}22 \Rightarrow 9\neq 22$	False

Since $b=12$ makes the equation true,

Hence the solution set for equation $34-b=22$ is $\boxed{\{12\}}$.

Answer 16PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given equation is $3a+7=31$.

Now replace *a* in $3a+7=31$ with each value in the replacement set $\{0,3,5,8,10\}$.

Then

The equation is $3a+7=31$, now for $a=0$

Taking the left hand side

$$\begin{aligned}\text{L.H.S.} &= 3a+7 \\ &= 3(0)+7 \qquad \text{(putting the value of } a\text{)} \\ &= 7 \\ &\neq 31.\end{aligned}$$

$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

a	$3a+7=31$	**True or False?**
0	$3(0)+7\stackrel{?}{=}31 \Rightarrow 7\neq 31$	False
3	$3(3)+7\stackrel{?}{=}31 \Rightarrow 16\neq 31$	False
5	$3(5)+7\stackrel{?}{=}31 \Rightarrow 22\neq 31$	False
8	$3(8)+7\stackrel{?}{=}31 \Rightarrow 31=31$	True
10	$3(10)+7\stackrel{?}{=}31 \Rightarrow 37\neq 31$	False

Since $a=8$ makes the equation true,

Hence the solution set for equation $3a+7=31$ is $\boxed{\{8\}}$.

Answer 17PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given equation is $4a+5=17$.

Now replace *a* in $4a+5=17$ with each value in the replacement set $\{0,3,5,8,10\}$.

Then

The equation is $4a+5=17$, now for $a=0$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= 4a+5 \\ &= 4(0)+5 \qquad\qquad \text{(putting the value of } a\text{)} \\ &= 5 \\ &\neq 17. \end{aligned}$$

$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

a	$4a+5=17$	**True or False?**
0	$4(0)+5\overset{?}{=}17 \Rightarrow 5 \neq 17$	False
3	$4(3)+5\overset{?}{=}17 \Rightarrow 17 = 17$	True
5	$4(5)+5\overset{?}{=}17 \Rightarrow 25 \neq 17$	False
8	$4(8)+5\overset{?}{=}17 \Rightarrow 37 \neq 17$	False
10	$4(10)+5\overset{?}{=}17 \Rightarrow 45 \neq 17$	False

Since $a=3$ makes the equation true,

Hence the solution set for equation $4a+5=17$ is $\boxed{\{3\}}$.

Answer 18PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given equation is $\frac{40}{a}-4=0$.

Now simplify the equation

$$\begin{aligned}
&\frac{40}{a}-4=0 && \text{(Write original equation)}\\
&a\left(\frac{40}{a}\right)=4a && \text{(Multiply each side by } a\text{)}\\
&40=4a && \text{(On Simplification)}\\
&40-4a=0
\end{aligned}$$

Now replace a in $40-4a=0$ with each value in the replacement set $\{0,3,5,8,10\}$.

Then

The equation is $40-4a=0$, now for $a=0$

Taking the left hand side

$$\begin{aligned}
\text{L.H.S.} &= 40-4a\\
&= 40-4(0) && \text{(putting the value of } a\text{)}\\
&= 40\\
&\neq 0.
\end{aligned}$$

$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

a	$40-4a=0$	**True or False?**
0	$40-4(0)\overset{?}{=}0 \Rightarrow 40\neq 0$	False
3	$40-4(3)\overset{?}{=}0 \Rightarrow 28\neq 0$	False
5	$40-4(5)\overset{?}{=}0 \Rightarrow 20\neq 0$	False
8	$40-4(8)\overset{?}{=}0 \Rightarrow 8\neq 0$	False
10	$40-4(10)\overset{?}{=}0 \Rightarrow 0=0$	True

Since $a=10$ makes the equation true,

Hence the solution set for equation $\frac{40}{a}-4=0$ is $\boxed{\{10\}}$.

Answer 19PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given equation is $\frac{b}{3}-2=4.$

Now simplify the equation

$$
\begin{aligned}
&\frac{b}{3}-2=4 && \text{(Write original equation)}\\
&\left(\frac{b}{3}-2\right)+2=4+2 && \text{(Add each side by 2)}\\
&3\left(\frac{b}{3}\right)=3\times 6 && \text{(Multiply each side by 3)}\\
&b-18=0 && \text{(On simplification)}
\end{aligned}
$$

Now replace *b* in $b-18=0$ with each value in the replacement set $\{12,17,18,21,25\}$.

Then

The equation is $b-18=0,$ now for $b=12$

Taking the left hand side

$$
\begin{aligned}
\text{L.H.S.} &= b-18\\
&=12-18 && \text{(putting the value of } b\text{)}\\
&=-6\\
&\neq 0.
\end{aligned}
$$

$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

b	$b-18=0$	**True or False?**
12	$12-18\overset{?}{=}0 \Rightarrow -6\neq 0$	False
17	$17-18\overset{?}{=}0 \Rightarrow -1\neq 0$	False
18	$18-18\overset{?}{=}0 \Rightarrow 0=0$	True
21	$21-18\overset{?}{=}0 \Rightarrow 3\neq 0$	False
25	$25-18\overset{?}{=}0 \Rightarrow 7\neq 0$	False

Since $b=18$ makes the equation true,

Hence the solution set for equation $\frac{b}{3}-2=4$ is $\boxed{\{18\}}$.

Answer 20PA.

The given equation is $x+\frac{7}{4}=\frac{17}{8}$.

Now replace x in $x+\frac{7}{4}=\frac{17}{8}$ with each value in the replacement set $\left\{\frac{1}{8},\frac{3}{8},\frac{5}{8},\frac{7}{8}\right\}$.

Then

The equation is $x+\frac{7}{4}=\frac{17}{8}$, now for $x=\frac{1}{8}$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= x+\frac{7}{4} \\ &= \frac{1}{8}+\frac{7}{4} \qquad \text{(putting the value of } x\text{)} \\ &= \frac{1+7\times 2}{8} \\ &= \frac{15}{8} \end{aligned}$$

$$\Rightarrow \frac{15}{8} \neq \frac{17}{8}$$
$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

x	$x+\frac{7}{4}=\frac{17}{8}$	**True or False?**
$\frac{1}{8}$	$\frac{1}{8}+\frac{7}{4}\stackrel{?}{=}\frac{17}{8} \Rightarrow \frac{15}{8}\neq\frac{17}{8}$	False
$\frac{3}{8}$	$\frac{3}{8}+\frac{7}{4}\stackrel{?}{=}\frac{17}{8} \Rightarrow \frac{17}{8}=\frac{17}{8}$	**True**
$\frac{5}{8}$	$\frac{5}{8}+\frac{7}{4}\stackrel{?}{=}\frac{17}{8} \Rightarrow \frac{19}{8}\neq\frac{17}{8}$	False
$\frac{7}{8}$	$\frac{5}{8}+\frac{7}{4}\stackrel{?}{=}\frac{17}{8} \Rightarrow \frac{19}{8}\neq\frac{17}{8}$	False

Since $x=\frac{3}{8}$ makes the equation true, the solution of $x+\frac{7}{4}=\frac{17}{8}$ is $\frac{3}{8}$.

