

Chapter # 4:-Basic Algebra and Algebraic Manipulation.Exercise # 4A

QAs:- Answers:-

(a)  $5y + ab$

(b)  $f^2 - 3$

(c)  $k \times 6q = k6q = 6kq$

(d)  $2w/3xy$

(e)  $3x - 4\sqrt{x}$

(f)  $2p/5q$

Q2:- Given  $x=6$  ,  $y=-4$ 

(a)  $4x - 7y$

Sol:-  $= 4(6) - 7(-4) = 24 + 28 = 52$  Ans.

(b)  $\frac{5x}{3y} + x$

①  $\frac{12}{6}$   
 $\frac{72}{72}$

Sol:-  $\frac{5(6)}{3(-4)} + 6 = \frac{30}{-12} + 6 = \frac{-30}{12} + 6 = \frac{-30 + 72}{12} = \frac{42}{12}$

$= \frac{42}{12} = \frac{21}{6} = \frac{7}{2} = 3\frac{1}{2}$  Ans

②  $\sqrt[3]{\frac{7}{6}}$   
 $\frac{1}{1}$

(c)  $2x^2 - y^3$

Sol:-  $= 2(6)^2 - (-4)^3 = 2(36) - (-4 \times -4 \times -4)$

①  $\frac{36}{2}$   
 $\frac{72}{72}$

$= 2(36) - (+16 \times -4)$

$= 2(36) - (-64)$

$= 2(36) + 64 =$

$= 72 + 64 = 136$  Ans.

(d)  $3x + \frac{x}{y} - y^2$

②  $\frac{18}{4}$   
 $\frac{72}{72}$

$= 3(6) + \frac{6}{-4} - (-4)^2$

$= \frac{16}{4}$   
 $\frac{64}{64}$

$= 18 - \frac{6}{4} - (16) = 18 - \frac{6}{4} - 16 = \frac{72 - 6 - 64}{4}$

$= \frac{2}{4} = \frac{1}{2}$  Ans

(2)

Ex#4A

Q#3, Given  $a=3$ ,  $b=-5$ ,  $c=6$

(a)  $a(3c-b)$

Putting values of  $a, b$  and  $c$  in above, we get.

$$= 3[3(6) - (-5)]$$

$$= 3[18 + 5] = 3[23] = 69 \text{ Ans}$$

(b)  $ab^2 - ac$

$$= (3)[(-5)^2] - (3)(6)$$

$$= 3(25) - 18 = 75 - 18 = 57 \text{ Ans}$$

(c)  $\frac{b}{a} - \frac{c}{b}$

$$= \frac{-5}{3} - \frac{6}{-5} = \frac{-5}{3^{x5}} + \frac{6}{5^{x3}} = \frac{(-5 \times 5) + (6 \times 3)}{15} = \frac{-25 + 18}{15}$$

$$= \frac{-7}{15} \text{ Ans}$$

(d)  $\frac{b+c}{a} + \frac{a+c}{b}$

$$= \frac{-5+6}{3} + \frac{3+6}{-5} = \frac{1}{3} + \frac{9}{-5} = \frac{1}{3^{x5}} - \frac{9}{5^{x3}} = \frac{(1 \times 5) - (9 \times 3)}{15}$$

$$= \frac{5 - 27}{15} = \frac{-22}{15} = -1 \frac{7}{15} \text{ Ans}$$

Q4c- Simplify each of the following

(a)  $5x + 22 - 6x - 23$

$$= 5x - 6x + 22 - 23$$

$$= -1x - 1 \Rightarrow -x - 1 \text{ Ans}$$

(b)  $x + 3y + 6x + 4y$

$$= x + 6x + 3y + 4y$$

$$= 7x + 7y \text{ Ans}$$

(c)  $6xy + 13x - 2yx - 5x$

$$= 6xy - 2yx + 13x - 5x$$

$$= 4xy + 8x \text{ Ans}$$

(d)  $6z - 20y + 7z - 8x + 25y - 11z$

$$= 6z - 8x - 20y + 25y + 7z - 11z$$

$$= -2x + 5y - 4z \text{ Ans}$$

### Ex # 4A

Q5: Find the sum of each of the following expressions.

