

**SUPPLEMENT - 1 (REVIEW OF CLASS X)**

Evaluate each of the following:

Q.1 (a)  $3^4$  (b)  $(-2x)^3$  (c)  $\left(\frac{3y}{4}\right)^3$  (d)  $4^{-3}$  (e)  $(-4x)^{-2}$  (f)  $(2y^{-1})^{-1}$   
 (g)  $\frac{3^{-1}x^2y^{-4}}{2^{-2}x^{-3}y^3}$  (h)  $(16)^{1/4}$  (i)  $\frac{8^{-2/3}(-8)^{2/3}}{8^{1/3}}$  (j)  $(-a^3b^3)^{-2/3}$   
 (k)  $-3(-1)^{-1/5}(4)^{-1/2}$  (l)  $(10^3)^0$  (m)  $(x-y)^0[(x-y)^4]^{-1/2}$   
 (n)  $x^y x^{4y}$  (o)  $3y^{2/3}y^{4/3}$  (p)  $(4 \cdot 10^3)(3 \cdot 10^{-5})(6 \cdot 10^4)$

Q.2 (a)  $\frac{2^3 \cdot 2^{-2} \cdot 2^4}{2^{-1} \cdot 2^0 \cdot 2^{-3}}$  (b)  $\frac{10^{x+y} \cdot 10^{y-x} \cdot 10^{y+1}}{10^{y+1} \cdot 10^{2y+1}}$  (c)  $\frac{3^{1/2} \cdot 3^{-2/3}}{3^{-1/2} \cdot 3^{1/3}}$   
 (d)  $\frac{(x+y)^{2/3}(x+y)^{-1/6}}{[(x+y)^2]^{1/4}}$  (e)  $\frac{(10^2)^{-3}(10^3)^{1/6}}{\sqrt{10} \cdot (10^4)^{-1/2}}$  (f)  $[(x^{-1})^{-2}]^{-3}$   
 (g)  $\frac{4^{-1/2} a^{2/3} b^{-1/6} c^{-3/2}}{8^{2/3} a^{-1/3} b^{-2/3} c^{5/2}}$  (h)  $\left(\frac{2^{-8} \cdot 3^4}{5^{-4}}\right)^{-1/4}$  (i)  $\sqrt{\frac{\sqrt[4]{a^2} \sqrt[3]{b^5}}{c^{-2}d^2}}$

Q.3 (a)  $\sqrt{27^{-2/3}} + 5^{2/3} \cdot 5^{1/3}$  (b)  $4\left(\frac{1}{2}\right)^0 + 2^{-1} - 6^{-1/2} \cdot 4 \cdot 3^0$   
 (c)  $8^{2/3} + 3^{-2} - \frac{1}{9}(10)^0$  (d)  $(27)^{2/3} - 3(3x)^0 + (25)^{1/2}$   
 (e)  $(8)^{2/3} \cdot (16)^{-3/4} \cdot 2^0 - 8^{-2/3}$  (f)  $\sqrt[3]{(x-2)^{-2}}$  when  $x = -6$   
 (g)  $x^{3/2} + 4x^{-1} - 5x^0$  when  $x = 4$  (h)  $y^{2/3} + 3y^{-1} - 2y^0$  when  $y = 1/8$   
 (i)  $64^{-2/3} \cdot 16^{5/4} \cdot 2^0 \cdot (\sqrt{3})^4$  (j)  $\frac{\sqrt{a} \cdot a^{-2/3}}{\sqrt[6]{a^5}} + \frac{a^{-5/6}}{\sqrt[3]{a^2} \cdot a^{-1/2}}$   
 (k)  $\left(\frac{\sqrt{72y^{2n}}}{3} \cdot 9^0\right)(2y^{n+2})^{-1}$

Q.4 (a)  $(25)^0 + (0.25)^{1/2} - 8^{1/3} \cdot 4^{-1/2} + (0.027)^{1/3}$  (b)  $\frac{1}{8^{-2/3}} + 3a^0 + (3a)^0 + (27)^{-1/3} - 1^{3/2}$   
 (c)  $\frac{3^{-2} + 5(2)^0}{3 - 4(3)^{-1}}$  (d)  $\frac{3^0x + 4x^{-1}}{2^{-2/3}}$  if  $x = 8$   
 (e)  $\frac{2 + 2^{-1}}{5} + (-8) - 4^{3/2}$  (f)  $(64)^{-2/3} - 3(150)^0 + 12(2)^{-2}$

