**PARAGON CONVENT SCHOOL**

**SECTOR 24 - B CHANDIGARH**

**Exercise 6 G**

**Q1. Expand the following**

a. (2x + y)3

**( a + b)3  = a3  + b 3  +3ab ( a+ b)**

a = 2x , b = y

(2x)3  + y 3  +3 . 2x . y (2x + y)

8 x3+ y 3 + 6xy (2x + y)

8 x3+ y 3 + 12x 2y + 6xy2

b. ( x + 3y) 3

**( a + b)3  = a3  + b 3  +3ab ( a+ b)**

a = x , b = 3y

(x)3  + (3y) 3  +3 . x . 3y (x + 3y)

x3+ 27y 3 + 9xy (x + 3y)

x3+ 27y 3 + 9x 2y + 27xy2

c. ( 3x – 2y)3

**( a - b)3  = a3  - b 3  - 3ab ( a - b)**

a = 3x , b = 2y

(3x)3  - (2y) 3  - 3 . 3x . 2y (3x - 2y)

27x3- 8 y 3 - 18xy (3x - 2y)

27x3- 8 y 3 - 54x 2y + 36xy2

d. ( 2a + 3b) 3

**( a + b)3  = a3  + b 3  +3ab ( a+ b)**

a = 2a , b = 3b

(2a)3  + (3b) 3  +3 . 2a . 3b (2a + 3b)

8a3+ 27b 3 + 18ab (2a + 3b)

8a3+ 27b 3 + 36a 2b + 54ab2

e. (5x + 3) 3

**( a + b)3  = a3  + b 3  +3ab ( a+ b)**

a = 5x , b = 3

(5x)3  + (3) 3  +3 . 5x . 3 (5x + 3)

125x3+ 27 + 45x (5x + 3)

125x3+ 27 + 225x 2 + 135x

f. ( x – 2y)3

**( a - b)3  = a3  - b 3  - 3ab ( a - b)**

a = 3x , b = 2y

(x)3  - (2y) 3  - 3 . x . 2y (x - 2y)

x3- 8 y 3 - 6xy (x - 2y)

x3- 8 y 3 - 6x 2y + 12xy2

Q2. Find the value

a. x3  + y 3  if x + y = 3 and xy = 2

**x3  + y 3 = ( x + y)3  - 3 xy ( x+ y)**

= ( 3 )3  - 3 x 2 ( 3)

= 27 – 18

**x3  + y 3 = 9**

b. 8x3  + 27y 3  if 2x + 3y = 14 and xy = 8

**x3  + y 3 = ( x + y)3  - 3 xy ( x+ y)**

(2**x)3  + (3y) 3 = (**2x + 3y)3 – 3 . 2x . 3y (2x + 3y)

= (14)3 – 18 xy (14)

= 2744 – 18 x 8 x 14

= 2744 - 2016

(2**x)3  + (3y) 3= 728**

**c.** 27x3  - 64y 3  if 3x - 4y = 0 and xy = 12

**x3  - y 3 = ( x - y)3  + 3 xy ( x- y)**

(3**x)3  - (4y) 3 = (**3x - 4y)3 + 3 . 3x . 4y (3x - 4y)

= 0 + 36xy x 0

(3**x)3  - (4y) 3  = 0**

Q3. Simplify

a. ( 3a + b) 3 +( 3a - b) 3

**( a + b)3  = a3  + b 3  +3ab ( a+ b)**

( 3a + b) 3 = (3a)3  + (b) 3  +3 . 3a . b (3a + b)

27a3+ b 3 + 9ab (3a + b)

27a3+ b 3 + 27 a 2b + 9ab2  **1**

( 3a - b) 3 = (3a)3  - (b) 3  -3 . 3a . b (3a - b)

27a3- b 3 - 9ab (3a - b)

27a3- b 3 - 27 a 2b + 9ab2 **2**

( 3a + b) 3 +( 3a - b) 3 = 27a3+ b 3 + 27 a 2b + 9ab2 + 27a3- b 3

- 27 a 2b + 9ab2

= 54 a3 + 18ab2

b. (5x + 2y)3 - (5x - 2y)3

**( a + b)3  = a3  + b 3  +3ab ( a+ b)**

(5x + 2y)3 = (5x)3  + (2y) 3  +3 . 5x . 2y (5x + 2y)

125 x3+ 8y 3 + 30xy (5x + 2y)

125 x3+ 8y 3 + 150x 2y + 60xy2

(5x - 2y)3 = (5x)3  - (2y) 3  -3 . 5x . 2y (5x - 2y)

