Chapter 1. Language of Algebra

Ex. 1.2

Answer 1CU.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets. Hence 2 and 5 are added first. Similarly square 6 as it is inside brackets. Also multiply 3 by 7. Finally subtract inside the brackets. Subtract 21 from 36.

Next divide or subtract from left to right. Here multiply 8 by the result of the above step. Also division is present. Hence divide the above result by 8.

Do addition or subtraction from left to right. Add the above result and 3.

Answer 2CU.

This numerical expression would contain two operations. Knowing the order of operations tells us which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets. Hence the expression involving addition can be written inside the parentheses.

Next divide or multiply from left to right. Here divide some number, variable or expression by the result of the above step. The expression is some number divided by the quantity a number plus another number. The quantity represents within parentheses. Here the number can be a variable or an expression.

Answer 3CU.

This numerical expression contains more operations. Knowing the order of operations tells which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. Both of them started right. But Laurie raised the incorrect quantity to the second power in the first step.

Chase raised the whole expression inside parentheses to the second power which is correct. All the other steps are carried out according to the order of operation and hence Chase is correct.

Answer 4CU.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. Hence 4 and 6 are added first. Result is 10.

$$(4+6)7=(10)7$$

Next multiply from left to right. Here multiply 10 by 7 to get 70.

$$\begin{aligned}(4+6)7&=(10)7\\&=70\end{aligned}$$

The expression after evaluation is $\boxed{70}$.

Answer 5CU.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. Hence 15 and 9 are added first. Result is 24.

$$50-(15+9)=50-24$$

Next subtract from left to right. Here subtract 24 from 50 to get 26.

$$\begin{aligned}50-(15+9)&=50-24\\&=26\end{aligned}$$

The expression after evaluation is $\boxed{26}$.

Answer 6CU.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. Hence subtract 4 from 9 first. Result is 5.

$$29-3(9-4)=29-3(5)$$

Next multiply from left to right. Here multiply 3 by 5 to get 15.

$$\begin{aligned}29-3(9-4)&=29-3(5)\\&=29-15\end{aligned}$$

Next subtract from left to right. Here subtract 15 from 29 to get 14.

$$\begin{aligned}29-3(9-4)&=29-3(5)\\&=29-15\\&=14\end{aligned}$$

The expression after evaluation is $\boxed{14}$.

Answer 7CU.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. Hence multiply 7 by 2 first. Result is 14. Similarly multiply 8 by 4 to get 32 for the second set of brackets.

$$[7(2)-4]+[9+8(4)]=[14-4]+[9+32]$$

Next add from left to right. For the first bracket, subtract 4 from 14 to get 10. Then add 9 and 32 to get 41 for the second set of brackets.

$$\begin{aligned}[7(2)-4]+[9+8(4)]&=[14-4]+[9+32]\\&=10+41\end{aligned}$$

Add 10 and 41 to get 51.

$$\begin{aligned}[7(2)-4]+[9+8(4)]&=[14-4]+[9+32]\\&=10+41\\&=51\end{aligned}$$

The expression after evaluation is $\boxed{51}$.

Answer 8CU.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. Hence multiply 4 by 3 first. Result is 12.

$$\frac{(4\cdot 3)^2\cdot 5}{9+3}=\frac{(12)^2\cdot 5}{9+3}$$

Evaluate the power in the numerator. 12 squared is 144.

$$\begin{aligned}\frac{(4\cdot 3)^2\cdot 5}{9+3}&=\frac{(12)^2\cdot 5}{9+3}\\&=\frac{144\cdot 5}{9+3}\end{aligned}$$

Multiply 144 by 5 to get 720 for the numerator.

$$\begin{aligned}\frac{(4\cdot 3)^2\cdot 5}{9+3}&=\frac{(12)^2\cdot 5}{9+3}\\&=\frac{144\cdot 5}{9+3}\\&=\frac{720}{9+3}\end{aligned}$$

Add 9 and 3 to get 12 in the denominator.

$$\begin{aligned}\frac{(4\cdot 3)^2\cdot 5}{9+3}&=\frac{(12)^2\cdot 5}{9+3}\\&=\frac{144\cdot 5}{9+3}\\&=\frac{720}{9+3}\\&=\frac{720}{12}\end{aligned}$$

Simplify. Factor the numerator and denominator completely.

$$\frac{720}{12}=\frac{2\cdot2\cdot\cancel{2}\cdot\cancel{2}\cdot\cancel{3}\cdot3\cdot5}{\cancel{2}\cdot\cancel{2}\cdot\cancel{3}}$$

Multiply the remaining factors in the numerator.

$$\begin{aligned}\frac{720}{12}&=\frac{2\cdot2\cdot3\cdot5}{1}\\&=60\end{aligned}$$

The expression after evaluation is $\boxed{60}$.

Answer 9CU.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

First evaluate the power in the numerator. 2 cubed is 8.

$$\frac{3+2^3}{5^2(4)}=\frac{3+8}{5^2(4)}$$

Add 3 and 8 to get 11 in the numerator.

$$\begin{aligned}\frac{3+2^3}{5^2(4)}&=\frac{3+8}{5^2(4)}\\&=\frac{11}{5^2(4)}\end{aligned}$$

Evaluate the power in the denominator. 5 squared is 25.

$$\begin{aligned}\frac{3+2^3}{5^2(4)}&=\frac{3+8}{5^2(4)}\\&=\frac{11}{5^2(4)}\\&=\frac{11}{25(4)}\end{aligned}$$

Multiply 25 by 4 to get 100 for the denominator.

$$\begin{aligned}\frac{3+2^3}{5^2(4)} &= \frac{3+8}{5^2(4)}\\ &= \frac{11}{5^2(4)}\\ &= \frac{11}{25(4)}\\ &= \frac{11}{100}\end{aligned}$$

The expression after evaluation is $\boxed{\frac{11}{100}}$.

Answer 10CU.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace *g* with 4, *h* with 6, *j* with 8, and *k* with 12.

$$hk - gj = (6)(12) - (4)(8)$$

Following order of operations tells which operation has to be performed first. Multiply 6 and 12 to get 72, 4 and 8 to get 32.

$$\begin{aligned}hk - gj &= (6)(12) - (4)(8)\\ &= 72 - 32\end{aligned}$$

Subtract 32 from 72 to get 40.

$$\begin{aligned}hk - gj &= (6)(12) - (4)(8)\\ &= 72 - 32\\ &= 40\end{aligned}$$

The expression after evaluation is $\boxed{40}$.

Answer 11CU.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace *g* with 4, *h* with 6, *j* with 8, and *k* with 12.

$$2k + gh^2 - j = 2(12) + (4)(6^2) - 8$$

Following order of operations tells which operation has to be performed first. Evaluate 6 squared. This 36.

$$\begin{aligned}2k + gh^2 - j &= 2(12) + (4)(6^2) - 8\\ &= 2(12) + (4)(36) - 8\end{aligned}$$

Multiply 2 and 12 to get 24, 4 and 36 to get 144.

$$\begin{aligned}2k+gh^2-j&=2(12)+(4)(6^2)-8\\&=2(12)+(4)(36)-8\\&=24+144-8\end{aligned}$$

Add 24 and 144 to get 168.

$$\begin{aligned}2k+gh^2-j&=2(12)+(4)(6^2)-8\\&=2(12)+(4)(36)-8\\&=24+144-8\\&=168-8\end{aligned}$$

Subtract 8 from 168 to get 160.

$$\begin{aligned}2k+gh^2-j&=2(12)+(4)(6^2)-8\\&=2(12)+(4)(36)-8\\&=24+144-8\\&=168-8\end{aligned}$$

$$=160$$

The expression after evaluation is $\boxed{160}$.