(g)  $(0.125)^{-2/3} + \frac{3}{2+2^{-1}}$

(h)  $\sqrt[n]{\frac{32}{2^{5+n}}}$

(i)  $\frac{(60000)^3(0.00002)^4}{(100)^2(72000000)(0.0002)^5}$

Q.5 (a)  $\frac{(x^2 + 3x + 4)^{1/3} \left[ \frac{-1}{2}(5-x)^{-1/2} \right] - (5-x)^{1/2} \left[ \frac{1}{3}(x^2 + 3x + 4)^{-2/3}(2x+3) \right]}{(x^2 + 3x + 4)^{2/3}}$  if  $x = 1$

(b)  $\frac{(9x^2 - 5y)^{1/4}(2x) - x^2 \left[ \frac{1}{4}(9x^2 - 5y)^{-3/4}(18x) \right]}{(9x^2 - 5y)^{1/2}}$  if  $x = 2, y = 4$

(c)  $\frac{(x+1)^{2/3} \left[ \frac{1}{2}(x-1)^{-1/2} \right] - (x-1)^{1/2} \left[ \frac{2}{3}(x+1)^{-1/3} \right]}{(x+1)^{4/3}}$

(d)  $x - 1 + \sqrt{x^2 + 2x + 1}$

(e)  $3x - 2y - \sqrt{4x^2 - 4xy + y^2}$

**SUPPLEMENT - 2 (REVIEW OF CLASS X)**

**FACTORIZATION**

**Type-1 :**  $E^2 - C^2 = (E - C)(E + C)$

(i)  $x^4 - y^4$  (ii)  $9a^2 - (2x - y)^2$  (iii)  $(3x - y)^2 - (2x - 3y)^2$   
 (iv)  $4x^2 - 9y^2 - 6x - 9y$  (v)  $4x^2 - 12x + 9 - 4y^2$

**Type-2 :**  $a^3 \pm b^3 \equiv (a \pm b)(a^2 \mp ab + b^2)$

(i)  $8x^3 - 27y^3$  (ii)  $a^6 - b^6$   
 (iii)  $8x^3 + 125y^3 + 2x - 5y$  (iv)  $8x^3 + 1$

**Type-3 :**  $x^2 + px + q / ax^2 + bx + r$

(i)  $x^2 + 3x - 40$  (ii)  $x^2 - 3x - 40$  (iii)  $x^2 + 5x - 14$   
 (iv)  $x^2 + 6x - 187$  (v)  $x^2 - 9x - 90$  (vi)  $a^2 - 11a + 28$   
 (vii)  $x^2 - 3x - 4$  (viii)  $x^2 - 2x - 3$

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 (i)  $3x^2 - 10x + 8$  (ii)  $12x^2 + x - 35$  (iii)  $3x^2 - 5x + 2$   
 (iv)  $3x^2 - 7x + 4$  (v)  $7x^2 - 8x + 1$  (vi)  $2x^2 - 17x + 26$   
 (vii)  $3a^2 - 7a - 6$  (viii)  $14a^2 + a - 3$

**Type-4 :** Factorisationally by converting the given expression into a perfect square.

(i)  $a^2 - 4a + 3 + 2b - b^2$  (ii)  $a^4 + a^2b^2 + b^4$  (iii)  $x^4 + 324$   
 (iv)  $x^4 - y^2 + 2x^2 + 1$  (v)  $a^4 + a^2 + 1$  (vi)  $9x^4 - 10x^2 + 1$   
 (vii)  $4a^4 - 5a^2 + 1$  (viii)  $4x^4 + 81$

**Type-5 :** Using Remainder Theorem

(i)  $x^3 - 13x - 12$  (ii)  $x^3 - 7x - 6$  (iii)  $x^3 - 6x^2 + 11x - 6$   
 (iv)  $2x^3 + 9x^2 + 10x + 3$  (v)  $x^3 - 9x^2 + 23x - 15$  (vi)  $2x^3 - 9x^2 + 13x - 6$   
 (vii)  $x^3 - 4x^2 + 5x - 2$

**Type-6 :**  $a^3 + b^3 + c^3 - 3abc$

(i)  $8a^3 + b^3 - 6abc$

(ii)  $8a^6 + 5a^3 + 1$

(iii) Show that  $(x - y)^3 + (y - z)^3 + (z - x)^3 = 3(x - y)(y - z)(z - x)$ .

