

Algebraic Expressions

MATHEMATICAL REASONING

1. The value of $(-5x^2y) \times \left(-\frac{2}{3}xy^2z\right) \times \left(\frac{8}{15}xyz^2\right) \times \left(-\frac{1}{4}z\right)$ is _____.
 - (a) $-\frac{4}{9}x^4y^4z^4$
 - (b) $\frac{4}{9}x^4y^4z^4$
 - (c) $-\frac{4}{9}x^3y^3z^3$
 - (d) $\frac{4}{9}x^3y^3z^3$

2. Addition of $\frac{a^2}{2} + \frac{b^3}{3} - \frac{c^3}{4}$.
 $\frac{2a^2}{3} + \frac{3b^3}{4} - \frac{4c^3}{4}$, and $a^2 + b^3 + c^3$ is _____.
 - (a) $\frac{13}{6}a + \frac{25}{12}b^3 - \frac{1}{20}c^3$
 - (b) $\frac{13}{6}a^2 - \frac{1}{20}b^3 + \frac{25}{12}c^3$
 - (c) $\frac{13}{6}a^2 + \frac{25}{12}b^3 - \frac{1}{20}c^3$
 - (d) $\frac{13}{6}a^2 - \frac{25}{12}b^3 + \frac{1}{20}c^3$

3. Simplify $\left(2x + \frac{1}{3y}\right)^2 - \left(2x - \frac{1}{3y}\right)^2$
 - (a) $\frac{4x}{3y}$
 - (b) $2\left(4x^2 + \frac{1}{9y^2}\right)$
 - (c) $\frac{8x}{3y}$
 - (d) $\frac{4y}{3x}$

4. The product of $\left(\frac{4p}{5} - 3\right)$ and $\left(\frac{5p}{8} - 6\right)$ is _____.
 - (a) $\frac{p^2}{2} + \frac{267}{40}p - 18$
 - (b) $\frac{p^2}{2} - \frac{267}{40}p - 18$
 - (c) $\frac{p^2}{2} + \frac{267}{40}p + 18$
 - (d) $\frac{p^2}{2} - \frac{267}{40}p + 18$

5. The value of $9x^2 + 49y^2 - 42xy$ when $x = 15$ and $y = 3$ is _____.
 - (a) 636
 - (b) 576
 - (c) 456
 - (d) 386

6. An expression is taken away from $3x^2 - 4y^2 + 5xy + 20$ to obtain $-x^2 - y^2 + 6xy + 20$, then the expression is _____.
 - (a) $4x^2 - 3y^2 - xy$
 - (b) $2x^2 - 5y^2 + xy + 40$
 - (c) $3y^2 - xy - 4x^2$
 - (d) $4x^2 + 3y^2 + xy$

7. The given algebraic expression of its exponent in ascending order is $x - x^8 + x^2 - 1.7x^{10} + 1.4x^8 - 7.8x^2 + 4 - 9x$
 - (a) $4 - 8x - 6.8x^2 + 0.4x^8 - 1.7x^{10}$
 - (b) $-1.7x^{10} + 0.4x^8 - 6.8x^2 - 8x + 4$
 - (c) $4 - 6.8x - 8x^2 + 0.4x^8 - 1.7x^{10}$
 - (d) $-1.7x^{10} - 0.4x^8 - 6.8x^2 + 8x + 4$

8. The number of diagonals drawn from one vertex of a polygon of n sides is _____.
 - (a) $n - 1$
 - (b) $n - 2$
 - (c) $n - 3$
 - (d) n