Answer 12CU.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace g with 4, h with 6, and j with 8.

$$\frac{2g(h-g)}{gh-j}=\frac{2(4)(6-4)}{(4)(6)-8}$$

Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

First evaluate the expression inside the grouping symbols in the numerator. Subtract 4 from 6 to get 2.

$$\frac{2g(h-g)}{gh-j} = \frac{2(4)(6-4)}{(4)(6)-8}$$
$$= \frac{2(4)(2)}{(4)(6)-8}$$

Multiply 2 and 4 to get 8, 8 and 2 to get 16 in the numerator.

$$\frac{2g(h-g)}{gh-j} = \frac{2(4)(6-4)}{(4)(6)-8}$$
$$= \frac{2(4)(2)}{(4)(6)-8}$$
$$= \frac{16}{(4)(6)-8}$$

Multiply 4 and 6 to get 24 in the denominator.

$$\frac{2g(h-g)}{gh-j} = \frac{2(4)(6-4)}{(4)(6)-8}$$
$$= \frac{2(4)(2)}{(4)(6)-8}$$
$$= \frac{16}{(4)(6)-8}$$
$$= \frac{16}{24-8}$$

Subtract 8 from 24 to get 16 in the denominator.

$$\frac{2g(h-g)}{gh-j} = \frac{2(4)(6-4)}{(4)(6)-8}$$
$$= \frac{2(4)(2)}{(4)(6)-8}$$
$$= \frac{16}{(4)(6)-8}$$
$$= \frac{16}{24-8}$$
$$= \frac{16}{16}$$

This is 1. The expression after evaluation is $\boxed{1}$.

Answer 13CU.

The cost of 5 software packages can be found out by adding 3 for $20.00 and additional 2 software package at the regular price of $9.95. Since the sale at 3 for 20 is available 3 out of 5 can be purchased at 20. Remaining 2 should be bought at regular price of 9.95 each.

$$20+2\times 9.95$$

Here no need of grouping symbol. This is because according to order of operations, multiplication is carried out first from left to right and then addition. This is exactly expected from the understanding of the problem. The expression to find the cost of 5 software packages is $\boxed{20+2\times 9.95}$.

Answer 14CU.

The cost of 5 software packages can be found out by adding 3 for $20.00 and additional 2 software package at the regular price of $9.95.

$$20+2\times 9.95$$

Since the sale at 3 for 20 is available 3 out of 5 can be purchased at 20. Remaining 2 should be bought at regular price of 9.95 each. First multiply 2 and 9.95 to get 19.90.

$$20+2\times 9.95=20+19.90$$

In the above expression there is no need of grouping symbol. This is because according to order of operations, multiplication is carried out first from left to right and then addition. Add 20 and 19.9 to get 39.9.

$$\begin{aligned}20+2\times 9.95&=20+19.90\\&=39.9\end{aligned}$$

The cost of 5 software packages is $\boxed{\$39.9}$.

Answer 15PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. Hence subtract 6 from 12 first. Result is 6.

$$(12-6)\cdot 2=(6)\cdot 2$$

Next multiply from left to right. Here multiply 6 by 2 to get 12.

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

The expression after evaluation is $\boxed{12}$.

Answer 16PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. Hence subtract 3 from 16 first. Result is13.

$$(16-3)\cdot 4=(13)\cdot 4$$

Next multiply from left to right. Here multiply 13 by 4 to get 52.

$$\begin{aligned}(16-3)\cdot 4&=(13)\cdot 4\\&=52\end{aligned}$$

The expression after evaluation is $\boxed{52}$.

Answer 17PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First multiply from left to right. Here multiply 3 by 2 to get 6.

$$15+3\cdot 2=15+6$$

Now add 15 and 6 to get 21.

$$\begin{aligned}15+3\cdot 2&=15+6\\&=21\end{aligned}$$

The expression after evaluation is $\boxed{21}$.

Answer 18PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First multiply from left to right. Here multiply 3 by 7 to get 21.

$$22+3\cdot 7=22+21$$

Now add 22 and 21 to get 43.

$$\begin{aligned}22+3\cdot 7&=22+21\\&=43\end{aligned}$$

The expression after evaluation is $\boxed{43}$.

Answer 19PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. Hence add 11 and 7 first. Result is 18.

$$4(11+7)-9\cdot 8=4(18)-9\cdot 8$$

Next multiply from left to right. First multiply 4 and 18 to get 72. Next multiply 9 and 8 72.

$$\begin{aligned}4(11+7)-9\cdot 8&=4(18)-9\cdot 8\\&=72-72\end{aligned}$$

Subtract 72 from 72 to get 0.

$$\begin{aligned}4(11+7)-9\cdot 8&=4(18)-9\cdot 8\\&=72-72\\&=0\end{aligned}$$

The expression after evaluation is $\boxed{0}$.

Answer 20PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. Hence add 9 and 5 first. Result is 14.

$$12(9+5)-6\cdot 3=12(14)-6\cdot 3$$

Next multiply from left to right. First multiply 12 and 14 to get 168. Next multiply 6 and 3 to get 18.

$$\begin{aligned}12(9+5)-6\cdot 3&=12(14)-6\cdot 3\\&=168-18\end{aligned}$$

Subtract 18 from 168 to get 150.

$$\begin{aligned}12(9+5)-6\cdot 3&=12(14)-6\cdot 3\\&=168-18\\&=150\end{aligned}$$

The expression after evaluation is $\boxed{150}$.

Answer 21PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First evaluate power. Hence 4 squared is evaluated first. Result is 16.

$$12 \div 3 \cdot 5 - 4^2 = 12 \div 3 \cdot 5 - 16$$

Next divide from left to right. Divide 12 by 3 to get 4.

$$\begin{aligned} 12 \div 3 \cdot 5 - 4^2 &= 12 \div 3 \cdot 5 - 16 \\ &= 4 \cdot 5 - 16 \end{aligned}$$

Now multiply from left to right. Multiply 4 by 5 to get 20.

$$\begin{aligned} 12 \div 3 \cdot 5 - 4^2 &= 12 \div 3 \cdot 5 - 16 \\ &= 4 \cdot 5 - 16 \\ &= 20 - 16 \end{aligned}$$

Next divide from left to right. Divide 12 by 3 to get 4.

$$\begin{aligned} 12 \div 3 \cdot 5 - 4^2 &= 12 \div 3 \cdot 5 - 16 \\ &= 4 \cdot 5 - 16 \end{aligned}$$

Now multiply from left to right. Multiply 4 by 5 to get 20.

$$\begin{aligned} 12 \div 3 \cdot 5 - 4^2 &= 12 \div 3 \cdot 5 - 16 \\ &= 4 \cdot 5 - 16 \\ &= 20 - 16 \end{aligned}$$

Subtract 16 from 20 to get 4.

$$\begin{aligned} 12 \div 3 \cdot 5 - 4^2 &= 12 \div 3 \cdot 5 - 16 \\ &= 4 \cdot 5 - 16 \\ &= 20 - 16 \\ &= 4 \end{aligned}$$

The expression after evaluation is $\boxed{4}$.

Answer 22PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First evaluate power. Hence 4 squared is evaluated first. Result is 16.

$$15 \div 3 \cdot 5 - 4^2 = 15 \div 3 \cdot 5 - 16$$

Next divide from left to right. Divide 15 by 3 to get 5.

$$\begin{aligned}15 \div 3 \cdot 5 - 4^2 &= 15 \div 3 \cdot 5 - 16 \\ &= 5 \cdot 5 - 16\end{aligned}$$

Now multiply from left to right. Multiply 5 by 5 to get 25.

$$\begin{aligned}15 \div 3 \cdot 5 - 4^2 &= 15 \div 3 \cdot 5 - 16 \\ &= 5 \cdot 5 - 16 \\ &= 25 - 16\end{aligned}$$

Answer 23PA.