**Type-7 :**

(i)  $f(x) = (x + 1)(x + 2)(x + 3)(x + 4) - 8$

(ii)  $(x + 1)(x + 2)(x + 3)(x + 4) - 15$

(iii)  $(x - 3)(x + 2)(x - 6)(x - 1) + 56$

(iv)  $4x(2x + 3)(2x - 1)(x + 1) - 54$

(v)  $(x - 3)(x + 2)(x + 3)(x + 8) + 56$

**SUPPLEMENT - 3 (REVIEW OF CLASS X)**

**Rationalization**

1. Simplify:

(a)  $\frac{1}{\sqrt{3} - \sqrt{2}}$

(b)  $\frac{1}{\sqrt{7} - 4\sqrt{3}}$

2. Rationalize the denominator of  $\frac{\sqrt{1+x^2} - \sqrt{1-x^2}}{\sqrt{1+x^2} + \sqrt{1-x^2}}$ .

3. Simplify  $\frac{3 + \sqrt{6}}{5\sqrt{3} - 2\sqrt{12} - \sqrt{32} + \sqrt{50}}$ .

4. Simplify  $\frac{3\sqrt{2}}{\sqrt{3} + \sqrt{6}} - \frac{4\sqrt{3}}{\sqrt{6} + \sqrt{2}} + \frac{\sqrt{6}}{\sqrt{2} + \sqrt{3}}$ .

5. Simplify:

(i)  $\frac{3\sqrt{2} + 2\sqrt{3}}{3\sqrt{2} - 2\sqrt{3}}$

(ii)  $\frac{3\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}}$

(iii)  $\frac{\sqrt{2} + 1}{\sqrt{2} - 1}$

(iv)  $\frac{\sqrt{3}}{2 - \sqrt{3}}$

(v)  $\frac{3}{\sqrt{5} - \sqrt{2}}$

(vi)  $\frac{3 + \sqrt{5}}{3 - \sqrt{5}}$

**SUPPLEMENT - 4 (REVIEW OF CLASS X)**

Q.1 Match the values of  $x$  given in **Column-II** satisfying the exponential equation given in **Column-I** (Do not verify). Remember that for  $a > 0$ , the term  $a^x$  is always greater than zero  $\forall x \in \mathbb{R}$ .

<b>Column-I</b>	<b>Column-II</b>
(A) $5^x - 24 = \frac{25}{5^x}$	(P) $-3$
(B) $(2^{x+1})(5^x) = 200$	(Q) $-2$
(C) $4^{2/x} - 5(4^{1/x}) + 4 = 0$	(R) $-1$
(D) $2^{2x+1} - 33(2^{x-1}) + 4 = 0$	(S) $0$
(E) $\frac{2^{x-1} \cdot 4^{x+1}}{8^{x-1}} = 16$	(T) $1$
(F) $3^{2x+1} + 10(3^x) + 3 = 0$	(U) $2$
(G) $4^{x^2+2} - 9(2^{x^2+2}) + 8 = 0$	(V) $3$
(H) $64(9^x) - 84(12^x) + 27(16^x) = 0$	(W) <b>None</b>
(I) $5^{2x} - 7^x - 5^{2x}(35) + 7^x(35) = 0$	

Q.2 Which of the following equation(s) has (have) only unity as the solution

- (A)  $4^{\frac{1}{x}-2} = \frac{\log \sqrt{10}}{2}$  (base of the log is 10)
- (B)  $2(3^{x+1}) - 6(3^{x-1}) - 3^x = 9$
- (C)  $7(3^{x+1}) - 5^{x+2} = 3^{x+4} - 5^{x+3}$
- (D)  $2^{x^2-6} \cdot 3^{x^2-6} = \frac{(6^{x-1})^4}{6^5}$

Q.3 Which of the following equation(s) has (have) only natural solution(s).