9. Simplify:
 $(a^3 - 2a^2 + 4a - 5) - (-a^3 - 8a + 2a^2 + 5)$
 (a) $2a^3 + 7a^2 + 6a - 10$
 (b) $2a^3 + 7a^2 + 12a - 10$
 (c) $2a^3 - 4a^2 + 12a - 10$
 (d) $2a^3 - 4a^2 + 6a - 10$
10. By how much is $a^4 + 4a^2b^2 + b^4$ more than $a^4 - 8a^2b^2 + b^4$?
 (a) $12a^2b^2$ (b) $-12a^2b^2$
 (c) $2a^4 + 2b^4$ (d) $10a^2b^2$
11. If $l = -1$ and $m = 2$, then the value of $4l^2 + 9m^2 + 2lm - 9l^2m$ is _____.
 (a) 39 (b) 24
 (c) 18 (d) 36
12. Degree of zero is _____.
 (a) 0 (b) 1
 (c) 2 (d) Not defined
13. The degree of $(6x^7 - 7x^3 + 3x^2 + 2x - 1)$ is.
 (a) 7 (b) 6
 (c) 3 (d) 5
14. If $\frac{x}{y} = \frac{3}{4}$, then the value of $\left(\frac{6}{7} + \frac{y-x}{y+x}\right)$ equals _____.
 (a) $\frac{5}{7}$ (b) $1\frac{1}{7}$
 (c) 1 (d) 2
15. If $A = 10w^3 + 20w^2 - 55w + 60$,
 $B = -25w^2 + 15w - 10$ and
 $C = 5w^2 - 10w + 20$,
 then $A + B - C$ is equal to _____.
 (a) $10w^3 + 10w^2 + 30w + 30$
 (b) $10w^3 + 10w^2 - 30w + 30$
 (c) $10w^3 - 10w^2 - 30w + 30$
 (d) None of these
16. Which of the following expressions is CORRECT?
 (a) $\frac{pq+r}{q} = p+r$
 (b) $\frac{p+r}{q+r} = \frac{q}{r}$
 (c) $\frac{pq+pr}{ps} = \frac{q+r}{s}$
 (d) $\frac{p(q+r)}{p+s} = \frac{q+r}{s}$
17. Simplify:
 $(3x + 2y - 9)(2x - 6y + 2) - [(4x - 9y - 1) + (-3x + 8y + 7)]$
 (a) $6x^2 - 14xy - 12y^2 - 13x + 59y - 24$
 (b) $6x^2 - 12xy - 18y^2 - 17x + 61y - 29$
 (c) $8x^2 - 14xy - 12y^2 - 13x + 57y - 24$
 (d) $8x^2 - 14xy - 12y^2 - 17x + 61y - 29$
18. Subtract $(2a - 3b + 4c)$ from the sum of $(a + 3b - 4c)$, $(4a - b + 9c)$ and $(-2b + 3c - a)$.
 (a) $3a + 2b + 4c$
 (b) $2a - 2b + 4c$
 (c) $3a - 4b - 2c$
 (d) $2a + 3b + 4c$
19. If $x = -2$, $y = 3$ and $z = 1$, then the value of expression $x^3 + y^3 + z^3 - 3xyz$ is _____.
 (a) 38 (b) 37
 (c) -37 (d) -38
20. How many trinomials are there?
 (i) $4y - 7z$
 (ii) $x + y - xy$
 (iii) $7mn$
 (iv) $z^2 - 3z + 8$
 (v) $1 + x + x^2$
 (a) 2 (b) 3
 (c) 4 (d) 5

EVERY DAY MATHEMATICS

21. In a school, $8a^2 + 4a + 9$ students were enrolled. $2a^2 - 9a + 2$ students were boys. How many girls were enrolled?

(a) $6a^2 - 13a + 7$
 (b) $4a^2 + 13a + 7$
 (c) $6a^2 + 13a + 7$
 (d) $4a^2 - 13a + 7$

22. Rohan spends Rs. x daily and saves Rs. y per week. What is his income in 3 weeks?

(a) Rs. $(21x + 3y)$ (b) Rs. $(3x + 9y)$
 (c) Rs. $(21x + 9y)$ (d) Rs. $(7x + 3y)$

23. Mohit's monthly salary was Rs. $5445q$. He

saved 30% of it and gave $\frac{1}{2}$ of the remainder

to his parents. If Mohit used $\frac{3}{4}$ of the amount

of money, he had left to buy a guitar, then how much money would he have left, if $q = 8$?

(a) Rs. 1100.50 (b) Rs. 11434.50
 (c) Rs. 11079.50 (d) Rs. 3811.50

24. A vacuum cleaner set costs Rs. $154.25k$. Additional pipe costs Rs. $15.2k$. What is the total cost of 3 vacuum cleaner sets and 5 additional pipes?

(a) Rs. 400 k (b) Rs. 530.75 k
 (c) Rs. 538.75 k (d) Rs. 600 k

25. From 2012-2016, the amount (in crores) spent on natural gas N and electricity E by Indian residents can be described by the following expressions, where t is the number of years since 2012.