Hence $\boxed{\text{"The solution set is } \left\{\frac{3}{8}\right\}\text{"}}$.

Answer 21PA.

The given equation is $x+\frac{7}{12}=\frac{25}{12}$.

Now replace x in $x+\frac{7}{12}=\frac{25}{12}$ with each value in the replacement set $\left\{\frac{1}{2},1,1\frac{1}{2},2\right\}$.

Then

The equation is $x+\frac{7}{12}=\frac{25}{12}$, now for $x=\frac{1}{2}$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= x+\frac{7}{12} \\ &= \frac{1}{2}+\frac{7}{12} \qquad \text{(putting the value of } x\text{)} \\ &= \frac{1\times 6+7\times 1}{12} \\ &= \frac{13}{12} \end{aligned}$$

$$\Rightarrow \frac{13}{12} \neq \frac{25}{12}$$
$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

x	$x+\frac{7}{12}=\frac{25}{12}$	True or False?
$\frac{1}{2}$	$\frac{1}{2}+\frac{7}{12}\stackrel{?}{=}\frac{25}{12} \Rightarrow \frac{13}{12}\neq\frac{25}{12}$	False
1	$1+\frac{7}{12}\stackrel{?}{=}\frac{25}{12} \Rightarrow \frac{19}{12}\neq\frac{25}{12}$	False
$1\frac{1}{2}$	$\frac{3}{2}+\frac{7}{12}\stackrel{?}{=}\frac{25}{12} \Rightarrow \frac{25}{12}=\frac{25}{12}$	True
2	$2+\frac{7}{12}\stackrel{?}{=}\frac{25}{12} \Rightarrow \frac{31}{12}\neq\frac{25}{12}$	False

Since $x=1\frac{1}{2}$ makes the equation true, the solution of $x+\frac{7}{12}=\frac{25}{12}$ is $1\frac{1}{2}$

Hence $\boxed{\text{"The solution set is } \left\{1\frac{1}{2}\right\}\text{"}}$.

Answer 22PA.

The given equation is $\frac{2}{5}(x+1)=\frac{8}{15}$.

Now replace *x* in $\frac{2}{5}(x+1)=\frac{8}{15}$ with each value in the replacement set $\left\{\frac{1}{6},\frac{1}{3},\frac{1}{2},\frac{2}{3}\right\}$.

Then

The equation is $\frac{2}{5}(x+1)=\frac{8}{15}$, now for $x=\frac{1}{6}$

Taking the left hand side

$$\begin{aligned}\text{L.H.S.} &= \frac{2}{5}(x+1)\\ &= \frac{2}{5}\left(\frac{1}{6}+1\right) \qquad \text{(putting the value of } x\text{)}\\ &= \frac{2}{5}\left(\frac{7}{6}\right)\\ &= \frac{7}{15}\end{aligned}$$

$$\Rightarrow \frac{7}{15}\neq\frac{8}{15}$$
$$\text{L.H.S.}\neq\text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

x	$\frac{2}{5}(x+1)=\frac{8}{15}$	**True or False?**
$\frac{1}{6}$	$\frac{2}{5}\left(\frac{1}{6}+1\right)\stackrel{?}{=}\frac{8}{15}\Rightarrow\frac{7}{15}\neq\frac{8}{15}$	False
$\frac{1}{3}$	$\frac{2}{5}\left(\frac{1}{3}+1\right)\stackrel{?}{=}\frac{8}{15}\Rightarrow\frac{8}{15}=\frac{8}{15}$	True
$\frac{1}{2}$	$\frac{2}{5}\left(\frac{1}{2}+1\right)\stackrel{?}{=}\frac{8}{15}\Rightarrow\frac{3}{5}\neq\frac{8}{15}$	False
$\frac{2}{3}$	$\frac{2}{5}\left(\frac{2}{3}+1\right)\stackrel{?}{=}\frac{8}{15}\Rightarrow\frac{2}{3}\neq\frac{8}{15}$	False

Since $x=\frac{1}{3}$ makes the equation true, the solution of $\frac{2}{5}(x+1)=\frac{8}{15}$ is $\frac{1}{3}$

Hence $\boxed{\text{"The solution set is } \left\{\frac{1}{3}\right\}\text{"}}$.

Answer 23PA.

The given equation is $2\cdot 7(x+5)=17\cdot 28.$

Now replace *x* in $2\cdot 7(x+5)=17\cdot 28$ with each value in the replacement set $\{1\cdot 2, 1\cdot 3, 1\cdot 4, 1\cdot 5\}.$

Then

The equation is $2\cdot 7(x+5)=17\cdot 28$, now for $x=1\cdot 2$

Taking the left hand side

$$\begin{aligned}\text{L.H.S.} &= 2\cdot 7(x+5)\\ &= 2\cdot 7(1\cdot 2+5) \qquad \text{(putting the value of } x\text{)}\\ &= 2\cdot 7(5\cdot 2)\\ &= 14\cdot 04\end{aligned}$$

$$\Rightarrow 14\cdot 04 \neq 17\cdot 28$$
$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

x	$2\cdot 7(x+5)=17\cdot 28$	**True or False?**
$1\cdot 2$	$2\cdot 7(1\cdot 2+5)\overset{?}{=}17\cdot 28 \Rightarrow 16\cdot 74 \neq 17\cdot 28$	False
$1\cdot 3$	$2\cdot 7(1\cdot 3+5)\overset{?}{=}17\cdot 28 \Rightarrow 17\cdot 01 \neq 17\cdot 28$	False
$1\cdot 4$	$2\cdot 7(1\cdot 4+5)\overset{?}{=}17\cdot 28 \Rightarrow 17\cdot 28 = 17\cdot 28$	True
$1\cdot 5$	$2\cdot 7(1\cdot 5+5)\overset{?}{=}17\cdot 28 \Rightarrow 17\cdot 55 \neq 17\cdot 28$	False

Since $x=1\cdot 4$ makes the equation true, the solution of $2\cdot 7(x+5)=17\cdot 28$ is $1\cdot 4$

Hence $\boxed{\text{"The solution set is } \{1\cdot 4\}\text{"}}$.

Answer 24PA.

The given equation is $16(x+2)=70\cdot 4$.

Now replace *x* in $16(x+2)=70\cdot 4$ with each value in the replacement set $\{2\cdot 2, 2\cdot 4, 2\cdot 6, 2\cdot 8\}$.

