Algebraic Expressions

QUESTIONS

1. If $x+y=7 : y+z=8; z+x=9$, what is the value of $x+y+z$?

(a) 12 (b) 9 (c) 7 (d) 16

2. What row is matched correctly?

Row	Expression	Term with factor x	Coefficient of x
A	$2x-4y$	$2x$	–4
B	$x-3+y$	x	0
C	y^2q+2x	$2x$	x
D	$2z+2zx$	$2zx$	$2z$

(a) Row A (b) Row B (c) Row C (d) Row D

3. Which row is matched incorrectly?

Row	Expression	Coefficient of m^2	Coefficient of mn	Coefficient of n^2
A	$m^2-5mn+3m+n^2$	1	–5	1
B	$n^2+5mn-6m+2m$	0	5	1
C	$m^2+45mn-17m+2$	1	45	0
D	$2n^2-23mn+7$	2	–23	1

(a) Row A (b) Row B (c) Row C (d) Row D

4. Which of the following statements is incorrect?

(a) The terms $4x^2y$ and $3xy^2$ are like terms.

(b) The coefficient of y^2 in the expression $-2x^2+8xy^2+39$ is $8x$.

(c) 3, x, x^2 and y are factors of $3x^2y$.

(d) The expression $15p^2q+8pq^2+42pq+99$ contains 4 terms.

5. What is the difference between a + b and a - b

(a) 2b (b) 2a (c) $2a+2b$ (d) $2a-2b$

6. The length and breadth of a rectangular plot are 1 and b. Two rectangular paths each of width 'r' run inside the plot one parallel to the length and the other parallel to the breadth. What is the total area of the paths?

(a) $(1+r)(b+r)-1b$ (b) $1b-(1-r)(b-r)$

(c) $(1+b-r)r$ (d) $1b-(1-2r)(b-2r)$

7. In a two digit number, the units digit is n and tens digit is $(n-1)$. What is the value of the number? (Where n $\leq$ 9).

(a) $kn-1$ (b) $2n+3$ (c) $3+n$ (d) $11n-10$

8. P_1 and P_2 are polynomials and each is the additive inverse of the other, what does it mean?

(a) $P_1=P_2$ (b) P_1+P_2 is a zero polynomial

(c) P_1-P_2 is a zero polynomial. (d) $P_1-P_2=P_2-P_1$

9. Four pairs of terms are given as:

(i) $16a$ and $16b$ (ii) $12ab$ and $13ab$

(iii) $-8xy$ and $10yx$ (iv) $8ab$ and $8ac$

Which two given pairs are pairs of like terms?

(a) (i) and (iv) (b) (i) and (iii) (c) (ii) and (iii) (d) (ii) and (iv)

10. Four pairs of terms are given as:

(i) a^2 and $3ab$ (ii) $3yz$ and $6zy$

(iii) b^2 and $-11b^2$ (iv) a^2b and $3ab^2$

Which two given pairs are pairs of unlike terms?

(a) (ii) and (iii) (b) (ii) and (iv) (c) (i) and (iii) (d) (i) and (iv)

11. Which algebraic expression correctly represents the statement twice the number ~~z~~ subtracted from one –half the product of x and y ?

(a) $\frac{xy}{2} = 2\text{-}\cancel{z}$ (b) $\frac{xy}{2} - 2\text{-}\cancel{z}$ (c) $2xy - \frac{\cancel{z}}{2}$ (d) $\frac{\cancel{z}}{2} - 2xy$

12. Which algebraic expression correctly represents the statement: the square of the product of numbers x and y subtracted from the square of their sum?