Gas spending model,

$$N = 2.13t^2 - 4.21t + 37.40$$

Electricity spending model,

$$E = -0.209t^2 + 5.393t + 307.735$$

What is the total amount A spent on natural gas and electricity by Indian residents from 2012 to 2016?

(a) $1.467t^2 + 7.423 + 121.721$
 (b) $1.339t^2 - 8.729t + 76.245$
 (c) $1.01t^2 + 7.083 + 97.83$
 (d) $1.921t^2 + 1.183t + 345.135$

ACHIEVERS SECTION (HOTS)

26. State 'T' for true and 'F' for false.

I. Expression with two unlike terms is called a monomial.

II. The sum of two unlike terms is a like term with coefficient equal to the sum of coefficients of the two unlike terms.

III. The value of $3y^2 - 5y + 3$, when $y = 1$ is 1.

	I	II	III
(a)	T	T	F
(b)	T	F	T
(c)	F	T	F
(d)	F	F	T

27. Match the following.

Column-I	Column-II
(P) $(x^2 + 5)(x^3 + 3) + 5$	(1) $-x^3 - 3x^2 + 3x + 2$
(Q) $\left(\frac{-10}{3}xy^3\right) \times \left(\frac{6}{5}x^3y\right)$	(2) $-x^2 + x^2 + 3x - 6$
(R) $(x^3 - x^2 - x - 2) - (2x^3 + 2x^2 - 4x - 4)$	(3) $x^5 + 5x^3 + 3x^2 + 20$
(S) $(x^3 - x^2 - x - 2) + (2x^2 - 2x^3 + 4x - 4)$	(4) $-4x^4y^4$

(a) (P) $\rightarrow$ (1), (Q) $\rightarrow$ (2), (R) $\rightarrow$ (3), (S) $\rightarrow$ (4)
 (b) (P) $\rightarrow$ (3), (Q) $\rightarrow$ (4), (R) $\rightarrow$ (1), (S) $\rightarrow$ (2)
 (c) (P) $\rightarrow$ (4), (Q) $\rightarrow$ (1), (R) $\rightarrow$ (3), (S) $\rightarrow$ (2)
 (d) (P) $\rightarrow$ (3), (Q) $\rightarrow$ (4), (R) $\rightarrow$ (2), (S) $\rightarrow$ (1)

28. The value of $\frac{1}{4}\{x - 5(q - x)\}$

$$-\frac{3}{2}\left\{\frac{1}{3}\left(q - \frac{x}{3}\right) - \frac{2}{9}\left[x - \frac{3}{4}\left(q - \frac{4x}{5}\right)\right]\right\}$$

(a) $\frac{9x}{5} + \frac{q}{2}$ (b) $\frac{9x}{4} - \frac{q}{2}$

$$(c) \frac{9x}{5} - \frac{q}{2}$$

$$(d) \frac{11x}{5} - 2q$$

29. Find the value of $4xy(x-y) - 6x^2(y-y^2) - 3y^2(2x^2-x) + 2xy(x-y)$ for $x=5$ and $y=13$.

- (a) -195 (b) 2535
(c) -2535 (d) 7605

30. Fill in the blanks.

- (i) Any expression with one or more terms is called a P.
(ii) Terms which have the same algebraic factors are Q terms.
(iii) The R is the numerical factor in the term.
(iv) Algebraic expressions are formed from S and T.

P	Q	R	S	T
(a) Binomial	unlike	term	factors	constants
(b) Polynomial	like	term	factors	constants
(c) Trinomial	unlike	coefficient	variables	constants
(d) Polynomial	like	coefficient	variables	constants

ANSWER KEY

1. A	2. C	3. C	4. D	5. B
6. A	7. A	8. C	9. C	10. A
11. C	12. D	13. A	14. C	15. C
16. C	17. A	18. D	19. A	20. B
21. C	22. A	23. D	24. C	25. D
26. D	27. B	28. D	29. C	30. D

SOLUTION

1. (a): We have

$$\begin{aligned} & (-5x^2y) \times \left(\frac{-2}{3}xy^2z\right) \times \left(\frac{8}{15}xyz^2\right) \times \left(\frac{-1}{4}z\right) \\ &= \left(-5 \times \left(\frac{-2}{3}\right) \times \frac{8}{15} \times \left(\frac{-1}{4}\right)\right) \times (x^2 \times x \times x) \end{aligned}$$

$$\begin{aligned} & \times (y \times y^2 \times y) \times (z \times z^2 \times z) \\ &= \frac{-4}{9}x^4y^4z^4 \end{aligned}$$