Then

The equation is $16(x+2)=70\cdot 4$, now for $x=2\cdot 2$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= 16(x+2) \\ &= 16(2\cdot 2+2) && (\text{putting the value of } x) \\ &= 16(4\cdot 2) \\ &= 67\cdot 2 \end{aligned}$$

$$\Rightarrow 67\cdot 2 \neq 70\cdot 4$$
$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

x	$16(x+2)=70\cdot 4$	**True or False?**
$2\cdot 2$	$16(2\cdot 2+2)\stackrel{?}{=}70\cdot 4 \Rightarrow 67\cdot 2 \neq 70\cdot 4$	False
$2\cdot 4$	$16(2\cdot 4+2)\stackrel{?}{=}70\cdot 4 \Rightarrow 70\cdot 4 = 70\cdot 4$	True
$2\cdot 6$	$16(2\cdot 6+2)\stackrel{?}{=}70\cdot 4 \Rightarrow 73\cdot 6 \neq 70\cdot 4$	False
$2\cdot 8$	$16(2\cdot 8+2)\stackrel{?}{=}70\cdot 4 \Rightarrow 76\cdot 8 \neq 70\cdot 4$	False

Since $x=2\cdot 4$ makes the equation true, the solution of $16(x+2)=70\cdot 4$ is $2\cdot 4$

Hence $\boxed{\text{"The solution set is } \{2\cdot 4\}\text{"}}$.

Answer 25PA.

The given equation is $21(x+5)=216\cdot3.$

Now replace *x* in $21(x+5)=216\cdot3$ with each value in the replacement set $\{3\cdot1, 4\cdot2, 5\cdot3, 6\cdot4\}$.

Then

The equation is $21(x+5)=216\cdot3$, now for $x=3\cdot1$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= 21(x+5) \\ &= 21(3\cdot1+5) && (\text{putting the value of } x) \\ &= 21(8\cdot1) \\ &= 170\cdot1 \end{aligned}$$

$$\Rightarrow 170\cdot1 \neq 216\cdot3$$
$$\text{L.H.S.} \neq \text{R.H.S.}$$

Similarly putting the remaining values of replacement set in the equation, get

x	$21(x+5)=216\cdot3$	**True or False?**
$3\cdot1$	$21(3\cdot1+5)\overset{?}{=}216\cdot3 \Rightarrow 170\cdot1 \neq 216\cdot3$	False
$4\cdot2$	$21(4\cdot2+5)\overset{?}{=}216\cdot3 \Rightarrow 193\cdot2 \neq 216\cdot3$	False
$5\cdot3$	$21(5\cdot3+5)\overset{?}{=}216\cdot3 \Rightarrow 216\cdot3 = 216\cdot3$	True
$6\cdot4$	$21(3\cdot1+5)\overset{?}{=}216\cdot3 \Rightarrow 239\cdot4 \neq 216\cdot3$	False

Since $x=5\cdot3$ makes the equation true, the solution of $21(x+5)=216\cdot3$ is $5\cdot3$

Hence $\boxed{\text{"The solution set is } \{5\cdot3\}\text{"}}$.

Answer 26PA.

Given that in Conkle family there are two adults, a daughter in high school, and two sons in middle school. They want to spend not more than $\$30.$

And given that

Admission prices

	Evening	Matinee
Adult	\$7·50	\$4·50
Student	\$4·50	\$4·50
Child	\$4·50	\$4·50
Senior	\$3·50	\$4·50

Since the movie theater charges the same price for high school and middle school students.

Now let cost for adult is denoted by *a* ,cost for high school daughter is denoted by *b* and cost for middle school students is denoted by *c*.

Then inequality is

$$2a+b+2c \le 30$$

Since the movie theater charges the same price for high school and middle school students. Then

$$\boxed{2a+3b \le 30} \text{ or } \boxed{2a+3c \le 30}.$$

Answer 27PA.

Given that in Conkle family there are two adults, a daughter in high school, and two sons in middle school. They want to spend not more than $\$30.$

And given that

Admission prices

	Evening	Matinee
Adult	$7·50	$4·50
Student	$4·50	$4·50
Child	$4·50	$4·50
Senior	$3·50	$4·50

Since the movie theater charges the same price for high school and middle school students.

Now let cost for adult is denoted by *a* ,cost for high school daughter is denoted by *b* and cost for middle school students is denoted by *c*.

Then inequality is

$$2a+b+2c \le 30$$

Since the movie theater charges the same price for high school and middle school students.

Then $2a+3b \le 30$

Since in matinee all cost are same.

Then cost for the family to see a matinee is

$$\begin{aligned} &2a+3b \le 30 && \text{(origin equation)} \\ &= 2(4\cdot 50)+3(4\cdot 50) && \text{(putting the values)} \\ &= 22\cdot 5 \end{aligned}$$

Hence $\boxed{\text{Conkle family have to spend } \$22\cdot 5 \text{ to see a movie in matinee}}$.

Answer 28PA.

Given that in Conkle family there are two adults, a daughter in high school, and two sons in middle school. They want to spend not more than $\$30.$

And given that

Admission prices

	Evening	Matinee
Adult	$7·50	$4·50
Student	$4·50	$4·50
Child	$4·50	$4·50
Senior	$3·50	$4·50

Since the movie theater charges the same price for high school and middle school students.

Now let cost for adult is denoted by *a* ,cost for high school daughter is denoted by *b* and cost for middle school students is denoted by *c*.

Then inequality is

$$2a + b + 2c \leq 30$$

Since the movie theater charges the same price for high school and middle school students. Then $2a + 3b \leq 30$

Then cost for the family to see a evening is

$$\begin{aligned} &2a + 3b \leq 30 && \text{(origin equation)} \\ &= 2(7 \cdot 50) + 3(4 \cdot 50) && \text{(putting the values)} \\ &= 28 \cdot 50 \end{aligned}$$

Hence $\boxed{\text{Conkle family have to spend } \$28 \cdot 50 \text{ to see a movie in evening}}$.

Answer 29PA.

The given equation is $14 \cdot 8 - 3 \cdot 75 = t.$

Now solve it for *t*, that is find the value of *t* using order of operation rules.

Then, get

$$\begin{aligned} 14 \cdot 8 - 3 \cdot 75 &= t && \text{(Write original equation)} \\ 11 \cdot 05 &= t && \text{(Simplify the subtraction)} \end{aligned}$$

Hence solution is $\boxed{t = 11 \cdot 05}$.

Answer 30PA.

The given equation is $a = 32 \cdot 4 - 18 \cdot 95.$

Now solve it for *a*, that is find the value of *a* using order of operation rules.

Then, get

$$\begin{aligned} a &= 32 \cdot 4 - 18 \cdot 95 && (\text{Write original equation}) \\ a &= 13 \cdot 45 && (\text{Simplify the subtraction}) \end{aligned}$$

Hence solution is $\boxed{a = 13 \cdot 45}$.

Answer 31PA.

The given equation is $y = \frac{12 \times 5}{(15-3)}$.

Now solve it for *y*, that is find the value of *y* using order of operation rules.