(a) $x^2 + y^2 - x^2y^2$ (b) $x^2y^2 - \left(x^2 + y^2\right)$ (c) $(x+y)^2 - x^2y^2$ (d) $x^2y^2 - (x+y)^2$

13. If $\left(a - \frac{1}{a}\right) = 7$, then the value $a^2 + \frac{1}{a^2}$ is:

(a) 50 (b) 51 (c) 49 (d) 47

14. The zero of the polynomial $\frac{4}{7}b - \frac{7}{15}$ is.....

(a) $\frac{49}{60}$ (b) $\frac{100}{71}$ (c) 70 (d) None of these

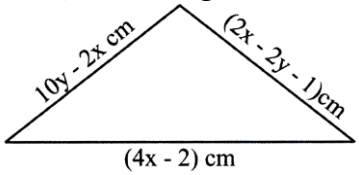
15. The product of $1 \times (x-y)(x+y)\left(x^2+y^2\right)$ is

(a) $x^2 - y^2$ (b) $x^4 + y^4$ (c) $x^4 - y^4$ (d) $x^2 + y^2$

16. If $m = \frac{ab}{a-b}$, then b equals.....

(a) $\frac{m(a-b)}{a}$ (b) $\frac{ab-ma}{m}$ (c) $\frac{1}{1+1}$ (d) $\frac{ma}{m+a}$

17. In the figure given, what is the perimeter, in cm, of the triangle?



(a) $(8y + 4x - 3)cm$ (b) $(8y - 4x + 3)cm$ c

(c) $(14y - 2x - 3)cm$ (d) $(12xy - 3)cm$ c

18. If $K = \frac{x-m}{x-n}$, find the value of x.

(a) $\frac{nK-m}{K-1}$ (b) $\frac{K-m}{K-n}$ (c) $\frac{K+m}{K+n}$ (d) $\frac{1+K}{m+nK}$

19. Match the following.

	Column-A		**Column-B**
(i)	$4m^2p, 4mp^2$	(a)	Binomial
(ii)	$3x-2$	(b)	Unlike terms
(iii)	$-7Z, \frac{15}{2}z$	(c)	Trinomial
(iv)	$1+y+y^2$	(d)	Like terms

(a) (i) - (a), (ii) - (b), (iii) - (c), (iv) - (d)

(b) (i) - (b), (ii) - (a), (iii) - (d), (iv) - (c)

(c) (i) - (d), (ii) - (c), (iii) - (b), (iv) - (a)

(d) (i) - (b), (ii) - (c), (iii) - (a), (iv) - (d)

20. Match the following.

	Column-A		**Column-B**
(i)	a^3-b^3 when a=3 and b=2	(a)	0
(ii)	$z^3-13(z+10)$ when $z=-10$	(b)	–22
(iii)	x^2+2x+1 when $x=-1$	(c)	–1000
(iv)	$5p-12$ when $p=-2$	(d)	19

(a) (i) - (d), (ii) - (a), (iii) - (b), (iv) - (c)

(b) (i) - (d), (ii) - (c), (iii) - (b), (iv) - (a)

(c) (i) - (a), (ii) - (b), (iii) - (c), (iv) - (d)

(d) (i) - (d), (ii) - (c), (iii) - (a), (iv) - (b)

21. By how much is $(x^2-y^2)^2$ less than $x^4+8x^2y^2+y^4$?

(a) $-12x^2y^2$ (b) $10x^2y^2$ (c) $-12xy$ (d) $10xy$

22. What is the sum of $\frac{a^2}{2}-\frac{b^3}{3}-\frac{c^3}{4}; \frac{2a^2}{3}-\frac{3b^3}{4}-\frac{4c^3}{5}$ and $a^2+b^3+c^3$?

(a) $\frac{13}{6}a-\frac{1}{12}b^3-\frac{1}{20}c^3$ (b) $\frac{13}{6}a-\frac{21}{20}b^3+\frac{25}{12}c^3$

(c) $\frac{13}{6}a^2+\frac{5}{12}b^3-\frac{1}{20}c^3$ (d) $\frac{23}{6}b^2+\frac{25}{12}a^3-\frac{1}{20}c^3$