- (A)  $6 \cdot 9^{1/x} - 13 \cdot 6^{1/x} + 6 \cdot 4^{1/x} = 0$
- (B)  $3 \cdot 2^{x/2} - 7 \cdot 2^{x/4} = 20$
- (C)  $4^{x-\sqrt{x^2-5}} - 6 \cdot 2^{x-\sqrt{x^2-5}} + 8 = 0$
- (D)  $5^x \cdot \sqrt[x]{8^{x-1}} = 500$

Q.4 Solve the following equations:

- (i)  $4^x - 10 \cdot 2^{x-1} = 24.$  (ii)  $4 \cdot 2^{2x} - 6^x = 18 \cdot 3^{2x}.$
- (iii)  $3^{2x-3} - 9^{x-1} + 27^{2x/3} = 675.$  (iv)  $7^{x+2} - \frac{1}{7} \cdot 7^{x+1} - 14 \cdot 7^{x-1} + 2 \cdot 7^x = 48$
- (v)  $\left(\frac{5}{3}\right)^{x+1} \cdot \left(\frac{9}{25}\right)^{x^2+2x-11} = \left(\frac{5}{3}\right)^9.$  (vi)  $\left(3^{x^2-7.2x+3.9} - 9\sqrt{3}\right) \log(7-x) = 0.$
- (vii)  $5^{2x} = 3^{2x} + 2 \cdot 5^x + 2 \cdot 3^x.$

[ANSWER KEY]

SUPPLEMENT - 1

Q.1 (a)  $81$  (b)  $-8x^3$  (c)  $\frac{27y^3}{64}$  (d)  $\frac{1}{64}$  (e)  $\frac{1}{16x^2}$  (f)  $\frac{y}{2}$  (g)  $\frac{4x^5}{3y^7}$   
(h)  $2$  (i)  $\frac{1}{2}$  (j)  $\frac{1}{a^2b^2}$  (k)  $\frac{3}{2}$  (l)  $1$  (m)  $\frac{1}{(x-y)^2}$  (n)  $x^{5y}$   
(o)  $3y^2$  (p)  $7200$

Q.2 (a)  $2^9$  (b)  $\frac{1}{10}$  (c)  $1$  (d)  $1$  (e)  $10^{-4}$  (f)  $x^{-6}$  (g)  $\frac{a\sqrt{b}}{8c^4}$   
(h)  $\frac{4}{15}$  (i)  $\frac{a^{1/4}b^{5/6}c}{d}$

Q.3 (a)  $\frac{16}{3}$  (b)  $\frac{7}{2}$  (c)  $4$  (d)  $11$  (e)  $\frac{1}{4}$  (f)  $\frac{1}{4}$  (g)  $4$  (h)  $\frac{89}{4}$   
(i)  $18$  (j)  $\frac{2}{a}$  (k)  $\frac{\sqrt{2}}{y^2}$

Q.4 (a)  $0.8$  (b)  $\frac{4}{3}$  (c)  $\frac{46}{15}$  (d)  $34$  (e)  $\frac{-13}{2}$  (f)  $\frac{1}{16}$  (g)  $\frac{26}{5}$   
(h)  $\frac{1}{2}$  (i)  $150$

Q.5 (a)  $\frac{-1}{3}$  (b)  $\frac{7}{8}$  (c)  $\frac{7-x}{6(x-1)^{1/2}(x+1)^{5/3}}$  (d)  $2x$  if  $x \geq -1$ ,  $-2$  if  $x \leq -1$   
(e)  $x-y$  if  $2x \geq y$ ,  $5x-3y$  if  $2x \leq y$

SUPPLEMENT - 2

Type-1

(i)  $(x^2 + y^2)(x + y)(x - y)$  (ii)  $(3a + 2x - y)(3a - 2x + y)$  (iii)  $(5x - 4y)(x + 2y)$   
(iv)  $(2x + 3y)(2x - 3y - 3)$  (v)  $(2x - 3 + 2y)(2x - 3 - 2y)$