2.

$$\begin{aligned} (c): & \left(\frac{a^2}{2} + \frac{b^3}{3} - \frac{c^3}{4}\right) + \left(\frac{2a^2}{3} + \frac{3b^3}{4} - \frac{4c^3}{5}\right) \\ & + (a^2 + b^3 + c^3) \\ &= \frac{13}{6}a^2 + \frac{25}{12}b^3 - \frac{1}{20}c^3 \end{aligned}$$

3.

$$\begin{aligned} (c): & \left(2x + \frac{1}{3y}\right)^2 - \left(2x - \frac{1}{3y}\right)^2 \\ &= \left[2x + \frac{1}{3y}\right] \left[2x + \frac{1}{3y}\right] - \left\{\left(2x - \frac{1}{3y}\right) \left(2x - \frac{1}{3y}\right)\right\} \\ &= \left[4x^2 + \frac{1}{9y^2} + \frac{4x}{3y}\right] - \left\{4x^2 + \frac{1}{9y^2} - \frac{4x}{3y}\right\} = \frac{8x}{3y} \end{aligned}$$

4.

$$\begin{aligned} (d): & \text{We have, } \left(\frac{4p}{5} - 3\right) \times \left(\frac{5p}{8} - 6\right) \\ &= \frac{p^2}{2} - \frac{24}{5}p - \frac{15}{8}p + 18 = \frac{p^2}{2} - \frac{267}{40}p + 18 \end{aligned}$$

5.

$$\begin{aligned} (b): & \text{When } x=15 \text{ and } y=3, \text{ we have} \\ & 9 \times (15)^2 + 49 \times (3)^2 - 42 \times 15 \times 3 \\ &= 2025 + 441 - 1890 = 576 \end{aligned}$$

6.

$$\begin{aligned} (a): & \text{Required expression} \\ &= (3x^2 - 4y^2 + 5xy + 20) - (-x^2 - y^2 + 6xy + 20) \\ &= 3x^2 - 4y^2 + 5xy + 20 + x^2 + y^2 - 6xy - 20 \\ &= 4x^2 - 3y^2 - xy \end{aligned}$$

7.

$$\begin{aligned} (a): & x - x^8 + x^2 - 1.7x^{10} + 1.4x^8 - 7.8x^2 + 4 - 9x \\ &= 4 + (x - 9x) + (x^2 - 7.8x^2) \\ &+ (-x^8 + 1.4x^8) - 1.7x^{10} \\ &= 4 - 8x - 6.8x^2 + 0.4x^8 - 1.7x^{10} \end{aligned}$$

8.

(c):

9.

$$\begin{aligned} (c): & (a^3 - 2a^2 + 4a - 5) - (-a^3 - 8a + 2a^2 + 5) \\ &= a^3 - 2a^2 + 4a - 5 + a^3 + 8a - 2a^2 - 5 \end{aligned}$$

$$= 2a^3 - 4a^2 + 12a - 10$$

10. (a): Required expression

$$= (a^4 + 4a^2b^2 + b^4) - (a^4 - 8a^2b^2 + b^4) \\ = a^4 + 4a^2b^2 + b^4 - a^4 + 8a^2b^2 - b^4 = 12a^2b^2$$

11. (c): We have $4l^2 + 9m^2 + 2lm - 9Fm$
 $= 4(-1)^2 + 9(2)^2 + 2(-1)(2) - 9(-1)^2(2)$
 $= 4 + 36 - 4 - 18 = 40 - 22 = 18$

12. (d)

13. (a)

14. (c)

15. (c) $A + B - C = (10w^3 + 20w^2 - 55w + 60)$
 $+ (-25w^2 + 15w - 10) - (5w^2 - 10w + 20)$
 Bring all the like terms together, we get
 $A + B - C = 10w^3 + (20w^2 - 25w^2 - 5w^2)$
 $+ (-55w + 15w + 10w) + (60 - 10 - 20)$
 $= 10w^3 - 10w^2 - 30w + 30$