This numerical expression contains more operations. Knowing the order of operations tells which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. That too inner parentheses first. Hence add 9 and 3 to get 12.

$$288 \div [3(9+3)] = 288 \div [3(12)]$$

Again inside grouping symbols, and now it is brackets. Multiply 3 by 12 to get 36.

$$\begin{aligned}288 \div [3(9+3)] &= 288 \div [3(12)] \\ &= 288 \div 36\end{aligned}$$

Divide from left to right. Divide 288 by 36 to get 8.

$$\begin{aligned}288 \div [3(9+3)] &= 288 \div [3(12)] \\ &= 288 \div 36 \\ &= 8\end{aligned}$$

The expression after evaluation is $\boxed{8}$.

Answer 24PA.

This numerical expression contains more operations. Knowing the order of operations tells which operation has to be performed first.

First expressions inside grouping symbols such as parentheses, brackets should be evaluated. That too inner parentheses first. Hence add 7 and 6 to get 13.

$$390 \div [5(7+6)] = 390 \div [5(13)]$$

Again inside grouping symbols, and now it is brackets. Multiply 5 by 13 to get 65.

$$\begin{aligned} 390 \div [5(7+6)] &= 390 \div [5(13)] \\ &= 390 \div 65 \end{aligned}$$

Divide from left to right. Divide 390 by 65 to get 6.

$$\begin{aligned} 390 \div [5(7+6)] &= 390 \div [5(13)] \\ &= 390 \div 65 \\ &= 6 \end{aligned}$$

The expression after evaluation is $\boxed{6}$.

Answer 25PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

First evaluate the power in the numerator. 8 squared is 64, and 2 squared is 4.

$$\frac{2 \cdot 8^2 - 2^2 \cdot 8}{2 \cdot 8} = \frac{2 \cdot 64 - 4 \cdot 8}{2 \cdot 8}$$

Multiply from left to right in the numerator. Multiply 2 by 64 to get 128, and 4 by 8 to get 32.

$$\begin{aligned} \frac{2 \cdot 8^2 - 2^2 \cdot 8}{2 \cdot 8} &= \frac{2 \cdot 64 - 4 \cdot 8}{2 \cdot 8} \\ &= \frac{128 - 32}{2 \cdot 8} \end{aligned}$$

Subtract 32 from 128 to get 96 in the numerator.

$$\begin{aligned} \frac{2 \cdot 8^2 - 2^2 \cdot 8}{2 \cdot 8} &= \frac{2 \cdot 64 - 4 \cdot 8}{2 \cdot 8} \\ &= \frac{128 - 32}{2 \cdot 8} \\ &= \frac{96}{2 \cdot 8} \end{aligned}$$

Multiply 2 by 8 in the denominator. It is 16.

$$\frac{2\cdot 8^2-2^2\cdot 8}{2\cdot 8}=\frac{2\cdot 64-4\cdot 8}{2\cdot 8}$$
$$=\frac{128-32}{2\cdot 8}$$
$$=\frac{96}{2\cdot 8}$$
$$=\frac{96}{16}$$

Divide 96 by 16 to get 6.

$$\frac{2\cdot 8^2-2^2\cdot 8}{2\cdot 8}=\frac{2\cdot 64-4\cdot 8}{2\cdot 8}$$
$$=\frac{128-32}{2\cdot 8}$$
$$=\frac{96}{2\cdot 8}$$
$$=\frac{96}{16}$$
$$=6$$

The expression after evaluation is $\boxed{6}$.

Answer 26PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

First evaluate the power in the numerator. 6 squared is 36, and 4 squared is 16.

$$\frac{4\cdot 6^2-4^2\cdot 6}{4\cdot 6}=\frac{4\cdot 36-16\cdot 6}{4\cdot 6}$$

Multiply from left to right in the numerator. Multiply 4 by 36 to get 144, and 16 by 6 to get 96.

$$\begin{aligned}\frac{4\cdot6^2-4^2\cdot6}{4\cdot6}&=\frac{4\cdot36-16\cdot6}{4\cdot6}\\&=\frac{144-96}{4\cdot6}\end{aligned}$$

Subtract 96 from 144 to get 48 in the numerator.

$$\begin{aligned}\frac{4\cdot6^2-4^2\cdot6}{4\cdot6}&=\frac{4\cdot36-16\cdot6}{4\cdot6}\\&=\frac{144-96}{4\cdot6}\\&=\frac{48}{4\cdot6}\end{aligned}$$

Multiply 4 by 6 in the denominator. It is 24.

$$\begin{aligned}\frac{4\cdot6^2-4^2\cdot6}{4\cdot6}&=\frac{4\cdot36-16\cdot6}{4\cdot6}\\&=\frac{144-96}{4\cdot6}\\&=\frac{48}{4\cdot6}\\&=\frac{48}{24}\end{aligned}$$

Divide 48 by 24 to get 2.

$$\begin{aligned}\frac{4\cdot6^2-4^2\cdot6}{4\cdot6}&=\frac{4\cdot36-16\cdot6}{4\cdot6}\\&=\frac{144-96}{4\cdot6}\\&=\frac{48}{4\cdot6}\\&=\frac{48}{24}\end{aligned}$$

$$=2$$

The expression after evaluation is $\boxed{2}$.

Answer 27PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

First evaluate the expression inside the grouping symbols such as parentheses, brackets, and braces in the numerator. Evaluate from left to right. Add 8 and 5 to get 13. Subtract 2 from 6 to get 4.

$$\begin{aligned}\frac{\left[(8+5)(6-2)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]} &= \frac{\left[(13)(4)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}\\ &= \frac{\left[(13)(4)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}\end{aligned}$$

4 squared is 16. Multiply 13 by 16 to get 208 for the first set of parentheses. Multiply 4 by 17 to get 68 for the second set of parentheses.

$$\begin{aligned}\frac{\left[(8+5)(6-2)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]} &= \frac{\left[(13)(4)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}\\ &= \frac{\left[(13)(4)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}\\ &= \frac{\left[(13)(16)-(68\div 2)\right]}{\left[(24\div 2)\div 3\right]}\\ &= \frac{\left[208-(68\div 2)\right]}{\left[(24\div 2)\div 3\right]}\end{aligned}$$

Divide 68 by 2 to get 34 in the numerator. Subtract 34 from 208 to get 174.

$$\begin{aligned}\frac{\left[(8+5)(6-2)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]} &= \frac{\left[(13)(4)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}\\ &= \frac{\left[(13)(4)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}\\ &= \frac{\left[(13)(16)-(68\div 2)\right]}{\left[(24\div 2)\div 3\right]}\\ &= \frac{\left[208-(68\div 2)\right]}{\left[(24\div 2)\div 3\right]}\end{aligned}$$

$$\begin{aligned}&= \frac{\left[208-34\right]}{\left[(24\div 2)\div 3\right]}\\ &= \frac{174}{\left[(24\div 2)\div 3\right]}\end{aligned}$$

In the denominator, divide 24 by 2 get 12. Again divide 12 by 3 to get 4.

$$\frac{\left[(8+5)(6-2)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}=\frac{\left[(13)(4)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}$$

$$=\frac{\left[(13)(4)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}$$

$$=\frac{\left[(13)(16)-(68\div 2)\right]}{\left[(24\div 2)\div 3\right]}$$

$$=\frac{\left[208-(68\div 2)\right]}{\left[(24\div 2)\div 3\right]}$$

$$=\frac{\left[208-34\right]}{\left[(24\div 2)\div 3\right]}$$

$$=\frac{174}{\left[(24\div 2)\div 3\right]}$$

$$=\frac{174}{\left[12\div 3\right]}$$

$$=\frac{174}{4}$$

Divide 174 by 4 to get 87 by 2.

$$\frac{\left[(8+5)(6-2)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}=\frac{\left[(13)(4)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}$$

$$=\frac{\left[(13)(4)^2-(4\cdot 17\div 2)\right]}{\left[(24\div 2)\div 3\right]}$$

$$=\frac{\left[(13)(16)-(68\div 2)\right]}{\left[(24\div 2)\div 3\right]}$$

$$=\frac{\left[208-(68\div 2)\right]}{\left[(24\div 2)\div 3\right]}$$

$$= \frac{[208-34]}{[(24\div 2)\div 3]}$$

$$= \frac{174}{[(24\div 2)\div 3]}$$

$$= \frac{174}{[12\div 3]}$$

$$= \frac{174}{4}$$

$$= \frac{87}{2}$$

The expression after evaluation is $\boxed{\frac{87}{2}}$.