23. Simplify the following expression $x(y-z)+y(z-x)+z(x-y)$

(a) 0 (b) $2y(z-x)$ (c) $2x(z-y)$ (d) $2z(x-y)$

24. What is the 6^{th} term of a pattern described by the expression n^2-1?

(a) 33 (b) 35 (c) 37 (d) 6

25. What is the expression related to the pattern 7, 11, 15, ...?

(a) $2n-1$ (b) $4n+3$ (c) $4n+1$ (d) n^2-1

26. Which expression gives the predecessor of a natural number 'n'?

(a) $2n-1$ (b) $n+1$ (c) $n-1$ (d) $2n+1$

27. For any natural number n, what does $2n+1$ denote?

(a) An even number (b) An odd number

(c) A composite number (d) A prime number

28. What do we call the algebraic terms with same literal coefficients?

(a) Equivalent (b) Unlike terms (c) Constants (d) Like terms

29. If $a+\frac{1}{a}=6$, then the value of $\left(a-\frac{1}{a}\right)$ is

(a) $\sqrt{32}$ (b) $\sqrt{49}$ (c) $\sqrt{140}$ (d) None of these

30. What is the value of ax^2+bx+c at $x=\frac{+b}{a}$?

(a) a (b) b^2-4ac (c) $c+\frac{2b^2}{a}$ (d) $25x^2+\frac{1}{4x^2}$

31. If $5x-\frac{1}{2x}=6$, then the value of $25x^2+\frac{1}{4x^2}$ is:

(a) 31 (b) 37 (c) 39 (d) 41

32. On simplification the product $\left(x-\frac{1}{x}\right)\left(x+\frac{1}{x}\right)\left(x^2+\frac{1}{x^2}\right)$ is

(a) $x^3-\frac{1}{x^3}$ (b) $x^3+\frac{1}{x^3}$ (c) $x^4-\frac{1}{x^4}$ (d) $x^4+\frac{1}{x^4}$

33. The real factors of x^4+9 are

(a) $\left(x^2+3\right)\left(x^2+3\right)$ (b) $\left(x^2+3\right)\left(x^2-3\right)$

(c) $\left(x^2+2x+3\right)\left(x^2-3x+3\right)$ (d) Does not exist

34. The value of which of the following expressions is 66 for $a=-2$ and $b=5$?

(a) $a^2+3ab-b^2$ (b) $6a^2-5ab$ (c) $-3a^2-ab+6b^2$ (d) $-a^2-2ab+2b^2$

35. If $p+\frac{9}{5}(30-p)=10$ then find 'p':

(a) –50 (b) 55 (c) –50 (d) +50

36. Express in the simplest form $\left(t+\frac{1}{t}\right)^2+4t=\left(t-\frac{1}{t}\right)^2$

(a) $2t^2+\frac{2}{t^2}+4t=0$ (b) 4 (c) $4t+4=0$ (d) $2t+2=0$

37. Simplify $\frac{4}{11}(132x+88)+\frac{3}{11}(66x-66)$

(a) $66x+14$ (b) $66x-14$ (c) $66x-14x$ (d) $66+14x$

38. 'S' packets of 12 sweets each are divides equally among 10 children. How many sweets does each child get?

(a) 6S (b) $3S-5$ (c) 6S (d) $6S-10$

39. The angles of a quadrilateral are $(p+25)°$, $2p°$, $(2p-15)°$ and $(p+20)°$. What is the value of the largest angle?

(a) $105°$ (b) $110°$ (c) $115°$ (d) $135°$

40. The value of the expression $(2x^2+2xy-y-1)$ is 1 at $x=0$. What is the value of y?

(a) –2 (b) 2 (c) 3 (d) 4

ANSWER – KEYS				
1. A	**2.** D	**3.** D	**4.** A	**5.** A
6. C	**7.** D	**8.** B	**9.** C	**10.** D
11. B	**12.** C	**13.** B	**14.** A	**15.** C
16. D	**17.** A	**18.** A	**19.** B	**20.** D
21. B	**22.** C	**23.** A	**24.** B	**25.** B
26. C	**27.** B	**28.** D	**29.** A	**30.** C
31. D	**32.** C	**33.** D	**34.** D	**35.** B
36. C	**37.** A	**38.** C	**39.** B	**40.** A

SOLUTIONS

1. (a)

$x + y = 7$

$+y + z = 8$

$\underline{z + x = 9}$

$2(x + y + z) = 24$

$\Rightarrow x + y + z = 12$

2. (d) Term containing $'x'$ is $(2\ z\ x)$ and also coefficient of $'x'$ in this term is $2z$.