Then, get

$$\begin{aligned} y &= \frac{12 \times 5}{(15-3)} && (\text{Original equation}) \\ y &= \frac{12 \times 5}{12} && (\text{Simplify the bracket that is subtract 3 from 15 in denominator}) \\ y &= \frac{\cancel{12} \times 5}{\cancel{12}} && (\text{Simplify}) \\ y &= 5 \end{aligned}$$

Hence solution is $\boxed{y = 5}$.

Answer 32PA.

The given equation is $g = \frac{15 \times 6}{(16-7)}$.

Now solve it for *g*, that is find the value of *g* using order of operation rules.

Then, get

$$\begin{aligned} g &= \frac{15 \times 6}{(16-7)} && (\text{Original equation}) \\ g &= \frac{90}{9} && \left(\begin{array}{l}\text{Multiply 15 and 6 in numerator} \\ \text{Simplify the bracket that is subtract 7 from 16 in denominator}\end{array}\right) \\ g &= 10 && (\text{Divide}) \end{aligned}$$

Hence solution is $\boxed{g = 10}$.

Answer 34PA.

The given equation is $a = \frac{4(14-1)}{3(6)-5} + 7$.

Now solve it for *d*, that is find the value of *d* using order of operation rules.

Then, get

$$\begin{aligned}
a &= \frac{4(14-1)}{3(6)-5} + 7 && \text{(Original equation)} \\
a &= \frac{4(13)}{18-5} + 7 && \begin{pmatrix}\text{Simplify the bracket that is subtract 1 from 14 in numerator} \\ \text{Simplify the bracket that is multiply 3 and 6 in denominator}\end{pmatrix} \\
a &= \frac{52}{13} + 7 && \begin{pmatrix}\text{Multiply 4 and 13 in numerator} \\ \text{Subtract 5 form 18 in denominator}\end{pmatrix} \\
a &= 4 + 7 && (\text{ Simplify division }) \\
a &= 11 && (\text{ Simplify addition that is add 4 and 7 })
\end{aligned}$$

Hence solution is $\boxed{a = 11}$.

Answer 35PA.

The given equation is $p = \frac{1}{4}\left[7(2^3) + 4(5^2) - 6(2)\right]$.

Now solve it for *p*, that is find the value of *p* using order of operation rules.

Then, get

$$\begin{aligned}
p &= \frac{1}{4}\left[7(2^3) + 4(5^2) - 6(2)\right] && \text{(Original equation)} \\
p &= \frac{1}{4}\left[7(8) + 4(25) - 6(2)\right] && (\text{Simplify the powers }) \\
p &= \frac{1}{4}[56 + 100 - 12] && \begin{pmatrix}\text{Simplify the brackets that is} \\ \text{Multiply 7 and 8, 4 and 25 \& 6 and 2}\end{pmatrix} \\
p &= \frac{1}{4}[156 - 12] && (\text{ Simplify addition }) \\
p &= \frac{1}{4}[144] && (\text{ Simplify subtraction }) \\
p &= 36 && (\text{ Simplify division })
\end{aligned}$$

Hence solution is $\boxed{p = 36}$.

Answer 36PA.

The given equation is $n=\frac{1}{8}\left[6\left(3^2\right)+2\left(4^3\right)-2(7)\right]$.

Now solve it for *n*, that is find the value of *n* using order of operation rules.

Then, get

$$\begin{aligned}
n&=\frac{1}{8}\left[6\left(3^2\right)+2\left(4^3\right)-2(7)\right] && \text{(Original equation)}\\
n&=\frac{1}{8}\left[6(9)+2(64)-2(7)\right] && \text{(Simplify the powers)}\\
n&=\frac{1}{8}[54+128-14] && \left(\begin{array}{l}\text{Simplify the brackets that is}\\ \text{Multiply 6 and 9, 2 and 64 \& 2 and 7}\end{array}\right)\\
n&=\frac{1}{8}[182-14] && \text{(Simplify addition)}\\
n&=\frac{1}{8}[168] && \text{(Simplify subtraction)}\\
n&=21 && \text{(Simplify division)}
\end{aligned}$$

Hence solution is $\boxed{n=21}$.

Answer 37PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $a-2<6$.

Now replace *a* in $a-2<6$ with each value in the replacement set $\{6,7,8,9,10,11\}$.

Then

The inequality is $a-2<6$ now for $a=6$

Taking the left hand side

$$\begin{aligned}
\text{L.H.S.}&=a-2\\
&=6-2 && \text{(putting the value of } a)\\
&=4\\
\Rightarrow 4&<6
\end{aligned}$$

Similarly putting the remaining values of replacement set in the inequality, get

a	$a-2<6$	True or False?
6	$6-2\overset{?}{<}6\Rightarrow 4<6$	True
7	$7-2\overset{?}{<}6\Rightarrow 5<6$	True
8	$8-2\overset{?}{<}6\Rightarrow 6<6$	False
9	$9-2\overset{?}{<}6\Rightarrow 7<6$	False
10	$10-2\overset{?}{<}6\Rightarrow 8<6$	False
11	$11-2\overset{?}{<}6\Rightarrow 9<6$	False

Since $x=6,7$ make the inequality true,

Hence the solution set for inequality $a-2<6$ is $\boxed{\{6,7\}}$.

Answer 38PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $a+7<22.$

Now replace a in $a+7<22$ with each value in the replacement set $\{13,14,15,16,17\}$.

Then

The inequality is $a+7<22$ now for $a=13$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= a+7 \\ &= 13+7 \qquad \text{(putting the value of } a) \\ &= 20 \\ \Rightarrow 20 &< 22 \end{aligned}$$

Similarly putting the remaining values of replacement set in the inequality, get

a	$a+7<22$	**True or False?**
13	$13+7\overset{?}{<}22 \Rightarrow 20<22$	True
14	$14+7\overset{?}{<}22 \Rightarrow 21<22$	True
15	$15+7\overset{?}{<}22 \Rightarrow 22<22$	False
16	$16+7\overset{?}{<}22 \Rightarrow 23<22$	False
17	$17+7\overset{?}{<}22 \Rightarrow 24<22$	False

Since $x=13,14$ make the inequality true,

Hence the solution set for inequality $a+7<22$ is $\boxed{\{13,14\}}$.

Answer 39PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $\frac{a}{5} \geq 2.$

Now replace *a* in $\frac{a}{5} \geq 2$ with each value in the replacement set $\{5, 10, 15, 20, 25\}.$

Then

The inequality is $\frac{a}{5} \geq 2$ now for $a = 5$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= \frac{a}{5} \\ &= \frac{5}{5} \qquad\qquad (\text{putting the value of } a) \\ &= 1 \end{aligned}$$
$$\Rightarrow 1 \not\geq 2$$

Similarly putting the remaining values of replacement set in the inequality, get

a	$\frac{a}{5} \geq 2$	**True or False?**
5	$\frac{5}{5} \overset{?}{\geq} 2 \Rightarrow 1 \geq 2$	False
10	$\frac{10}{5} \overset{?}{\geq} 2 \Rightarrow 2 \geq 2$	True
15	$\frac{15}{5} \overset{?}{\geq} 2 \Rightarrow 3 \geq 2$	True
20	$\frac{20}{5} \overset{?}{\geq} 2 \Rightarrow 4 \geq 2$	True
25	$\frac{25}{5} \overset{?}{\geq} 2 \Rightarrow 5 \geq 2$	True

Since $x = 10, 15, 20, 25$ make the inequality true,

Hence the solution set for inequality $\frac{a}{5} \geq 2$ is $\boxed{\{10, 15, 20, 25\}}$.