Answer 28PA.

This numerical expression contains many operations. Following order of operations tells us which operation has to be performed first.

First evaluate the expression inside the grouping symbols such as parentheses, brackets, and braces. Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

Add 2 and 7 to get 9. Divide 9 by 3 to get 3.

$$\begin{aligned} 6-\left[\frac{2+7}{3}-(2\cdot 3-5)\right] &= 6-\left[\frac{9}{3}-(2\cdot 3-5)\right] \\ &= 6-[3-(2\cdot 3-5)] \end{aligned}$$

Evaluate expression inside inner parentheses. Multiply 2 by 3 to get 6. Subtract 5 from 6 to get 1.

$$\begin{aligned} 6-\left[\frac{2+7}{3}-(2\cdot 3-5)\right] &= 6-\left[\frac{9}{3}-(2\cdot 3-5)\right] \\ &= 6-[3-(2\cdot 3-5)] \\ &= 6-[3-(6-5)] \\ &= 6-[3-1] \end{aligned}$$

Evaluate expression inside parentheses. Subtract 1 from 3 to get 2.

$$6-\left[\frac{2+7}{3}-(2\cdot3-5)\right]=6-\left[\frac{9}{3}-(2\cdot3-5)\right]$$
$$=6-[3-(2\cdot3-5)]$$
$$=6-[3-(6-5)]$$
$$=6-[3-1]$$

$$=6-2$$

Subtract 2 from 6 to get 4.

$$6-\left[\frac{2+7}{3}-(2\cdot3-5)\right]=6-\left[\frac{9}{3}-(2\cdot3-5)\right]$$
$$=6-[3-(2\cdot3-5)]$$
$$=6-[3-(6-5)]$$
$$=6-[3-1]$$

$$=6-2$$
$$=4$$

The expression after evaluation is $\boxed{4}$.

Answer 29PA.

Area of the rectangle is length by width. Length is $2n+3$ and width is *n*. The expression for the area of the rectangle is $n(2n+3)$. Given *n* is 4 centimeters.

Hence substitute 4 for *n* in the expression $n(2n+3)$.

$$n(2n+3)=4(2(4)+3)$$

First evaluate expression inside parentheses. Multiply 4 by 2 to get 8.

$$n(2n+3)=4(2(4)+3)$$
$$=4(8+3)$$

Add 8 and 3 to get 11.

$$n(2n+3)=4(2(4)+3)$$
$$=4(8+3)$$
$$=4(11)$$

Multiply 4 by 11 to get 44.

$$n(2n+3)=4(2(4)+3)$$
$$=4(8+3)$$
$$=4(11)$$
$$=44$$

The area of the given rectangle is $\boxed{44\text{cm}^2}$.

Answer 30PA.

The money collected by S and D for tickets can be found out by adding number of floor seats by cost of the same and number of balcony seats by cost of the same. S sold 60 floor seats and 70 balcony seats. D sold 50 floor seats and 90 balcony seats. Cost of a floor seat is $7.50 and a balcony seat costs $5.00.

For S the expression for total money collected is as follows.

$$7.50\times 60+5\times 70$$

For D the expression for total money collected is as follows.

$$7.50\times 50+5\times 90$$

Total money collected can be found by adding the above two expressions. This is done by having a plus symbol between these expressions.

$$(7.50\times 60+5\times 70)+(7.50\times 50+5\times 90)$$

Here no need of grouping symbol inside the parentheses. This is because according to order of operations, multiplication is carried out first from left to right and then addition. This is exactly expected from the understanding of the problem. The expression to find the money collected by S and D for tickets is $\boxed{(7.50\times 60+5\times 70)+(7.50\times 50+5\times 90)}$.

Answer 31PA.

The money collected by S and D for tickets can be found out by adding number of floor seats by cost of the same and number of balcony seats by cost of the same. S sold 60 floor seats and 70 balcony seats. D sold 50 floor seats and 90 balcony seats. Cost of a floor seat is $7.50 and a balcony seat costs $5.00.

For S the expression for total money collected is as follows.

$$7.50\times 60+5\times 70$$

For D the expression for total money collected is as follows.

$$7.50\times 50+5\times 90$$

Total money collected can be found by adding the above two expressions. This is done by having a plus symbol between these expressions.

$$(7.50\times 60+5\times 70)+(7.50\times 50+5\times 90)$$

Here no need of grouping symbol inside the parentheses. This is because according to order of operations, multiplication is carried out first from left to right and then addition. This is exactly expected from the understanding of the problem. The expression to find the money collected by S and D for tickets is $(7.50\times 60+5\times 70)+(7.50\times 50+5\times 90)$.

To evaluate the expression $(7.50\times 60+5\times 70)+(7.50\times 50+5\times 90)$, first evaluate the expression within first parentheses.

$$(7.50\times 60+5\times 70)+(7.50\times 50+5\times 90)=(450+350)+(7.50\times 50+5\times 90)$$

Next evaluate the expression within second parentheses.

$$(7.50\times 60+5\times 70)+(7.50\times 50+5\times 90)=(450+350)+(375+450)$$

Add 450 and 350 to get 800. Add 375 and 450 to get 825.

$$\begin{aligned}(7.50\times 60+5\times 70)+(7.50\times 50+5\times 90)&=(450+350)+(375+450)\\&=800+825\end{aligned}$$

Add 800 and 825 to get 1625.

$$\begin{aligned}(7.50\times 60+5\times 70)+(7.50\times 50+5\times 90)&=(450+350)+(375+450)\\&=800+825\\&=1625\end{aligned}$$

Total money collected is $\boxed{\$1625}$.

Answer 32PA.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace *x* with 12, *y* with 8, and *z* with 3.

$$x + y^2 + z^2 = 12 + (8)^2 + (3)^2$$

Following order of operations tells which operation has to be performed first. Evaluate 8 squared. This 64. Evaluate 3 squared. This is 9.

$$\begin{aligned} x + y^2 + z^2 &= 12 + (8)^2 + (3)^2 \\ &= 12 + 64 + 9 \end{aligned}$$

Add 12, 64, and 9 to get 85.

$$\begin{aligned} x + y^2 + z^2 &= 12 + (8)^2 + (3)^2 \\ &= 12 + 64 + 9 \\ &= 85 \end{aligned}$$

The expression after evaluation is $\boxed{85}$.

Answer 33PA.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace *x* with 12, *y* with 8, and *z* with 3.

$$x^3 + y + z^3 = (12)^3 + 8 + (3)^3$$

Following order of operations tells which operation has to be performed first. Evaluate 12 cubed. This is 1728. Evaluate 3 cubed. This is 27.

$$\begin{aligned} x^3 + y + z^3 &= (12)^3 + 8 + (3)^3 \\ &= 1728 + 8 + 27 \end{aligned}$$

Add 1728, 8, and 27 to get 1763.

$$\begin{aligned} x^3 + y + z^3 &= (12)^3 + 8 + (3)^3 \\ &= 1728 + 8 + 27 \\ &= 1763 \end{aligned}$$

The expression after evaluation is $\boxed{1763}$.

Answer 34PA.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace *x* with 12, *y* with 8, and *z* with 3.

$$3xy - z = 3(12)(8) - 3$$

Following order of operations tells which operation has to be performed first. Multiply 3 and 12 to get 36, 36 and 8 to get 288.

Subtract 3 from 288 to get 285.

$$\begin{aligned} 3xy - z &= 3(12)(8) - 3 \\ &= 288 - 3 \\ &= 285 \end{aligned}$$

The expression after evaluation is $\boxed{285}$.