16. (c)

17. (a): $(3x + 2y - 9)(2x - 6y + 2)$
 $[(4x - 9y - 1)] + [-3x + 8y + 7]$
 $= (6x^2 - 18xy + 6x + 4xy - 12y^2 + 4y - 18x +$
 $54y - 18) - (x - y + 6)$
 $= 6x^2 - 12y^2 - 14xy - 12x + 58y - 18 - x + y - 6$
 $= 6x^2 - 12y^2 - 14xy - 13x + 59y - 24$

18. (d): Sum $= (a + 3b - 4c) + (4a - b + 9c) +$
 $(-2b + 3c - a)$
 $= (a + 4a - a) + (3b - b - 2b) + (-4c + 9c + 3c)$
 $= 4a + 8c$
 $\therefore$ Required difference
 $= (4a + 8c) - (2a - 3b + 4c)$
 $= 4a + 8c - 2a + 3b - 4c = 2a + 3b + 4c$

19. (a): $(-2)^3 + (3)^3 + (1)^3 - 3(-2)(3)(1)$
 $= -8 + 27 + 1 + 18 = 38$

20. (b): An expression having 3 terms is known as trinomial.

21. (c): Number of girls enrolled
 $= (8a^2 + 4a + 9) - (2a^2 - 9a + 2)$
 $= 8a^2 + 4a + 9 - 2a^2 + 9a - 2 = 6a^2 + 13a + 7$

22. (a): Amount of money spent in 1 day = Rs. x
 So, amount of money spent in 7 days
 $= \text{Rs.}(7x)$
 $\Rightarrow$ Amount of money spent in 1 week =
 $\text{Rs.}(7x)$
 Amount of money saved in 1 week = Rs. y
 $\therefore$ Income in 1 week $\text{Rs.}(7x + y)$
 So, income in 3 weeks $= \text{Rs.}[3 \times (7x + y)]$
 $= \text{Rs.}(21x + 3y)$

23. (d)

24. (c): Cost of 1 vacuum cleaner set =
 $\text{Rs.}154.25k$
 $\therefore$ Cost of 3 vacuum cleaner sets
 $= \text{Rs.}(3 \times 154.25k)$
 Cost of 1 additional pipe = $\text{Rs.}15.20k$
 $\therefore$ Cost of 5 additional pipes
 $= \text{Rs.}(5 \times 15.2k) = \text{Rs.}76k$
 So total cost
 $= \text{Rs.}(462.75k + 76k) = \text{Rs.}538.75k$

25. (d)

26. (d)

27. (b): $(P)(x^2 + 5)(x^3 + 3) + 5$
 $= x^5 + 3x^2 + 5x^3 + 15 + 5$
 $= x^5 + 5x^3 + 3x^2 + 20$
 (Q) $\left(\frac{-10}{3} \times xy^3\right) \times \left(\frac{6}{5}x^3y\right)$
 $= \left(\frac{-10}{3} \times \frac{6}{5}\right)x^4y^4 = -4x^4y^4$
 (R) $(x^3 - x^2 - x - 2) - (2x^3 + 2x^2 - 4x - 4)$
 $= x^3 - x^2 - x - 2 - 2x^3 - 2x^2 + 4x + 4$
 $= -x^3 - 3x^2 + 3x + 2$
 (S) $(x^3 - x^2 - x - 2) + (2x^2 - 2x^3 + 4x - 4)$

$$\begin{aligned}
&= x^3 - x^2 - x - 2 + 2x^2 - 2x^3 + 4x - 4 \\
&= -x^3 + x^2 + 3x - 6
\end{aligned}$$

28. (d)

29. (c): We have, $4xy(x - y) - 6x^2(y - y^2)$
 $-3y^2(2x^2 - x) + 2xy(x - y)$
 $= 4x^2y - 4xy^2 - 6x^2y + 6x^2y^2 - 6x^2y^2 + 3xy^2$
 $+ 2x^2y - 2xy^2$
 $= (4x^2y - 6x^2y + 2x^2y) + (-4xy^2 + 3xy^2 - 2xy^2)$
 $+ (6x^2y^2 - 6x^2y^2)$
 $= 0 - 3xy^2 + 0 = -3(5) \times (13)^2$
 $= -3 \times 5 \times 169 = -2535$

30. (d)