Type-2

(i)  $(2x - 3y)(4x^2 + 6xy + 9x^2)$  (ii)  $(a + b)(a^2 - ab + b^2)(a - b)(a^2 + ab + b^2)$   
(iii)  $(2x - 5y)(4x^2 + 10xy + 25y^2 + 1)$  (iv)  $(1 + 2x)(1 - 2x + 4x^2)$

Type-3

(i)  $(x + 8)(x - 5)$  (ii)  $(x - 8)(x + 5)$  (iii)  $(x + 7)(x - 2)$  (iv)  $(x + 17)(x - 11)$   
(v)  $(x - 15)(x + 6)$  (vi)  $(a - 7)(a - 4)$  (vii)  $(x - 4)(x + 1)$  (viii)  $(x - 3)(x + 1)$   
 $\times \times \times \times \times \times \times \times$   
(i)  $(x - 2)(3x - 4)$  (ii)  $(4x + 7)(3x - 5)$  (iii)  $(3x - 2)(x - 1)$   
(iv)  $(x - 1)(3x - 4)$  (v)  $(x - 1)(7x - 1)$  (vi)  $(2x - 13)(x - 2)$   
(vii)  $(a - 3)(3a + 2)$  (viii)  $(2a + 1)(7a - 3)$

**Type-4**

- (i)  $(a - b - 1)(a + b - 3)$  (ii)  $(a^2 + ab + b^2)(a^2 - ab + b^2)$   
 (iii)  $(x^2 + 6x + 18)(x^2 - 6x + 18)$  (iv)  $(x^2 + 1 + y)(x^2 + 1 - y)$   
 (v)  $(a^2 + a + 1)(a^2 - a + 1)$  (vi)  $(3x + 1)(3x - 1)(x + 1)(x - 1)$   
 (vii)  $(2a + 1)(2a - 1)(a + 1)(a - 1)$

**Type-5**

- (i)  $(x + 1)(x - 4)(x + 3)$  (ii)  $(x + 2)(x - 3)(x + 1)$  (iii)  $(x - 1)(x - 2)(x - 3)$   
 (iv)  $(x + 1)(x + 3)(2x + 1)$  (v)  $(x - 1)(x - 3)(x - 5)$  (vi)  $(x - 1)(x - 2)(2x - 3)$   
 (vii)  $(x - 2)(x - 1)^2$ .

**Type-6**

- (i)  $(2a + b + c)(4a^2 + b^2 + c^2 - 2ab - bc - 2ac)$ .  
 (ii)  $(2a^2 - a + 1)(4a^4 + 2a^3 - a^2 + a + 1)$

**Type-7**

- (i)  $(x^2 + 5x + 8)(x^2 + 5x + 2)$  (ii)  $(x^2 + 5x + 1)(x^2 + 5x + 9)$   
 (iii)  $(x^2 - 4x - 4)(x - 5)(x + 1)$  (iv)  $2(2x^2 + 2x + 3)(4x^2 + 4x - 9)$   
 (v)  $(x^2 + 5x - 22)(x + 1)(x + 4)$

**SUPPLEMENT - 3**

2.  $\frac{1 - \sqrt{1 - x^4}}{x^2}$       3.  $\sqrt{3}$       4. 0  
 5. (i)  $5 + 2\sqrt{6}$ ; (ii)  $9 + 2\sqrt{15}$ ; (iii) 5.828; (iv) 6.464  
 (v) 3.650; (vi) 6.854

**SUPPLEMENT - 4**

- Q.1 (A) U, (B) U, (C) T, (D) Q, V, (E) P, Q, R, S, T, U, V, (F) W, (G) R, T, (H) T, U, (I) S  
 Q.2 AB  
 Q.3 BD

- Q.4 (i)  $x = 3$ ; (ii)  $x = -2$ ; (iii)  $x = 3$ ; (iv)  $x = 0$ ; (v)  $x = \frac{-7}{2}, 2$   
 (vi)  $x = \frac{1}{5}, 6$ ; (vii)  $x = 1$