Answer 35PA.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace *x* with 12, *y* with 8, and *z* with 3.

$$4x - yz = 4(12) - (8)(3)$$

Following order of operations tells which operation has to be performed first. Multiply 4 and 12 to get 48, 8 and 3 to get 24.

$$\begin{aligned} 4x - yz &= 4(12) - (8)(3) \\ &= 48 - 24 \end{aligned}$$

Subtract 24 from 48 to get 24.

$$\begin{aligned} 4x - yz &= 4(12) - (8)(3) \\ &= 48 - 24 \\ &= 24 \end{aligned}$$

The expression after evaluation is $\boxed{24}$.

Answer 36PA.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace *x* with 12, *y* with 8, and *z* with 3.

$$\frac{2xy - z^3}{z} = \frac{2(12)(8) - (3)^3}{3}$$

Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

First evaluate 3 cubed to get 27.

$$\begin{aligned}\frac{2xy - z^3}{z} &= \frac{2(12)(8) - (3)^3}{3} \\ &= \frac{2(12)(8) - 27}{3}\end{aligned}$$

Multiply 2 and 12 to get 24, 24 and 8 to get 192 in the numerator.

$$\begin{aligned}\frac{2xy - z^3}{z} &= \frac{2(12)(8) - (3)^3}{3} \\ &= \frac{2(12)(8) - 27}{3} \\ &= \frac{192 - 27}{3}\end{aligned}$$

Subtract 27 from 192 to get 165 in the numerator.

$$\begin{aligned}\frac{2xy - z^3}{z} &= \frac{2(12)(8) - (3)^3}{3} \\ &= \frac{2(12)(8) - 27}{3} \\ &= \frac{192 - 27}{3} \\ &= \frac{165}{3}\end{aligned}$$

This is 55. The expression after evaluation is $\boxed{55}$.

Answer 37PA.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace *x* with 12, *y* with 8, and *z* with 3.

$$\frac{xy^2-3z}{3}=\frac{12(8)^2-3(3)}{3}$$

Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

First evaluate 8 squared to get 64.

$$\begin{aligned}\frac{xy^2-3z}{3}&=\frac{12(8)^2-3(3)}{3}\\&=\frac{12(64)-3(3)}{3}\end{aligned}$$

Multiply 12 and 64 to get 768, 3 and 3 to get 9 in the numerator.

$$\begin{aligned}\frac{xy^2-3z}{3}&=\frac{12(8)^2-3(3)}{3}\\&=\frac{12(64)-3(3)}{3}\\&=\frac{768-9}{3}\end{aligned}$$

Subtract 9 from 768 to get 759 in the numerator.

$$\begin{aligned}\frac{xy^2-3z}{3}&=\frac{12(8)^2-3(3)}{3}\\&=\frac{12(64)-3(3)}{3}\\&=\frac{768-9}{3}\\&=\frac{759}{3}\end{aligned}$$

This is 253. The expression after evaluation is $\boxed{253}$.

Answer 38PA.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace *x* with 12, *y* with 8, and *z* with 3.

$$\left(\frac{x}{y}\right)^2 - \frac{3y-z}{(x-y)^2} = \left(\frac{12}{8}\right)^2 - \frac{3(8)-3}{(12-8)^2}$$

Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

First evaluate $\left(\frac{12}{8}\right)^2$ to get $\frac{144}{64}$.

$$\begin{aligned}\left(\frac{x}{y}\right)^2 - \frac{3y-z}{(x-y)^2} &= \left(\frac{12}{8}\right)^2 - \frac{3(8)-3}{(12-8)^2}\\ &= \frac{144}{64} - \frac{3(8)-3}{(12-8)^2}\end{aligned}$$

Multiply 3 and 8 to get 24 in the numerator.

$$\begin{aligned}\left(\frac{x}{y}\right)^2 - \frac{3y-z}{(x-y)^2} &= \left(\frac{12}{8}\right)^2 - \frac{3(8)-3}{(12-8)^2}\\ &= \frac{144}{64} - \frac{3(8)-3}{(12-8)^2}\\ &= \frac{144}{64} - \frac{24-3}{(12-8)^2}\end{aligned}$$

Subtract 3 from 24 to get 21 in the numerator.

$$\begin{aligned}\left(\frac{x}{y}\right)^2 - \frac{3y-z}{(x-y)^2} &= \left(\frac{12}{8}\right)^2 - \frac{3(8)-3}{(12-8)^2}\\ &= \frac{144}{64} - \frac{3(8)-3}{(12-8)^2}\\ &= \frac{144}{64} - \frac{24-3}{(12-8)^2}\\ &= \frac{144}{64} - \frac{21}{(12-8)^2}\end{aligned}$$

Subtract 8 from 12 to get 4 in the numerator.

$$\left(\frac{x}{y}\right)^2-\frac{3y-z}{(x-y)^2}=\left(\frac{12}{8}\right)^2-\frac{3(8)-3}{(12-8)^2}$$

$$=\frac{144}{64}-\frac{3(8)-3}{(12-8)^2}$$

$$=\frac{144}{64}-\frac{24-3}{(12-8)^2}$$

$$=\frac{144}{64}-\frac{21}{(12-8)^2}$$

$$=\frac{144}{64}-\frac{21}{(4)^2}$$

Find 4 squared. This is 16.

$$\left(\frac{x}{y}\right)^2-\frac{3y-z}{(x-y)^2}=\left(\frac{12}{8}\right)^2-\frac{3(8)-3}{(12-8)^2}$$

$$=\frac{144}{64}-\frac{3(8)-3}{(12-8)^2}$$

$$=\frac{144}{64}-\frac{24-3}{(12-8)^2}$$

$$=\frac{144}{64}-\frac{21}{(12-8)^2}$$

$$=\frac{144}{64}-\frac{21}{(4)^2}$$

$$=\frac{144}{64}-\frac{21}{16}$$

Find the least common denominator of 16, and 64. 16 can be factored as 2 to the power of 4. 64 can be factored as 2 to the power of 6. Highest power is 6. Hence 2 to the power of 6 is the lcm. Hence lcm is 64. Multiply the numerator and denominator of the second fraction by 4 to get the common denominator.

$$\frac{144}{64}-\frac{21}{16}=\frac{144}{64}-\frac{21\cdot 4}{16\cdot 4}$$

$$=\frac{144}{64}-\frac{84}{64}$$

Subtract 84 from 144 to get 60. Divide 60 by 64. Factorize 60, and 64.

$$\frac{144}{64}-\frac{21}{16}=\frac{144}{64}-\frac{21\cdot 4}{16\cdot 4}$$

$$=\frac{144}{64}-\frac{84}{64}$$

$$=\frac{60}{64}$$

$$=\frac{2\cdot 2\cdot 3\cdot 5}{2\cdot 2\cdot 2\cdot 2\cdot 2\cdot 2}$$

Cancel the common factors.

$$\frac{2\cdot2\cdot3\cdot5}{2\cdot2\cdot2\cdot2\cdot2\cdot2}=\frac{\not{2}\cdot\not{2}\cdot3\cdot5}{\not{2}\cdot\not{2}\cdot2\cdot2\cdot2\cdot2}$$

Multiply the remaining numbers in the numerator and denominator.

$$\begin{aligned}\frac{2\cdot2\cdot3\cdot5}{2\cdot2\cdot2\cdot2\cdot2\cdot2}&=\frac{\not{2}\cdot\not{2}\cdot3\cdot5}{\not{2}\cdot\not{2}\cdot2\cdot2\cdot2\cdot2}\\&=\frac{3\cdot5}{2\cdot2\cdot2\cdot2}\\&=\frac{15}{16}\end{aligned}$$

The expression after evaluation is $\boxed{\frac{15}{16}}$.

Answer 39PA.