Answer 40PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $\frac{2a}{4} \le 8.$

Now replace *a* in $\frac{2a}{4} \le 8$ with each value in the replacement set $\{12, 14, 16, 18, 20, 22\}$.

Then

The inequality is $\frac{2a}{4} \le 8$ now for $a = 12$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= \frac{2a}{4} \\ &= \frac{2(12)}{4} \qquad \text{(putting the value of } a\text{)} \\ &= 6 \end{aligned}$$

$$\Rightarrow 6 \le 8$$

Similarly putting the remaining values of replacement set in the inequality, get

a	$\frac{2a}{4} \le 8$	True or False?
12	$\frac{2(12)}{4} \overset{?}{\le} 8 \Rightarrow 6 \le 8$	True
14	$\frac{2(14)}{4} \overset{?}{\le} 8 \Rightarrow 7 \le 8$	True
16	$\frac{2(16)}{4} \overset{?}{\le} 8 \Rightarrow 8 \le 8$	True
18	$\frac{2(18)}{4} \overset{?}{\le} 8 \Rightarrow 9 \le 8$	False
20	$\frac{2(20)}{4} \overset{?}{\le} 8 \Rightarrow 10 \le 8$	False
22	$\frac{2(22)}{4} \overset{?}{\le} 8 \Rightarrow 11 \le 8$	False

Since $x = 12, 14, 16$ make the inequality true,

Hence the solution set for inequality $\frac{2a}{4} \le 8$ is $\boxed{\{12, 14, 16\}}$.

Answer 41PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $4a-3\geq 10\cdot 6.$

Now replace *a* in $4a-3\geq 10\cdot 6$ with each value in the replacement set $\{3\cdot 2, 3\cdot 4, 3\cdot 6, 3\cdot 8, 4\}$.

Then

The inequality is $4a-3\geq 10\cdot 6$ now for $a=3\cdot 2$

Taking the left hand side

$$\begin{aligned}\text{L.H.S.} &= 4a-3 \\ &= 4(3\cdot 2)-3 \qquad\qquad (\text{putting the value of } a) \\ &= 12\cdot 8-3 \\ &= 9\cdot 8\end{aligned}$$

$$\Rightarrow 9\cdot 8 \not\geq 10\cdot 6$$

Similarly putting the remaining values of replacement set in the inequality, get

a	$4a-3\geq 10\cdot 6$	**True or False?**
$3\cdot 2$	$4(3\cdot 2)-3\overset{?}{\geq}10\cdot 6 \Rightarrow 9\cdot 8\geq 10\cdot 6$	False
$3\cdot 4$	$4(3\cdot 4)-3\overset{?}{\geq}10\cdot 6 \Rightarrow 10\cdot 6\geq 10\cdot 6$	True
$3\cdot 6$	$4(3\cdot 6)-3\overset{?}{\geq}10\cdot 6 \Rightarrow 11\cdot 4\geq 10\cdot 6$	True
$3\cdot 8$	$4(3\cdot 8)-3\overset{?}{\geq}10\cdot 6 \Rightarrow 12\cdot 2\geq 10\cdot 6$	True
4	$4(4)-3\overset{?}{\geq}10\cdot 6 \Rightarrow 13\geq 10\cdot 6$	True

Since $x=3\cdot 4, 3\cdot 6, 3\cdot 8, 4$ make the inequality true,

Hence the solution set for inequality $4a-3\geq 10\cdot 6$ is $\boxed{\{3\cdot 4, 3\cdot 6, 3\cdot 8, 4\}}$.

Answer 42PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $6a-5 \geq 23\cdot 8.$

Now replace a in $6a-5 \geq 23\cdot 8$ with each value in the replacement set $\{4\cdot 2, 4\cdot 5, 4\cdot 8, 5\cdot 1, 5\cdot 4\}.$

Then

The inequality is $6a-5 \geq 23\cdot 8$ now for $a = 4\cdot 2$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= 6a-5 \\ &= 6(4\cdot 2)-5 \qquad\qquad (\text{putting the value of } a) \\ &= 25\cdot 2-5 \\ &= 20\cdot 2 \end{aligned}$$

$$\Rightarrow 20\cdot 2 \not\geq 23\cdot 8$$

Similarly putting the remaining values of replacement set in the inequality, get

a	$6a-5 \geq 23\cdot 8$	**True or False?**
$4\cdot 2$	$6(4\cdot 2)-5 \overset{?}{\geq} 23\cdot 8 \Rightarrow 20\cdot 2 \geq 23\cdot 8$	False
$4\cdot 5$	$6(4\cdot 5)-5 \overset{?}{\geq} 23\cdot 8 \Rightarrow 22 \geq 23\cdot 8$	False
$4\cdot 8$	$6(4\cdot 8)-5 \overset{?}{\geq} 23\cdot 8 \Rightarrow 23\cdot 8 \geq 23\cdot 8$	True
$5\cdot 1$	$6(5\cdot 1)-5 \overset{?}{\geq} 23\cdot 8 \Rightarrow 25\cdot 6 \geq 23\cdot 8$	True
$5\cdot 4$	$6(5\cdot 4)-5 \overset{?}{\geq} 23\cdot 8 \Rightarrow 27\cdot 4 \geq 23\cdot 8$	True

Since $x = 4\cdot 8, 5\cdot 1, 5\cdot 4$ make the inequality true,

Hence the solution set for inequality $6a-5 \geq 23\cdot 8$ is $\boxed{\{4\cdot 8, 5\cdot 1, 5\cdot 4\}}$.

Answer 43PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $3a \le 4.$

Now replace *a* in $3a \le 4$ with each value in the replacement set $\left\{0, \frac{1}{3}, \frac{2}{3}, 1, 1\frac{1}{3}\right\}$.