3. (d) Since in (d), term containing n^2 is $2n^2$

$\therefore$ Coefficient of n^2 is 2.

4. (a) Two terms are called like terms only when their variable part is the same.

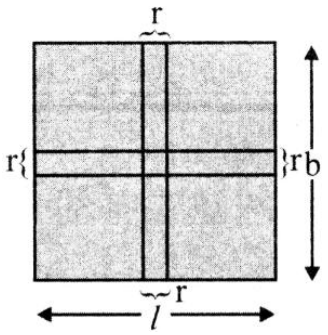
In $4x^2y$, variable is x^2y whereas in $3xy^2$, variable is xy^2.

5. (a) $(a+b)+(a-b) = a+b-a+b = b+b = 2b$

It is a good idea to memorize

$(a+b)+(a-b) = 2a$ and $(a+b)-(a-b) = 2b$ This will be helpful to expedite your calculations now and also in higher classes.

6. (c)



Area of the path along length $= l \times r$

Area of the path along breadth $= b \times r$

The common area of the paths $= r^2$

$\therefore$ Total area of the path

$= lr + br - r^2 = (l + b - r)r$

7. (d) Value of number $= 10 \times (n-1)$ tens place + unit place $n = 10n - 10 + n = 11n - 10$

8. (b) Not Available

9. (c) Not Available

10. (d) Not Available

11. (b) One half of product of x and $y = xy/2$

Twice of $\not{Z} = 2\not{Z}$

$\Rightarrow \left(\frac{xy}{2} - 2Z\right)$

12. (c) Square of sum $= (x + y)^2$

Square of product $= (xy)^2 = x^2y^2$

$\Rightarrow (x + y)^2 - x^2y^2$

13. (b) $\left(a - \frac{1}{a}\right)^2 = a^2 - 2 + \frac{1}{a^2} = 49$

$\Rightarrow a^2 + \frac{1}{a^2} = 49 + 2 = 51$

14. (a) $\frac{4}{7}b - \frac{7}{15} = 0 \Rightarrow \frac{4}{7}b = \frac{7}{15} \Rightarrow b = \frac{7}{15} \times \frac{7}{4} = \frac{49}{60}$

15. (c) $(x - y)(x + y) = x^2 - y^2$

$\therefore (x - y)(x + y)\left(x^2 + y^2\right) = \left(x^2 - y^2\right)\left(x^2 + y^2\right)$

$= x^4 - y^4$

16. (d) $m = \frac{ab}{a - b}$

$\Rightarrow \frac{1}{m} = \frac{a - b}{ab} \Rightarrow \frac{1}{m} = \frac{1}{b} - \frac{1}{a} \Rightarrow \frac{1}{b} = \frac{1}{m} + \frac{1}{a}$

$\Rightarrow \frac{1}{b} = \frac{a + m}{ma} \Rightarrow b = \frac{ma}{m + a}$

17. (a) Perimeter= sum of sides

$$\begin{array}{r} 2x - 2y - 1 \\ 4x + 0y - 2 \\ \underline{-2x + 10y + 0} \\ 4x + 8y - 3 \end{array}$$

18. (a) $K = \frac{x - m}{x - n}$

$\Rightarrow K(x - n) = x - m$

$\Rightarrow Kx - nK = x - m$

$\Rightarrow x = \frac{nK - m}{K - 1}$

$\Rightarrow (k-1)x$

$= nK - m$

19. (b) Not Available

20. (d) Substitute the given values in the expressions and evaluate.

$a^3 - b^3 = 3^3 - 2^3 = 27 - 8 = 19$

$z^3 - 13(z + 10) = (-10)^3 - 3(-10 + 10) = -1000$

$x^2+2x+1-(-1)^2+2(1)+1$

$=1-2+1-0$

$5x-2-12$

$=-10-12=-22$

21. (b) One can also do it m the following conventional way:

$x^4+8x^2y^2+y^4$

$x^4\ \ 2x^2y^2+y^4$

$-\quad +\quad -$

$\boxed{10x^2y^2}$ $\therefore$ less by $10x^2y^2$

Mathematical Ingenuity tips

However, if we do it by first bringing $(x^2-y^2)^2$ in the form of $x^4+8x^2y^2+y^4$ and then, mentally think as to what extra term is getting added or subtracted, it will help solve us many more problems of similar nature.