Like numerical expressions, algebraic expressions contains many operations. Algebraic expressions can be evaluated when the values of the variables are known. First replace the variables with their values. Replace *x* with 12, *y* with 8, and *z* with 3.

$$\frac{x-z^2}{y\div x}+\frac{2y-x}{y^2\div2}=\frac{12-3^2}{8\div12}+\frac{2(8)-12}{8^2\div2}$$

Fraction is a type of grouping symbol. It indicates that the numerator and denominator should be treated as a single value.

First evaluate 3^2 to get 9. Subtract 9 from 12 to get 3.

$$\begin{aligned}\frac{x-z^2}{y\div x}+\frac{2y-x}{y^2\div2}&=\frac{12-3^2}{8\div12}+\frac{2(8)-12}{8^2\div2}\\&=\frac{12-9}{8\div12}+\frac{2(8)-12}{8^2\div2}\\&=\frac{3}{8\div12}+\frac{2(8)-12}{8^2\div2}\end{aligned}$$

In the denominator, 8 by 12 can be simplified as follows.

$$\begin{aligned}\frac{x-z^2}{y\div x}+\frac{2y-x}{y^2\div2}&=\frac{12-3^2}{8\div12}+\frac{2(8)-12}{8^2\div2}\\&=\frac{12-9}{8\div12}+\frac{2(8)-12}{8^2\div2}\\&=\frac{3}{8\div12}+\frac{2(8)-12}{8^2\div2}\\&=\frac{3\times12}{8}+\frac{2(8)-12}{8^2\div2}\end{aligned}$$

$$=\frac{3\times3}{2}+\frac{2(8)-12}{8^2\div2}$$

$$=\frac{9}{2}+\frac{2(8)-12}{8^2\div2}$$

Multiply 2 and 8 to get 16 in the numerator. Subtract 12 from 16 to get 4.

$$\begin{aligned}\frac{x-z^2}{y\div x}+\frac{2y-x}{y^2\div 2}&=\frac{12-3^2}{8\div 12}+\frac{2(8)-12}{8^2\div 2}\\&=\frac{12-9}{8\div 12}+\frac{2(8)-12}{8^2\div 2}\\&=\frac{3}{8\div 12}+\frac{2(8)-12}{8^2\div 2}\\&=\frac{3\times 12}{8}+\frac{2(8)-12}{8^2\div 2}\end{aligned}$$

$$\begin{aligned}&=\frac{3\times 3}{2}+\frac{2(8)-12}{8^2\div 2}\\&=\frac{9}{2}+\frac{2(8)-12}{8^2\div 2}\\&=\frac{9}{2}+\frac{16-12}{8^2\div 2}\\&=\frac{9}{2}+\frac{4}{8^2\div 2}\end{aligned}$$

In the denominator, $8^2\div 2$ can be simplified as follows. First find the square of 8. This is 64. To find 64 by 2, multiply the numerator by the reciprocal of the denominator. Multiply 4 by 2 and retain 64 in the denominator.

$$\begin{aligned}\frac{x-z^2}{y\div x}+\frac{2y-x}{y^2\div 2}&=\frac{12-3^2}{8\div 12}+\frac{2(8)-12}{8^2\div 2}\\&=\frac{12-9}{8\div 12}+\frac{2(8)-12}{8^2\div 2}\\&=\frac{3}{8\div 12}+\frac{2(8)-12}{8^2\div 2}\\&=\frac{3\times 12}{8}+\frac{2(8)-12}{8^2\div 2}\end{aligned}$$

$$\begin{aligned}&=\frac{3\times 3}{2}+\frac{2(8)-12}{8^2\div 2}\\&=\frac{9}{2}+\frac{2(8)-12}{8^2\div 2}\\&=\frac{9}{2}+\frac{16-12}{8^2\div 2}\\&=\frac{9}{2}+\frac{4}{8^2\div 2}\\&=\frac{9}{2}+\frac{4}{64\div 2}\\&=\frac{9}{2}+\frac{4\times 2}{64}\\&=\frac{9}{2}+\frac{1}{8}\end{aligned}$$

Find the least common denominator of 2, and 8. 2 is already factored. 8 can be factored as 2 to the power of 3. Highest power is 3. Hence 2 to the power of 3 is the lcm. Hence lcm is 8. Multiply the numerator and denominator of the first fraction by 4 to get the common denominator.

$$\frac{9}{2}+\frac{1}{8}=\frac{9\cdot 4}{2\cdot 4}+\frac{1}{8}$$
$$=\frac{36}{8}+\frac{1}{8}$$

Add 36 and 1 to get 37. Divide 37 by 8. Write as mixed fraction.

$$\frac{9}{2}+\frac{1}{8}=\frac{9\cdot 4}{2\cdot 4}+\frac{1}{8}$$
$$=\frac{36}{8}+\frac{1}{8}$$
$$=\frac{37}{8}$$
$$=4\frac{5}{8}$$

The expression after evaluation is $\boxed{4\frac{5}{8}}$.

Answer 40PA.

Double means multiply by 2. There are two culture dish and each has 100 and 250 bacterial cells respectively. This bacteria double its numbers every 20 minutes. Hence 100 becomes 2 by 100 and 250 becomes 2 by 250.

An expression that shows the total number of bacteria cells in both dishes after 20 minutes can be arrived as follows.

Total number of bacteria cells in both dishes after 20 minutes

$$=2\times 100+2\times 250$$

To evaluate the right side of the above equation, multiply 2 by 100 to get 200 and 2 by 250 to get 500.

Total number of bacteria cells in both dishes after 20 minutes

$$= 2 \times 100 + 2 \times 250$$

$$= 200 + 500$$

Now add 200 and 500 to get 700. Therefore, the total number of bacteria cells in both dishes after 20 minutes is $\boxed{700}$.

Answer 41PA.

Mr. M receives a salary and monthly commission every month. Hence for a year 12 such salary and monthly commissions are being received.

Here it is given he receives four equal bonuses in a year. Again four times bonuses are added to twelve times the salary and monthly commission.

Therefore, the verbal expression is

$\boxed{\text{twelve times the salary and monthly commission plus four times bonus}}$.

Answer 42PA.

Mr. M receives a salary *s* and monthly commission *c* every month. Hence for a year 12 such salary and monthly commissions are being received.

Here it is given he receives four equal bonuses 4*b* in a year. Now four times bonuses are added to twelve times the salary and monthly commission to get his earnings.

Therefore, the algebraic expression representing his earnings is $\boxed{e = 12(s + c) + 4b}$.

Answer 43PA.

Mr. M receives annual salary of $42,000 and average monthly commission is $825. Hence for a year 12 such monthly commissions are being received.

Here it is given he receives four equal bonuses of $750 each in a year. Again four times bonuses are added to the salary and 12 times the monthly commission.

Each month $825 is being received as a commission. Hence for 12 month 12 by $825 is being received. Next single bonus is $750. Four such equal bonuses amounts to 4 by $750.

$$\begin{aligned}\text{Total amount he earns in a year} &= 42000 + (12 \times 825) + (4 \times 750) \\ &= 42000 + 9900 + 3000 \\ &= 54{,}900\end{aligned}$$

Therefore, Mr. M earns $\boxed{\$54{,}900}$ in a year.

Answer 44PA.

After choosing 1, 2, and 3 work out as many expressions as possible. Each expression should have different results when evaluated. Also all the numbers should be used once and only once in any expression.

First add all the three numbers, the expression being $1+2+3$, and the result is 6. Now multiply all the three numbers. The expression is $1\cdot 2\cdot 3$. Result is 6, which is same as above. Hence discard this expression.

Now combine addition and multiplication. The expression is $1+2\cdot 3$. Result is 7. Another expression changing the order is $1\cdot 2+3$, the result being 5.

Division and addition is combined in this expression. The expression is $2\div 1+3$. Result is 5. This is same as above. Hence discard this expression. Now change the order in the above expression as $2+1\div 3$. Result is a fraction $\frac{7}{3}$.

Move on to subtraction. Expression is $1-2-3$. Result is -4. Changing the position of 3, and 1 gives another expression $3-2-1$. Result being 0. Combining addition and subtraction as in $1-2+3$. Result is 2.