125 x3- 8y 3 - 30xy (5x - 2y)

125 x3- 8y 3 - 150x 2y + 60xy2

(5x + 2y)3 - (5x - 2y)3 = 125 x3+ 8y 3 + 150x 2y + 60xy2 – (125 x3- 8y 3 -

150x 2y + 60xy2 )

= 125 x3+ 8y 3 + 150x 2y + 60xy2 – 125 x3+ 8y 3 +150x 2y - 60xy2

= 16y 3 + 300x 2y

c. (2x - y)3 - (2x + y)3

**( a - b)3  = a3  - b 3  - 3ab ( a- b)**

(2x - y)3 = (2x)3  - y 3  - 3 . 2x . y (2x - y)

8 x3- y 3 - 6xy (2x - y)

8 x3 - y 3 - 12x 2y + 6xy2

(2x + y)3 = (2x)3  + y 3  +3 . 2x . y (2x + y)

8 x3+ y 3 + 6xy (2x + y)

8 x3+ y 3 + 12x 2y + 6xy2

(2x - y)3 - (2x + y)3  = 8 x3 - y 3 - 12x 2y + 6xy2 - (8 x3+ y 3

+ 12x 2y + 6xy2 )

= 8 x3 - y 3 - 12x 2y + 6xy2 - 8 x3 - y 3 - 12x 2y - 6xy2

= - 2y 3 - 24x 2y

d. ( 3x – 4y)3 + ( 3x + 4y)3

**( a - b)3  = a3  - b 3  - 3ab ( a - b)**

( 3x – 4y)3 = (3x)3  - (4y) 3  - 3 . 3x . 4y (3x - 4y)

27x3- 64 y 3 - 36xy (3x - 4y)

27x3- 64 y 3 - 108x 2y + 144xy2

( 3x + 4y)3 = (3x)3  + (4y) 3  + 3 . 3x . 4y (3x + 4y)

27x3+ 64 y 3 + 36xy (3x + 4y)

27x3+ 64 y 3 + 108x 2y + 144xy2

( 3x – 4y)3 + ( 3x + 4y)3 = 27x3- 64 y 3 - 108x 2y + 144xy2 +27x3+ 64 y 3

+ 108x 2y + 144xy2

= 54 x3+ + 288 xy2

Q4 Evaluate

a. (102)3 =(100 + 2)3

= (100)3 +(2)3 + 3 x 100 x2 (100 + 2)

= 1000000 + 8 + 600(100 + 2)

= 1000008 +60000 + 1200 = 1061208

**b.** (105)3 =(100 + 5)3

= (100)3 +(5)3 + 3 x 100 x5 (100 + 5)

= 1000000 + 125 + 1500(100 + 5)

= 1000125 +150000 + 7500 = 1157625

c. (1001)3 =(1000 + 1)3

= (1000)3 +(1)3 + 3 x 1000 x1 (1000 + 1)

= 1000000000 + 1 + 3000(1000 + 1)

= 100000001 +3000000 + 3000 = 1003003001

d. (99)3 = =(100 - 1)3

= (100)3 - (1)3 - 3 x 100 x1 (100 - 1)

= 1000000 - 1 - 300 (100 - 1)

= 1000000 - 1 - 30000 + 300

= 999999 – 30000 + 300

= 969999 +300 = 970299

Q5. Expand the following

a. (a - b + c)2

a2 + (-b)2 + c2  +( 2 x a x –b) + ( 2 x –b x c) +( 2 x c x a)

a2 + b2 + c2  - 2ab - 2bc + 2ca

b. (a - b - c)2

a2 + (-b)2 + (-c)2  +( 2 x a x –b) + ( 2 x –b x- c) +( 2 x -c x a)

a2 + b2 + c2  - 2ab + 2bc - 2ca

c. (5x + y + 2z)2

(5x)2 + (y)2 + (2z)2  +( 2 x 5*x* x y ) + ( 2 x y x 2z) + ( 2 x 2z x 5*x*)

25x2 + y2 + 4z2  + 10xy +4yz + 20zx

d. (a - 2b - 3c)2

a2 + (-2b)2 + (-3c)2  +( 2 x a x –2b) + ( 2 x –2b x- 3c) +( 2 x -3c x a)

a2 + 4b2 + 9c2  - 4ab + 12 bc - 6ca

e. (2x - y + 3z)2

(2x)2 + (-y)2 + (3z)2  +( 2 x 2*x* x - y ) + ( 2 x -y x 3z) + ( 2 x 3z x 2*x*)

4x2 + y2 + 9z2  - 4xy - 6yz + 12zx