Then

The inequality is $3a \le 4$ now for $a = 0$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= 3a \\ &= 3(0) \qquad \text{(putting the value of } a\text{)} \\ &= 0 \\ \Rightarrow 0 &\le 4 \end{aligned}$$

Similarly putting the remaining values of replacement set in the inequality, get

a	$3a \le 4$	**True or False?**
0	$3(0) \stackrel{?}{\le} 4 \Rightarrow 0 \le 4$	True
$\frac{1}{3}$	$3\left(\frac{1}{3}\right) \stackrel{?}{\le} 4 \Rightarrow 1 \le 4$	True
$\frac{2}{3}$	$3\left(\frac{2}{3}\right) \stackrel{?}{\le} 4 \Rightarrow 2 \le 4$	True
1	$3(1) \stackrel{?}{\le} 4 \Rightarrow 3 \le 4$	True
$\frac{4}{3}$	$3\left(\frac{4}{3}\right) \stackrel{?}{\le} 4 \Rightarrow 4 \le 4$	True

Since $x = 0, \frac{1}{3}, \frac{2}{3}, 1, 1\frac{1}{3}$ make the inequality true,

Hence the solution set for inequality $3a \le 4$ is $\boxed{\left\{0, \frac{1}{3}, \frac{2}{3}, 1, 1\frac{1}{3}\right\}}$.

Answer 44PA.

Definition (Replacement set): A set of numbers from which replacements for a variable may be chosen is called a replacement set.

Definition (Solution set): The solution set of an open sentence is the set of elements from the replacement set that make an open sentence true.

The given inequality is $2b < 5$.

Now replace b in $2b < 5$ with each value in the replacement set $\left\{1, 1\frac{1}{2}, 2, 2\frac{1}{2}, 3\right\}$.

Then

The inequality is $2b < 5$ now for $b = 1$

Taking the left hand side

$$\begin{aligned} \text{L.H.S.} &= 2b \\ &= 2(1) \qquad\qquad (\text{putting the value of } b) \\ &= 2 \\ \Rightarrow 2 &< 5 \end{aligned}$$

Similarly putting the remaining values of replacement set in the inequality, get

b	$2b < 5$	**True or False?**
1	$2(1) \overset{?}{<} 5 \Rightarrow 2 < 5$	True
$1\frac{1}{2}$	$2\left(\frac{3}{2}\right) \overset{?}{<} 5 \Rightarrow 3 < 5$	True
2	$2(2) \overset{?}{<} 5 \Rightarrow 4 < 5$	True
$2\frac{1}{2}$	$2\left(\frac{5}{2}\right) \overset{?}{<} 5 \Rightarrow 5 < 5$	False
3	$2(3) \overset{?}{<} 5 \Rightarrow 6 < 5$	False

Since $x = 1, 1\frac{1}{2}, 2$ make the inequality true,

Hence the solution set for inequality $2b < 5$ is $\boxed{\left\{1, 1\frac{1}{2}, 2\right\}}$.

Answer 45PA.

Given that during the lifetime, the average Americans drink

$15,579$ glasses of milk,

$6,220$ glasses of juice, and

$18,995$ glasses of soda.

Then to find the equation that show the total number of glasses of milk, juice and soda the average Americans drink during the lifetime add all these values. That is

$\boxed{g = 15,579 + 6,220 + 18,995}$.

Answer 46PA.

Given that during the lifetime, the average American drinks

$15,579$ glasses of milk,

$6,220$ glasses of juice, and

$18,995$ glasses of soda.

Then equation that show the total number of glasses of milk, juice and soda the average American drinks during the lifetime is

$$\begin{aligned} g &= 15,579 + 6,220 + 18,995 \\ g &= 40,794 \qquad \text{(add 15579, 6220 and 18995)} \end{aligned}$$

Hence the average American drink in a lifetime is $\boxed{g = 40,794}$.

Answer 47PA.

Given that each sweater cost is $\$39 \cdot 00$ from an online catalog and additional shipping charges are $\$10 \cdot 95.$

Since total money to spend is $\$102 \cdot 50.$

Now let total number of sweaters you purchase are n

Then inequality is

$$\begin{aligned} &(\text{cost of each sweater})n + (\text{additional shipping charges}) \le (\text{total spend money}). \\ &\Rightarrow 39n + 10 \cdot 95 \le 102 \cdot 50. \end{aligned}$$

Hence inequality is $\boxed{39n + 10 \cdot 95 \le 102 \cdot 50}$.

Answer 48PA.

Given that each sweater cost is $\$39\cdot00$ from an online catalog and additional shipping charges are $\$10\cdot95.$

Since total money to spend is $\$102\cdot50.$

Now let total number of sweaters you purchase are *n*

Then inequality is

$$(\text{cost of each sweater})n+(\text{additional shipping charges})\le(\text{total spend money}).$$
$$\Rightarrow 39n+10\cdot95\le102\cdot50.$$

Then inequality is $39n+10\cdot95\le102\cdot50$

Now check for maximum value of *n* which makes inequality true

Then

$$\begin{array}{ll}
39n+10\cdot95\le102\cdot50 & (\text{Original inequality}) \\
(39n+10\cdot95)-10\cdot95\le102\cdot50-10\cdot95 & (\text{Subtract each side by } 10\cdot95) \\
39n\le91\cdot55 & (\text{Simplify}) \\
\dfrac{39n}{39}\le\dfrac{91\cdot55}{39} & (\text{Divide each side by } 39)
\end{array}$$

$$n\le2\cdot34$$

$\boxed{\textbf{Hence maximum 2 sweaters you can buy}}$.

Answer 49PA.

The given inequality is $3x\le1.$

Then solve it for *x*, get

$$\begin{array}{ll}
3x\le1 & \\
\dfrac{3x}{3}\le\dfrac{1}{3} & (\text{divide each side by } 3) \\
\Rightarrow x\le\dfrac{1}{3} &
\end{array}$$

That is all numbers which are less than or equal to $\frac{1}{3}$ make inequality true.

Hence the solution set for inequality $3x\le1$ is $\boxed{\left\{\text{all numbers less than or equal to } \frac{1}{3}\right\}}$.

Answer 51PA.

The given inequality is $\frac{(5\times n)^2+5}{(9\times 3^2)-n}<28.$

Now replace n in $\frac{(5\times n)^2+5}{(9\times 3^2)-n}<28$ with each value in the replacement set $\{5,7,9,11,13\}$.

Then

The inequality is $\frac{(5\times n)^2+5}{(9\times 3^2)-n}<28$ now for $n=5$

Taking the left hand side

$$\begin{aligned}
\text{L.H.S.} &= \frac{(5\times n)^2+5}{(9\times 3^2)-n} \\
&= \frac{(5\times 5)^2+5}{(9\times 3^2)-5} && (\text{putting the value of } n) \\
&= \frac{(25)^2+5}{(9\times 9)-5} && (\text{simlifying the powers and then brackets}) \\
&= \frac{625+5}{81-5} && (\text{simlifying the powers and then brackets}) \\
&= \frac{630}{77} && \left(\begin{array}{l}\text{Add 625 and 5 in numerator} \\ \text{Subtract 5 from 81 in denominator}\end{array}\right) \\
&= 8\cdot 18 && (\text{Divide 630 by 77})
\end{aligned}$$

$$\Rightarrow 8\cdot 18<28$$

Similarly putting the remaining values of replacement set in the inequality, get

n	$\frac{(5\times n)^2+5}{(9\times 3^2)-n}<28$	**True or False?**
5	$\frac{(5\times 5)^2+5}{(9\times 3^2)-5}\overset{?}{<}28\Rightarrow 8\cdot 18<28$	True
7	$\frac{(5\times 7)^2+5}{(9\times 3^2)-7}\overset{?}{<}28\Rightarrow 16\cdot 62<28$	True
9	$\frac{(5\times 9)^2+5}{(9\times 3^2)-9}\overset{?}{<}28\Rightarrow 28\cdot 19<28$	False
11	$\frac{(5\times 11)^2+5}{(9\times 3^2)-11}\overset{?}{<}28\Rightarrow 43\cdot 28<28$	False
13	$\frac{(5\times 13)^2+5}{(9\times 3^2)-13}\overset{?}{<}28\Rightarrow 62\cdot 21<28$	False

Since $n=5,7$ make the inequality true,

Hence the option (B) is true. That is the solution set for inequality $\frac{(5\times n)^2+5}{(9\times 3^2)-n}<28$ is

$\boxed{\{5,7\}}$.