(a)  $2x + 4y, -5y$

Sol:  $= 2x + 4y + (-5y)$   
 $= 2x + 4y - 5y$   
 $= 2x - y$  Ans.

(b)  $-b - 4a, 7b - 6a$

Sol:  $= (-b - 4a) + (7b - 6a)$   
 $= -b - 4a + 7b - 6a$   
 $= -b + 7b - 4a - 6a$   
 $= 6b - 10a$  Ans.

(c)  $6d - 4c, -7c + 6d$

Sol:  
 $= (6d - 4c) + (-7c + 6d)$   
 $= 6d - 4c + 7c + 6d$   
 $= 6d + 6d - 4c - 7c$   
 $= 12d - 11c$  Ans.

(d)  $3pq - 6hk, -3qp + 14kh$

Sol:  
 $= (3pq - 6hk) + (-3qp + 14kh)$

$= 3pq - 6hk - 3qp + 14kh$

$= 3p/q - 3q/p - 6hk + 14kh$

$= 0 - 6hk + 14kh$

$= + 8kh$  Ans

## Exercise # 4B

Q1:- Expand each of the following expressions.

(a)  $-(x+5)$

$= -x - 5$  Ans.

(b)  $-(4-x)$

$= -4 + x$  Ans.

(c)  $2(3y+7)$

$= 6y + 14$  Ans.

(d)  $8(2y-5)$

$= 16y - 40$

(e)  $8(3a-4b)$

$= 24a - 32b$  Ans.

(f)  $-3(c+6)$

$= -3c - 18$  Ans.

(g)  $-4(d-6)$

$= -4d + 24$  Ans.

(h)  $2a(x-y)$

$= 2ax - 2ay$  Ans.

Q2:- Expand and simplify each of the following

(a)  $5(a+2b) - 3b$

$= 5a + 10b - 3b$

$= 5a + 7b$  Ans.

(c)  $a + 3b - (5a - 4b)$

$= a + 3b - 5a + 4b$

$= a - 5a + 3b + 4b$

$= -4a + 7b$  Ans.

(b)  $7(p+10q) + 2(6p+7q)$

$= 7p + 70q + 12p + 14q$

$= 7p + 12p + 70q + 14q$

$= 19p + 84q$  Ans.

(d)  $x + 3(2x - 3y + z) + 7z$

$= x + 6x - 9y + 3z + 7z$

$= 7x - 9y + 10z$  Ans.

Q3:-

Khairul age =  $x$

Khairul's uncle age =  $4(x+5)$

$= 4x + 20$  Ans.

Q4:-

Pear costs =  $x$

Orange costs =  $x - y$

cost of 4 pears and half dozen oranges =  $4x + 6(x - y)$

Ans.

Q5:-

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$$\text{Total Cost} = (7 \times \$x) + (n \times \$12) + [(2n+1) \times \$15] + (4 \times \$3)$$

$$= 7\$x + n\$12 + \$15(2n+1) + 12\$x$$

$$= \$7x + \$12n + \$30n + \$15 + \$12x$$

$$= \$7x + \$12x + \$12n + \$30n + \$15$$

$$= \$19x + \$42n + \$15$$

$$\text{OR, } \$ (19x + 42n + 15) \text{ Ans}$$

Q1: Simplify each of the following expressions.