Use grouping symbols. For the expression, $(1+2)3$ the result is 9. The expression $2\div(1+3)$ has result $\frac{1}{2}$.

Combining multiplication and subtraction as in $1-2\times 3$. Result is -5. Changing the position of the operations $1\times 2-3$ gives the result -1.

Use grouping symbols as in $(1-2)3$ for which the result is -3. The expression $2\div(1+3)$ has result $\frac{1}{2}$. Combining division and subtraction as in $1-2\div 3$. Result is $\frac{1}{3}$.

Changing the position of the operations $1\div 2-3$ gives the result $-\frac{5}{2}$. Use grouping symbols as in $(1-2)\div 3$ for which the result is $-\frac{1}{3}$.

Answer 46PA.

Perimeter of the triangle is *P*. *P* is obtained by adding the sides, *a*, *b*, and *c*. If *a* is 10 mm, *b* is 12 mm, and *c* is 17 mm, *P* is obtained by adding 10, 12, and 17.

Add 10, 12, and 17.

$$P = 10 + 12 + 17$$
$$= 39$$

Therefore, the correct choice is $\boxed{A}$.

Answer 47PA.

First evaluate expressions inside grouping symbols. Subtract 1 from 5 to get 4. Next subtract 2 from 11 to get 9. Finally subtract 4 from 7 to get 3.

$$(5-1)^3 + (11-2)^2 + (7-4)^3 = 4^3 + 9^2 + 3^3$$

Evaluate the powers. Now cube 4 to get 64. Square of 9 is 81. Three cubed is 27.

$$\begin{aligned}(5-1)^3 + (11-2)^2 + (7-4)^3 &= 4^3 + 9^2 + 3^3 \\ &= 64 + 81 + 27\end{aligned}$$

Add 64, 81, and 27 to get 172.

$$\begin{aligned}(5-1)^3 + (11-2)^2 + (7-4)^3 &= 4^3 + 9^2 + 3^3 \\ &= 64 + 81 + 27 \\ &= 172\end{aligned}$$

Therefore, the correct choice is $\boxed{B}$.

Answer 48PA.

A fraction bar is another type of grouping symbol. It indicates that the numerator and denominator should each be treated as a single value. First evaluate the numerator. Find 0.75 squared.

$$0.75^2 = 0.5625$$

Multiply 0.25 by 0.5625 to get 0.140625 in the numerator.

$$\begin{aligned}0.25\left(0.75^2\right) &= 0.25(0.5625) \\ &= 0.140625\end{aligned}$$

Now evaluate the denominator. Find 0.75 cubed.

$$0.75^3 = 0.421875$$

Multiply 7 by 0.421875 to get 2.953125 in the denominator.

$$7(0.75^3) = 7(0.421875)$$
$$= 2.953125$$

Divide 0.140625 and 2.953125.

$$\frac{0.140625}{2.953125} \approx 0.047619047619047619...$$

Therefore, the answer is approximately $\boxed{0.\overline{047619}}$.

Answer 49PA.

A fraction bar is another type of grouping symbol. It indicates that the numerator and denominator should each be treated as a single value. First evaluate the numerator. Find 27.89 squared.

$$27.89^2 = 777.8521$$

Multiply 2 by 777.8521 to get 1555.7042 in the numerator.

$$2(27.89^2) = 2(777.8521)$$
$$= 1555.7042$$

Now evaluate the denominator. 27.89 squared 777.8521.

Subtract 27.89 from 777.8521 in the denominator.

$$777.8521 - 27.89 = 749.9621$$

Divide 1555.7042 and 749.9621.

$$\frac{1555.7042}{749.9621} \approx 2.0743770918557084417999256229081...$$

Therefore, the answer (corrected to nine decimal places) is approximately $\boxed{2.074377092}$.

Answer 50PA.

A fraction bar is another type of grouping symbol. It indicates that the numerator and denominator should each be treated as a single value. First evaluate the numerator. Find 12.75 cubed and squared.

$$12.75^3 = 2072.671875$$
$$12.75^2 = 162.5625$$

Add both of them for the numerator.

$$2072.671875 + 162.5625 = 2235.234375$$

Subtract 162.5625 from 2072.671875 for the denominator.

$$2072.671875 - 162.5625 = 1910.109375$$

Divide 2235.234375 and 1910.109375.

$$\frac{2235.234375}{1910.109375} \approx 1.17021276595744680851063829787 23...$$

Therefore, the answer (corrected to nine decimal places) is approximately $\boxed{1.170212766}$.

Answer 51MYS.

The word product suggests multiplication. Third power suggest exponent is 3. Fourth power suggests exponent is 4.

$$\underbrace{\text{the product of}}_{\cdot}\ \underbrace{\text{the third power of } a}_{a^3}\ \underbrace{\text{and the fourth power of } b}_{b^4}$$

The given verbal expression in algebraic expression is $\boxed{a^3 \cdot b^4}$.

Answer 52MYS.

The word less than suggests subtraction. Times suggest multiplication. Square of suggests the exponent is 2.

$$\underbrace{\text{six}}_{6}\ \underbrace{\text{less than}}_{-}\ \underbrace{\text{three times the square of } y}_{3y^2}$$

The given verbal expression in algebraic expression is $\boxed{3y^2 - 6}$.

Answer 53MYS.

The word sum, and increased by suggests addition. Quotient suggests division.

$$\underbrace{\text{the sum of } a \text{ and } b}_{a+b}\ \underbrace{\text{increased by}}_{+}\ \underbrace{\text{the quotient of } b \text{ by } a}_{\frac{b}{a}}$$

The given verbal expression in algebraic expression is $\boxed{a + b + \frac{b}{a}}$.

Answer 54MYS.

The word sum, and increased by suggests addition. times suggests multiplication. Twice suggests multiplied by 2. Difference suggests subtraction.

$$\underbrace{\text{four times the sum of } r \text{ and } s}_{4(r+s)}\ \underbrace{\text{increased by}}_{+}\ \underbrace{\text{twice the difference of } r \text{ and } s}_{2(r-s)}$$

The given verbal expression in algebraic expression is $\boxed{4(r+s)+2(r-s)}$.

Answer 55MYS.

The word triple suggests multiplied by 3. Difference suggests subtraction. Cube suggests exponent is 3.

$$\underbrace{\text{triple}}_{3(\ )}\ \underbrace{\text{the difference of}}_{-}\ \underbrace{55}_{55}\ \underbrace{\text{cube of } w}_{w^3}$$

The given verbal expression in algebraic expression is $\boxed{3(55-w^3)}$.

Answer 56MYS.

An expression like x^n is called a power and is read "*x* to the *n*th power." Here evaluate 2 to the fourth power.

In the given expression, 2 is the base, and 4 is called the exponent. Here 4 indicates the number of times 2 is used as a factor.

$$2^4 = 2 \cdot 2 \cdot 2 \cdot 2$$

Multiply to get 16. Therefore given expression after evaluation is $\boxed{16}$.

Answer 57MYS.

An expression like x^n is called a power and is read "*x* to the *n*th power." Here evaluate 12 to the first power.

In the given expression, 12 is the base, and 1 is called the exponent. Here 1 indicates the number of times 12 is used as a factor.

$$12^1 = 12$$

Therefore given expression after evaluation is $\boxed{12}$.

Answer 58MYS.

An expression like x^n is called a power and is read "*x* to the *n*th power." Here evaluate 8 to the second power.

In the given expression, 8 is the base, and 2 is called the exponent. Here 2 indicates the number of times 8 is used as a factor.

$$8^2 = 8 \cdot 8$$

Multiply to get 64. Therefore given expression after evaluation is $\boxed{64}$.

Answer 59MYS.

An expression like x^n is called a power and is read "*x* to the *n*th power." Here evaluate 4 to the fourth power.