Answer 52PA.

Oprtion (B). The given expression is $6(3+2)\div(9-7)$

Now evaluate it using order of operation rules.

Then, get

$$\begin{aligned}
&6(3+2)\div(9-7) && (\text{Original expression})\\
&=6(5)\div(2) && (\text{Simplify the brackets})\\
&=30\div 2 && (\text{Multiply 6 and 5})\\
&=15 && (\text{Divide 30 by 2})
\end{aligned}$$

Hence solution of $6(3+2)\div(9-7)$ is 15. **Then option (B) is not true**.

Oprtion (C). The given expression is $27\div 3+(12-4)$

Now evaluate it using order of operation rules.

Then, get

$$\begin{aligned}
&27\div 3+(12-4) && (\text{Original expression})\\
&=9+8 && (\text{Divide 27 by 3 and simplify the bracket})\\
&=17 && (\text{Add 9 and 8})
\end{aligned}$$

Hence solution of $27\div 3+(12-4)$ is 17. **Then option (C) is true**.

Oprtion (A). The given expression is $2[2(6-3)]-5$

Now evaluate it using order of operation rules.

Then, get

$$\begin{aligned}
&2[2(6-3)]-5 && (\text{Original expression})\\
&=2[2\times 3]-5 && (\text{Subtract 3 from 6})\\
&=2\times 6-5 && (\text{Multiply 2 and 3})\\
&=12-5 && (\text{Multiply 2 and 6})\\
&=7 && (\text{Subtract 5 from 12})
\end{aligned}$$

Hence solution of $2[2(6-3)]-5$ is 7. **Then option (D) is not true**.

$\boxed{\textbf{Hence optioin (C) is true}}$.

Answer 53MYS.

The given verbal expression is "*r* squared increased by 3 times *s*".

Now as the verbal expression states:

r squared means multiply *r* two times $(r\times r=r^2)$

and three times of *s* means multiply 3 and *s* $(3s)$

So **algebraic expression** is

$\boxed{r^2+3s}$.

Now given $r=2, s=5, t=\frac{1}{2}$.

Putting these value in the algebraic expression, get

$$
\begin{aligned}
& r^2+3s \\
& =(2)^2+3(5) && \text{(simplifying brackets)} \\
& =4+15 && \text{(simplifying addition)} \\
& =19
\end{aligned}
$$

Hence $\boxed{r^2+3s=19}$.

Answer 54MYS.

The given verbal expression is "*t* times the sum of four times *s* and *r*".

Now as the verbal expression states:

The sum of four times *s* and *r* is $(4s+r)$

and *t* times the sum is $t(4s+r)$

So **algebraic expression** is

$\boxed{t(4s+r)}$.

Now given $r=2, s=5, t=\frac{1}{2}$.

Putting these value in the algebraic expression, get

$$
\begin{aligned}
& t(4s+r) \\
& =\left(\frac{1}{2}\right)(4\times 5+2) && \text{(Putting the given values)} \\
& =\frac{22}{2} && \text{(simplifying bracket)} \\
& =11
\end{aligned}
$$

Hence $\boxed{t(4s+r)=11}$.

Answer 55MYS.

The given verbal expression is "the sum of *r* and *s* times the square of *t*".

Now as the verbal expression states:

the sum of *r* and *s* is $r+s$

and square of *t* is t^2.

So **algebraic expression** is

$\boxed{(r+s)t^2}$.

Now given $r=2, s=5, t=\frac{1}{2}$.

Putting these value in the algebraic expression, get

$$
\begin{aligned}
&(r+s)t^2 \\
&=(2+5)\left(\frac{1}{2}\right)^2 && \text{(simplifying brackets)} \\
&=(7)\left(\frac{1}{4}\right) && \text{(simplifying multiplication)} \\
&=\frac{7}{4}
\end{aligned}
$$

Hence $\boxed{(r+s)t^2=\frac{7}{4}}$.

Answer 56MYS.

The given verbal expression is "*r* to the fifth power decreased by *t*".

Now as the verbal expression states:

r to the fifth power is r^5

So **algebraic expression** is

$\boxed{r^5-t}$.

Now given $r=2, s=5, t=\frac{1}{2}$.

Putting these value in the algebraic expression, get

$$
\begin{aligned}
&r^5-t \\
&=(2)^5-\frac{1}{2} && \text{(putting the given values)} \\
&=32-\frac{1}{2} && \text{(simplify power)} \\
&=\frac{32\times 2-1}{2} \\
&=\frac{63}{2} \\
&=31\cdot 5
\end{aligned}
$$

Hence $\boxed{r^5-t=31\cdot 5}$.

Answer 57MYS.

The given expression is $5^3+3(4^2)$.

Now evaluate it using order of operation rules.

Then, get

$$\begin{aligned}
&5^3+3(4^2) && (\text{Original expression})\\
&=(5\times5\times5)+3(4\times4) && (\text{Simplify the powers})\\
&=125+48 && (\text{Simplify the bracket})\\
&=173 && (\text{Simplify the addition})
\end{aligned}$$

Hence solution is $\boxed{5^3+3(4^2)=173}$.

Answer 58MYS.

The given expression is $\frac{38-12}{2\times13}$.

Now evaluate it using order of operation rules.

Then, get

$$\begin{aligned}
&\frac{38-12}{2\times13} && (\text{Original expression})\\
&=\frac{26}{26} && \left(\begin{matrix}\text{Subtract 12 from 38 in numerator}\\ \text{multiply 2 and 13 in denominator}\end{matrix}\right)\\
&=1 && (\text{Simplify division})
\end{aligned}$$

Hence solution is $\boxed{\frac{38-12}{2\times13}=1}$.

Answer 59MYS.

The given expression is $[5(2+1)]^4+3$.

Now evaluate it using order of operation rules.