$$(a) \frac{1}{4}x + \frac{1}{5}y - \frac{1}{6}x - \frac{1}{10}y$$

$$= \frac{1^{x3}}{4^{x3}}x - \frac{1^{x2}}{6^{x2}}x + \frac{1^{x2}}{5^{x2}}y - \frac{1}{10}y$$

$$= \frac{3x - 2x}{12} + \frac{2y - 1y}{10}$$

$$= \frac{x}{12} + \frac{y}{10} \quad \text{Ans}$$

$$\begin{array}{r|l} 2 & 4, 6 \\ \hline & 2, 3 \\ 3 & 1, 3 \\ \hline & 1, 1 \end{array}$$

$$3 \times 2 \times 2 = 12$$

$$\begin{array}{r|l} 5 & 5, 10 \\ \hline & 1, 2 \\ 2 & 1, 2 \\ \hline & 1, 1 \end{array}$$

$$5 \times 2 = 10$$

$$(b) \frac{2}{3}a - \frac{1}{7}b + 2a - \frac{3}{5}b$$

$$= \frac{2}{3}a + \frac{2a^{x3}}{1^{x3}} - \frac{1^{x5}}{7^{x5}}b - \frac{3^{x5}}{5^{x5}}b$$

$$= \frac{2a + 6a}{3} + \frac{-5b - 21b}{35}$$

$$= \frac{8a}{3} - \frac{26}{35}$$

$$= \frac{8a}{3} + \frac{26}{35} \quad \text{Ans}$$

$$\begin{array}{r|l} 7 & 7, 5 \\ \hline & 1, 5 \\ 5 & 1, 5 \\ \hline & 1, 1 \end{array}$$

$$7 \times 5 = 35$$

Ex 4c

Pg# 2.

$$(c) \frac{5c}{9} + \frac{3d}{4} - \frac{7c}{8} - \frac{4d}{3}$$

$$= \frac{5^{\times 8}c}{9^{\times 8}} - \frac{7^{\times 9}c}{8^{\times 9}} + \frac{3^{\times 3}d}{4^{\times 3}} - \frac{4^{\times 4}d}{3^{\times 4}}$$

$$= \frac{40c - 63c}{72} + \frac{9d - 16d}{12}$$

$$= \frac{-23c}{72} + \frac{-7d}{12}$$

$$= \frac{-23c}{72} - \frac{7d}{12} \text{ Ans}$$

$$\begin{array}{r} 2 \frac{28}{3} \\ 84 \\ \underline{25} \\ 59 \end{array}$$



Name \_\_\_\_\_

Ex#4C

Pg#3

Class \_\_\_\_\_

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$$Q1 (a) 2f - \frac{5h}{3} + \frac{9k}{4} - \frac{1}{2}f - \frac{28k}{5} + \frac{5}{4}kh$$

$$= 2f - \frac{1}{2}f - \frac{5^{\cancel{4}}h}{3^{\cancel{4}}} + \frac{5^{\cancel{3}}h}{4^{\cancel{3}}} + \frac{9^{\cancel{5}}k}{4^{\cancel{5}}} - \frac{28^{\cancel{4}}k}{5^{\cancel{4}}}$$

$$= \frac{4f}{2} - \frac{f}{2} - \frac{20h + 15h}{12} + \frac{45k - 112k}{20}$$

$$= \frac{3f}{2} - \frac{5h}{12} + \frac{-67k}{20} \text{ Ans.}$$

Ex#4C

Q2:- Expand and simplify each of the following expressions.