In the given expression, 4 is the base, and 4 is called the exponent. Here 4 indicates the number of times 4 is used as a factor.

$$4^4 = 4 \cdot 4 \cdot 4 \cdot 4$$

Multiply to get 256. Therefore given expression after evaluation is $\boxed{256}$.

Answer 60MYS.

First the product of 5 and the variable *n* is given. Next the quotient of the variable *n* and 2 is given. Both the above terms are added together.

Hence the verbal expression for the given algebraic expression is "the product of 5 and *n* increased by the quotient of *n* and 2." Therefore the verbal expression is

$\boxed{\text{the product of 5 and } n \text{ increased by the quotient of } n \text{ and 2}}$.

Answer 61MYS.

First the square of the variable *q* is given. Next the number 12 is given. Both the above terms are subtracted.

Hence the verbal expression for the given algebraic expression is "the difference of square of *q* and 12." Therefore the verbal expression is $\boxed{\text{the difference of the square of } q \text{ and 12}}$.

Answer 62MYS.

First in the numerator the sum of the variable *x* and 3 is given. Next in the denominator the square of the difference of the variable *x* and 2 is given.

Hence the verbal expression for the given algebraic expression is "the quotient of the sum of *x* and 3 and the square of the difference of *x* and 2." Therefore the verbal expression is

$\boxed{\text{the quotient of the sum of } x \text{ and 3 and the square of the difference of } x \text{ and 2}}$.

Answer 63MYS.

First in the numerator the cube of the variable x is given. Next in the denominator number 9 is given.

Hence the verbal expression for the given algebraic expression is "the quotient of the cube of x and 9." Therefore the verbal expression is $\boxed{\text{the quotient of the cube of } x \text{ and } 9}$.

Answer 64MYS.

Subtract 7 from 9 to get 2. 2 is the number in the thousandth digit.

$$\begin{array}{r} 4\,9\,9\,10 \\ 0.\not{5}000 \\ \underline{0.0075} \\ 25 \end{array}$$

Subtract 0 from 9 to get 9. 9 is the number in the hundredth digit.

$$\begin{array}{r} 4\,9\,9\,10 \\ 0.\not{5}000 \\ \underline{0.0075} \\ 925 \end{array}$$

Subtract 0 from 4 to get 4. 4 is the number in the tenth digit.

$$\begin{array}{r} 4\,9\,9\,10 \\ 0.\not{5}000 \\ \underline{0.0075} \\ 0.4925 \end{array}$$

The expression after evaluation is $\boxed{0.4925}$.

Answer 65MYS.

Add 0 and 1 to get 1. 6 and 6 gives 12. Retain 2 as the tenth digit and carry over 1 for the previous digit.

$$\begin{array}{r} 1 \\ 5.600 \\ \underline{1.612} \\ .212 \end{array}$$

Add 1, 5, and 1 to get 7. 7 is the number in the ones digit.

The expression after evaluation is $\boxed{7.212}$.

Answer 66MYS.

Divide 14.9968 by 5.2. To divide these numbers remove the decimal point.

$$149968 \div 52$$

Divide 149968 by 52.

$$\begin{array}{r} 2 \\ 52\overline{)149968} \\ \underline{104} \\ 45 \end{array}$$

Bring down the 9 to get 459.

$$\begin{array}{r} 28 \\ 52\overline{)149968} \\ \underline{104} \\ 459 \\ \underline{416} \\ 43 \end{array}$$

Bring down the 6 to get 436.

$$\begin{array}{r} 288 \\ 52\overline{)149968} \\ \underline{104} \\ 459 \\ \underline{416} \\ 436 \\ \underline{416} \\ 20 \end{array}$$

Bring down the 8 to get 208.

$$\begin{array}{r} 2884 \\ 52\overline{)149968} \\ \underline{104} \\ 459 \\ \underline{416} \\ 436 \\ \underline{416} \\ 208 \\ \underline{208} \\ 0 \end{array}$$

Dividend has 4 digits and divisor has 1 digit after the decimal point. Hence the quotient has 1(4 - 1) digit after the decimal point. The expression after evaluation is $\boxed{2.884}$.

Answer 67MYS.

First number has digit after the decimal point and the second number has 3 digits after the decimal point. Now add both the numbers to get 4. Hence the answer number should have 4 digits after the decimal point.

$$\begin{array}{r} 23 \\ 6425 \\ \hline 115 \\ 46 \\ 92 \\ 138 \\ \hline 14.7775 \end{array}$$

The expression after evaluation is $\boxed{14.7775}$.

Answer 68MYS.

Convert the mixed numbers to improper fraction. They are $\frac{33}{8}$ and $\frac{3}{2}$. First write 8, and 2 as factors.

$$8 = 2 \times 2 \times 2$$
$$2 = 2$$

Here 2 is used a maximum of 3 times in any factorization. Hence multiply 2 by 2 by 2 to get 8. This is the lowest common multiple (LCM).

Divide 8 by 8 to get 1, and 8 by 2 to get 4. Hence retain the first number, and multiply the second number by 4 to get common denominator.

Multiply 3, and 2 by 4. Then subtract the numerators. Retain the common denominator, which is the LCM.

$$\begin{aligned} \frac{33}{8} - \frac{3}{2} &= \frac{33}{8} - \frac{3 \cdot 4}{2 \cdot 4} \\ &= \frac{33}{8} - \frac{12}{8} \\ &= \frac{21}{8} \\ &= 2\frac{5}{8} \end{aligned}$$

The expression after evaluation is $\boxed{2\frac{5}{8}}$.

Answer 69MYS.

Convert mixed fraction to an improper fraction. It is $\frac{19}{7}$. Now write the denominators 5, and 7 as factors. Here 5 and 7 are already factored completely. Now multiply 5 by 7 to get lowest common multiple of them. This is 35.

Divide 35 by 5 to get 7, and 35 by 7 to get 5. Hence multiply both the numerator and denominator of first number by 7, and the second number by 5 to get common denominator.

Multiply 3, and 5 by 7. Similarly 19 and 7 by 5. Then add the numerator. Retain the common denominator, which is the LCM.

$$\begin{aligned}\frac{3}{5}+\frac{19}{7}&=\frac{3\cdot 7}{5\cdot 7}+\frac{19\cdot 5}{7\cdot 5}\\&=\frac{21}{35}+\frac{95}{35}\\&=\frac{116}{35}\end{aligned}$$

Convert the mixed number to a proper fraction. The expression after evaluation is $\boxed{3\frac{11}{35}}$.

Answer 70MYS.

Write both the numbers in a completely factored form. 5 is already factored completely.

$$6=2\times 3$$

Write them and cancel the common factors.

$$\begin{aligned}\frac{5}{6}\cdot\frac{4}{5}&=\frac{5}{2\times 3}\cdot\frac{2\times 2}{5}\\&=\frac{1\cancel{5}}{1\cancel{2}\times 3}\cdot\frac{\cancel{2}\times 2}{\cancel{5}1}\\&=\frac{1}{1\times 3}\times\frac{2}{1}\\&=\frac{1}{3}\times\frac{2}{1}\end{aligned}$$

Multiply the remaining numbers in the numerator and denominator.

$$\frac{1}{3}\times\frac{2}{1}=\frac{2}{3}$$

The expression after evaluation is $\boxed{\frac{2}{3}}$.

Answer 71MYS.

Division can be considered as a multiplication after writing the second number which is after the division symbol can be written as its reciprocal.

Write the second number $\frac{2}{9}$ as its reciprocal $\frac{9}{2}$ and carry multiplication.

Number 8 can be written as $\frac{8}{1}$. Write them and cancel the common factors.

$$\frac{8}{1}\times\frac{9}{2}=\frac{4}{1}\times\frac{9}{1}$$

Multiply the remaining numbers in the numerator and denominator.

$$\begin{aligned}\frac{4}{1}\times\frac{9}{1}&=\frac{36}{1}\\&=36\end{aligned}$$

The expression after evaluation is $\boxed{36}$.