22. (c) $\left(\frac{a^2}{2}-\frac{b^3}{3}-\frac{c^3}{4}\right)+\left(\frac{2a^2}{3}-\frac{3b^3}{4}-\frac{4c^3}{5}\right)+\left(a^2+b^3+c^3\right)$

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

23. (a) $x(y-z)+y(z-x)+z(x-y)=0$

24. (b) First term means $n=1$

second term means $n=2$

and so on.

substitute $n=6$ in n^2-1 and simplify.

$n^2-1=(6)^2=1=36-1=35$

25. (b) These problems are solved by observations.

$T_1=7, T_2=11, T_3=15 \Rightarrow$ Regular difference of 4.

For $n=1$: $T_1=4\times1+3=7, T_2=4\times2+3=11$ and so on.

26. (c) Not Available

27. (b) $2n+1$ denotes an odd number. Since it leaves a remainder 1 when divided by 2.

28. (d) Not Available

29. (a) $6=a+\frac{1}{a}=\left(\sqrt{a}\right)^2-2+\left(\frac{1}{\sqrt{a}}\right)^2+2$

$=\left(\sqrt{a}-\frac{1}{\sqrt{a}}\right)^2+2$

$\therefore\left(\sqrt{a}-\frac{1}{\sqrt{a}}\right)^2=4$

Now $\left(a-\frac{1}{a}\right)=\left(\sqrt{a}\right)^2+2+\left(\frac{1}{\sqrt{a}}\right)^2$

30. (c) $x=\frac{b}{a}\Rightarrow a\left(\frac{b^2}{a^2}\right)+b\left(\frac{b}{a}\right)+c$

$=\frac{b^2}{a}+\frac{b^2}{a}+c=c+\frac{2b^2}{a}$

31. (d) $36=\left(5x-\frac{1}{2x}\right)^2=25x^2+\frac{1}{4x^2}-2.5x\frac{1}{2x}$

$=\left(25x^2+\frac{1}{4x^2}\right)-5$

$\therefore\left(25x^2+\frac{1}{4x^2}\right)=36+5=41$

32. (c) Product= $\left[x^2-\left(\frac{1}{x}\right)^2\right]\left(x^2+\frac{1}{x^2}\right)$

$=\left(x^2-\frac{1}{x^2}\right)\left(x^2+\frac{1}{x^2}\right)$

$=x^4-\frac{1}{x^4}$

33. (d) x^4 is always positive for all values of x.

$\therefore\ x^4+9$ is also always positive and never zero.

34. (d) $-a^2-2ab+2b^2=-(-2)^2-2(-2)(5)+2\left(5^2\right)=-4+20+50=66$

35. (b) $-+54-\frac{9p}{5}=10\Rightarrow\frac{-4p}{5}=10-54$

$\Rightarrow\frac{-4p}{5}=-44\Rightarrow p=+44\times\frac{5}{4}=+55$

36. (c) $\left(t+\frac{1}{t}\right)^2-\left(t-\frac{1}{t}\right)^2=4$ (we have done such expansions earlier and this result may be committed to memory)

$\therefore\left(t+\frac{1}{t}\right)^2-\left(t-\frac{1}{t}\right)^2+4t=0$

$\Rightarrow 4+4t=0$

37. (a) Not Available

38. (c) Total number of sweets $=125$; Number of sweets each child gets

$=\frac{12S}{10}=\frac{6S}{5}$

39. (b) Sum of angles in a quadrilateral is 360°.

$\Rightarrow 6p+30^\circ=360^\circ$

$\Rightarrow p = \frac{330°}{6} = 55°$

Angle are $\therefore$

$(p + 25)° = 80°, 2p° = 110° 2p - 15 = 95°$

$(p + 20)° = 55°, 20° = 75°$

$\therefore$ The biggest angle is $110°$

40. (a) At $x = 0 : (0 + 0 - y - 1) = 1$

$\Rightarrow -2 = y$