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

$$= 5a + 4b - 3c - 2a + \frac{3b}{2} - \frac{3c}{2}$$

$$= 5a - 2a + 4b + \frac{3b}{2} - 3c - \frac{3c}{2}$$

$$= 3a + \frac{8b + 3b}{2} + \frac{-6c - 3c}{2}$$

$$= 3a + \frac{11b}{2} + \frac{-9c}{2}$$

$$= 3a + \frac{11b}{2} - \frac{9c}{2} \text{ Ans.}$$

$$(b) \frac{1}{2} [2x + 2(x-3)]$$

$$= \frac{1}{2} [2x + 2x - 6]$$

$$= \frac{1}{2} [4x - 6]$$

$$= \frac{1}{2} \times 4x - \frac{1}{2} \times 6$$

$$= 2x - 3 \text{ Ans}$$





Q# 2

$$(c) \frac{2}{5} [12p - (5 + 2p)]$$

$$= \frac{2}{5} [12p - 5 - 2p]$$

$$= \frac{2}{5} [10p - 5]$$

$$= \frac{2}{5} [10p - 5]$$

$$= \frac{2}{5} \times 10p - \frac{2}{5} \times 5$$

$$= 4p - 2 \text{ Ans}$$

$$(d) \frac{1}{2} [8x + 10 - 6(1 - 4x)]$$

$$= \frac{1}{2} [8x + 10 - (6 - 24x)]$$

$$= \frac{1}{2} [8x + 10 - 6 + 24x]$$

$$= \frac{1}{2} [8x + 24x + 10 - 6]$$

$$= \frac{1}{2} [32x + 4]$$

$$= \frac{16}{2} x + \frac{4}{2}$$

$$= 16x + 2 \text{ Ans}$$

Q3: Express each of the following as a fraction in its simplest form.

$$(a) \frac{x^{x5}}{2^{x5}} + \frac{2x}{5^{x2}}$$

$$= \frac{5x + 4x}{10}$$

$$= \frac{9x}{10} = \frac{9}{10} x \text{ Ans}$$

Q3

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

$$= \frac{4a - 3a}{12}$$

$$= \frac{a}{12} = \frac{1}{12} a \text{ Ans}$$

$$\begin{array}{r|l} 2 & 4, 3 \\ \hline 2 & 2, 3 \\ \hline 3 & 1, 3 \\ \hline & 1, 1 \end{array}$$

$$2 \times 2 \times 3 = 12$$

$$(c) \frac{2h^{x+5}}{7^{x+5}} + \frac{h+1^{x+7}}{5^{x+7}}$$

$$= \frac{10h + 7(h+1)}{35}$$

$$= \frac{10h + 7h + 7}{35}$$

$$= \frac{17h + 7}{35}$$

$$\begin{array}{r|l} 7 & 7, 5 \\ \hline 5 & 1, 5 \\ \hline & 1, 1 \end{array}$$

$$7 \times 5 = 35$$

$$(d) \frac{3x^{x+1}}{8^{x+1}} - \frac{x+2^{x+2}}{4^{x+2}}$$

$$= \frac{3x - 2(x+2)}{8}$$

$$= \frac{3x - 2x - 4}{8}$$

$$= \frac{x - 4}{8}$$

$$\begin{array}{r|l} 2 & 4, 8 \\ \hline 2 & 2, 4 \\ \hline 2 & 1, 2 \\ \hline & 1, 1 \end{array}$$

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

$$(e) \frac{4x+1^{x+2}}{5^{x+2}} + \frac{3x-1^{x+5}}{2^{x+5}}$$

$$= \frac{2(4x+1) + 5(3x-1)}{10}$$

$$= \frac{8x+2+15x-5}{10}$$

$$= \frac{8x+15x+2-5}{10} = \frac{23x-3}{10} \text{ Ans}$$



Q# 2

$$(f) \frac{3y-1}{4^{x^3}} - \frac{2y-3}{6^{x^2}}$$

2	4, 6
2	2, 3
3	1, 3
	1, 1

$$2 \times 2 \times 3 = 12$$

$$= \frac{3(3y-1) - 2(2y-3)}{12}$$

$$= \frac{9y-3-4y+6}{12}$$

$$= \frac{9y-4y-3+6}{12}$$

$$= \frac{5y+3}{12}$$

$$(g) \frac{a-2^{x^2}}{4^{x^2}} - \frac{a+7}{8}$$

$$= \frac{2(a-2) - 1(a+7)}{8}$$

$$= \frac{2a-4-a-7}{8}$$

$$= \frac{2a-a-4-7}{8}$$

$$= \frac{a-11}{8} \text{ Ans}$$

Q#3

$$(b) \frac{3p-2q}{3 \times 4} \times 4 - \frac{4p-5q}{4 \times 3} \times 3$$

$$= \frac{4(3p-2q) - 3(4p-5q)}{12}$$

$$= \frac{(12p-8q) - (12p-15q)}{12}$$

$$= \frac{12p-8q-12p+15q}{12}$$

$$= \frac{1\cancel{2}p - 1\cancel{2}p - 8q + 15q}{12}$$

$$= \frac{7q}{12}$$

$$= \frac{7}{12} q \text{ Ans.}$$

Q4s - Factorize each of the following expressions completely.