Then, get

$$\begin{aligned}
&[5(2+1)]^4+3 && (\text{Original expression})\\
&=[5(3)]^4+3 && (\text{Simplify bracket that is add 2 and 1})\\
&=[15]^4+3 && (\text{Multiply 5 and 3})\\
&=[15\times15\times15\times15]+3 && (\text{Simplify power})
\end{aligned}$$

$$\begin{aligned}
&=50{,}625+3 && (\text{Simplify power})\\
&=50{,}628 && (\text{add } 50{,}625 \text{ and } 3)
\end{aligned}$$

Hence solution is $\boxed{[5(2+1)]^4+3=50{,}628}$.

Answer 60MYS.

The given expression is $\frac{1}{6}\times\frac{2}{5}$.

Now evaluate the product, get

$$\begin{aligned}
&\frac{1}{6}\times\frac{2}{5} && \text{(Original expression)}\\
&=\frac{1\times 2}{6\times 5} && \left(\begin{array}{l}\text{Multiply the numerators}\\ \text{Multiply the denominators}\end{array}\right)\\
&=\frac{1\times \cancel{2}}{\cancel{2}\times 3\times 5} && \text{(prime factors of 6 are 2 and 3)}\\
&=\frac{1}{15}
\end{aligned}$$

Hence solution is $\boxed{\frac{1}{6}\times\frac{2}{5}=\frac{1}{15}}$.

Answer 61MYS.

The given expression is $\frac{4}{9}\times\frac{3}{7}$.

Now evaluate the product, get

$$\begin{aligned}
&\frac{4}{9}\times\frac{3}{7} && \text{(Original expression)}\\
&=\frac{4\times 3}{9\times 7} && \left(\begin{array}{l}\text{Multiply the numerators}\\ \text{Multiply the denominators}\end{array}\right)\\
&=\frac{4\times \cancel{3}}{\cancel{3}\times 3\times 7} && \text{(prime factors of 9 are 3 and 3)}\\
&=\frac{4}{21}
\end{aligned}$$

Hence solution is $\boxed{\frac{4}{9}\times\frac{3}{7}=\frac{4}{21}}$.

Answer 62MYS.

The given expression is $\frac{5}{6}\times\frac{15}{16}$.

Now evaluate the product, get

$$\begin{aligned}
&\frac{5}{6}\times\frac{15}{16} && \text{(Original expression)}\\
&=\frac{5\times 15}{6\times 16} && \left(\begin{array}{l}\text{Multiply the numerators}\\ \text{Multiply the denominators}\end{array}\right)\\
&=\frac{5\times \cancel{3}\times 5}{2\times \cancel{3}\times 2\times 2\times 2\times 2} && \left(\begin{array}{l}\text{prime factors of 15 are 3 and 5}\\ \text{prime factors of 6 are 2 and 3}\\ \text{prime factors of 16 are 2, 2, 2 and 2}\end{array}\right)\\
&=\frac{25}{32}
\end{aligned}$$

Hence solution is $\boxed{\frac{5}{6}\times\frac{15}{16}=\frac{25}{32}}$.

Answer 63MYS.

The given expression is $\frac{6}{14}\times\frac{12}{18}$.

Now evaluate the product, get

$$\frac{6}{14}\times\frac{12}{18} \qquad \text{(Original expression)}$$

$$=\frac{6\times12}{14\times18} \qquad \begin{pmatrix}\text{Multiply the numerators}\\ \text{Multiply the denominators}\end{pmatrix}$$

$$=\frac{\cancel{2}\times\cancel{3}\times\cancel{2}\times2\times\cancel{3}}{\cancel{2}\times7\times\cancel{2}\times\cancel{3}\times\cancel{3}} \qquad \begin{pmatrix}\text{prime factors of } 6 \text{ are } 2 \text{ and } 3\\ \text{prime factors of } 12 \text{ are } 2,2 \text{ and } 3\\ \text{prime factors of } 14 \text{ are } 2 \text{ and } 7\\ \text{prime factors of } 18 \text{ are } 2,3 \text{ and } 3\end{pmatrix}$$

$$=\frac{2}{7}$$

Hence solution is $\boxed{\frac{6}{14}\times\frac{12}{18}=\frac{2}{7}}$.

Answer 64MYS.

The given expression is $\frac{8}{13}\times\frac{2}{11}$.

Now evaluate the product, get

$$\frac{8}{13}\times\frac{2}{11} \qquad \text{(Original expression)}$$

$$=\frac{8\times2}{13\times11} \qquad \begin{pmatrix}\text{Multiply the numerators}\\ \text{Multiply the denominators}\end{pmatrix}$$

$$=\frac{16}{143}$$

Hence solution is $\boxed{\frac{8}{13}\times\frac{2}{11}=\frac{16}{143}}$.

Answer 65MYS.

The given expression is $\frac{4}{7}\times\frac{4}{9}$.

Now evaluate the product, get

$$\frac{4}{7}\times\frac{4}{9} \qquad \text{(Original expression)}$$

$$=\frac{4\times4}{7\times9} \qquad \begin{pmatrix}\text{Multiply the numerators}\\ \text{Multiply the denominators}\end{pmatrix}$$

$$=\frac{16}{63}$$

Hence solution is $\boxed{\frac{4}{7}\times\frac{4}{9}=\frac{16}{63}}$.

Answer 66MYS.

The given expression is $\frac{3}{11}\times\frac{74}{16}$.

Now evaluate the product, get

$$\begin{aligned}
&\frac{3}{11}\times\frac{74}{16} && \text{(Original expression)}\\
&=\frac{3\times 74}{11\times 16} && \begin{pmatrix}\text{Multiply the numerators}\\ \text{Multiply the denominators}\end{pmatrix}\\
&=\frac{3\times \cancel{2}\times 37}{11\times \cancel{2}\times 2\times 2\times 2} && \begin{pmatrix}\text{prime factors of 74 are 2 and 37}\\ \text{prime factors of 16 are 2, 2, 2 and 2}\end{pmatrix}\\
&=\frac{111}{88}
\end{aligned}$$

Hence solution is $\boxed{\frac{3}{11}\times\frac{74}{16}=\frac{111}{88}}$.

Answer 67MYS.

The given expression is $\frac{2}{9}\times\frac{24}{25}$.

Now evaluate the product, get

$$\begin{aligned}
&\frac{2}{9}\times\frac{24}{25} && \text{(Original expression)}\\
&=\frac{2\times 24}{9\times 25} && \begin{pmatrix}\text{Multiply the numerators}\\ \text{Multiply the denominators}\end{pmatrix}\\
&=\frac{2\times 2\times 2\times 2\times \cancel{3}}{\cancel{3}\times 3\times 5\times 5} && \begin{pmatrix}\text{prime factors of 24 are 2, 2, 2 and 3}\\ \text{prime factors of 9 are 3, and 3}\\ \text{prime factors of 25 are 5, and 5}\end{pmatrix}\\
&=\frac{16}{75}
\end{aligned}$$

Hence solution is $\boxed{\frac{2}{9}\times\frac{24}{25}=\frac{16}{75}}$.