$$(a) \quad 12x - 9 \\ = 3(4x - 3) \text{ Ans.}$$

$$(b) \quad -25y - 35 \\ = -5(5y - 7) \text{ Ans.}$$

$$(c) \quad 27b - 36by \\ = 9b(3 - 4y) \text{ Ans.}$$

$$(d) \quad 8ax + 12a - 4az \\ = 4a(x + 3 - z) \text{ Ans.}$$

$$(e) \quad 4m - 6my - 18mz \\ = 2m(2 - 3y - 9z) \text{ Ans.}$$

### ADVANCED LEVEL

7 - Factorize each of the following expressions

$$(a) \quad 5x + 10x(b+c) \\ = 5x[1 + 2(b+c)] \\ = 5x(1 + 2b + 2c) \text{ Ans.}$$

~~Q#7~~  
 (b)  $3xy - 6x(y-z)$   
 $= 3x(y - 2(y-z))$   
 $= 3x(y - 2y + 2z)$   
 $= 3x(-y + 2z)$  Ans

(c)  $2x(7+y) - 14x(y+2)$   
 $= 2x[7+y - 7(y+2)]$   
 $= 2x[7+y - 7y - 14]$   
 $= 2x[y - 7y + 7 - 14]$   
 $= 2x[-6y - 7]$  Ans

(d)  $-3a(2+b) + 18a(b-1)$   
 $= -3a[(2+b) - 6(b-1)]$   
 $= -3a(2+b - 6b + 6)$   
 $= -3a(b - 6b + 2 + 6)$   
 $= -3a(-5b + 8)$  Ans

(e)  $-4y(x-2) - 12y(3-x)$   
 $= -4y[(x-2) + 3(3-x)]$   
 $= -4y(x - 2 + 9 - 3x)$   
 $= -4y(x - 3x - 2 + 9)$   
 $= -4y(-2x - 11)$  Ans

CHAPTER # 4

SOLVED WORKSHEET

BASIC ALGEBRA AND ALGEBRAIC MANIPULATION

MCQ'S (Ex # 4A, 4B, 4C)

① If  $x=2$  and  $y=-1$ , then  $4x-7y=$  \_\_\_\_\_  
(a) 12                      (b) 14                       (c) 15                      (d) 47

② The sum of  $8x$  and  $-2x$  is \_\_\_\_\_  
 (a)  $6x$                       (b)  $10x$                       (c)  $8x$                       (d)  $16x$

③  $a(b+c) =$  \_\_\_\_\_  
(a)  $a+bc$                       (b)  $ab+bc$                       (c)  $ab+c$                        (d)  $ab+ac$

④ Expand  $-3(c+6) =$  \_\_\_\_\_  
(a)  $-3c-6$                       (b)  $-3c-36$                       (c)  $-3+6c$                        (d)  $-3c-18$

⑤ Simplify  $5a+2a =$  \_\_\_\_\_  
(a)  $3a$                       (b)  $10a$                       (c)  $2a$                        (d)  $7a$

⑥ Expand  $3x(5x) =$  \_\_\_\_\_  
(a)  $8x^2$                        (b)  $15x^2$                       (c)  $53x^2$                       (d)  $35x$

7 In  $5^4$ , 4 is called the  
(a) variable (b) square (c) cube (d) Index

8  $a \times a \times a =$   
(a)  $3a$  (b)  $a^3$  (c)  $3a^3$  (d)  $3a^2$

9 In  $3a$ ,  $a$  is called the  
(a) variable (b) digit (c) coefficient (d) power

10  $3^2 =$   
(a) 9 (b) 6 (c) 5 (d) 32.

11 In expression  $4x$ , '4' is called  
(a) variable (b) constant (c) coefficient (d) equation

12  $6x - 12 =$   
(a)  $6(x-2)$  (b)  $2(6x-6)$  (c)  $6(x-12)$  (d)  $6(6x-12)$