EXERCISE – 3B

FORMULA USED –: $(a^2 - b^2) = (a - b)(a + b)$

Answer.1. $9x^2 - 16y^2$

$9x^2 - 16y^2 = (3x)^2 - (4y)^2$
$$= (3x - 4y)(3x + 4y)$$

Answer.2. $\left(\frac{25}{4}x^2 - \frac{1}{9}y^2\right)$

$.\left(\frac{25}{4}x^2 - \frac{1}{9}y^2\right) = \left(\frac{25}{4}x\right)^2 - \left(\frac{1}{9}y\right)^2$
$$= \left(\frac{25}{4}x - \frac{1}{9}y\right)\left(\frac{25}{4}x + \frac{1}{9}y\right)$$

Answer.3. $81 - 16x^2$

$81 - 16x^2 = (9)^2 - (4x)^2$
$$= (9 - 4x)(9 + 4x)$$

Answer.4. $5 - 20x^2$

$5 - 20x^2 = 5(1 - 4x^2)$
$$= 5[(1)^2 - (2x)^2]$$
$$= 5(1 - 2x)(1 + 2x)$$

Answer.5. $2x^4 - 32$

$2x^4 - 32 = 2(x^4 - 16)$
$$= 2[(x^2)^2 - (4)^2]$$
$$= 2(x^2 - 4)(x^2 + 4)$$
$$= 2(x - 2)(x + 2)(x^2 + 4)$$

Answer.6. $3a^3b - 243ab^3$

$3a^3b - 243ab^3 = 3ab(a^2 - 81b^2)$
$$= 3ab(a - 9b)(a + 9b)$$

Answer.7. $3x^3 - 48x$

$3x^3 - 48x = 3x(x^2 - 16)$
$$= 3x(x - 4)(x + 4)$$

Answer.8. $27a^2 - 48b^2$

$27a^2 - 48b^2 = 3(9a^2 - 16b^2)$
$$= 3[(3a)^2 - (4b)^2]$$
$$= 3(3a - 4b)(3a + 4b)$$

Answer.9. $x - 64x^3$

$.x - 64x^3 = x(1 - 64x^2)$
$$= x\{(1)^2 - (8x)^2\}$$
$$= x(1 - 8x)(1 + 8x)$$

Answer.10. $8ab^2 - 18a^3$

$8ab^2 - 18a^3 = 2a(4b^2 - 9a^2)$
$$= 2a(2b - 3b)(2b + 3a)$$

Answer.11. $150 - 6x^2$

CLASS IX   **RS Aggarwal solutions**

$$150 - 6x^2 = 6(25 - x^2)$$
$$= 6(5 - x)(5 + x)$$

Answer.12. $2 - 50x^2$

$$2 - 50x^2 = 2(1 - 25x^2)$$
$$= 2(1 - 5x)(1 + 5x)$$

Answer.13. $20x^2 - 45$

$$20x^2 - 45 = 5(4x^2 - 9)$$
$$= 5(2x - 3)(2x + 3)$$

Answer.14. $(3a + 5b)^2 - 4c^2$

$$(3a + 5b)^2 - 4c^2 = (3a + 5b - 2c)(3a + 5b + 2c)$$

Answer.15. $a^2 - b^2 - a - b$

$$.a^2 - b^2 - a - b = (a - b)(a + b) - 1(a + b)$$
$$= (a + b)(a - b - 1)$$

Answer.16. $4a^2 - 9b^2 - 2a - 3b$

$$4a^2 - 9b^2 - 2a - 3b = (2a - 3b)(2a + 3b) - 1(2a + 3b)$$
$$= (2a + 3b)\{(2a - 3b) - 1\}$$
$$= (2a + 3b)(2a - 3b - 1)$$

Answer.17. $a^2 - b^2 + 2bc - c^2$

$$.a^2 - b^2 + 2bc - c^2 = a^2 - (b^2 - 2bc + c^2)$$
$$= a^2 - (b - c)^2$$
$$= \{a - (b - c)\}\{a + (b - c)\}$$
$$= (a - b + c)\,(a + b - c)$$

Answer.18. $4a^2 - 4b^2 + 4a + 1$

$$4a^2 - 4b^2 + 4a + 1 = (4a^2 + 4a + 1) - 4b^2$$
$$= (2a + 1)^2 - (2b)^2$$
$$= (2a + 1 + 2b)(2a + 1 - 2b)$$
$$= (2a + 2b + 1)(2a - 2b + 1)$$

Answer.19. $a^2 + 2ab + b^2 - 9c^2$

$$.a^2 + 2ab + b^2 - 9c^2 = (a^2 + 2ab + b^2) - (3c)^2$$
$$= (a + b)^2 - (3c)^2$$
$$= (a + b - 3c)(a + b + 3c)$$

Answer.20. $108a^2 - 3(b - c)^2$

$$108a^2 - 3(b - c)^2 = 3\{36a^2 - (b - c)^2\}$$
$$= 3\{6a - (b - c)\}\{6a + (b - c)\}$$
$$= 3(6a - b + c)(6a + b - c)$$

Answer.21. $(a + b)^3 - a - b$

$$(a + b)^3 - a - b = (a + b)^3 - 1(a + b)$$
$$= (a + b)\{(a + b)^2 - 1\}$$
$$= (a + b)(a + b + 1)(a + b - 1)$$

Answer.22. $x^2 + y^2 - z^2 - 2xy$

$$.x^2 + y^2 - z^2 - 2xy = (x^2 + y^2 - 2xy) - z^2$$

$$= (x - y)^2 - z^2$$
$$= (x - y - z)(x - y + z)$$

Answer.23. $x^2 + 2xy + y^2 - a^2 + 2ab - b^2$

$$
\begin{aligned}
.x^2 + 2xy + y^2 - a^2 + 2ab - b^2 &= (x^2 + 2xy + y^2) - (a^2 - 2ab + b^2) \\
&= (x + y)^2 - (a - b)^2 \\
&= \{(x + y) - (a - b)\}\{(x + y) + (a - b)\} \\
&= x + y - a + b)(x + y + a - b)
\end{aligned}
$$

Answer.24. $25x^2 - 10x + 1 - 36y^2$

$$
\begin{aligned}
25x^2 - 10x + 1 - 36y^2 &= (25x^2 - 10x + 1) - (6y)^2 \\
&= (5x - 1)^2 - (6y)^2 \\
&= (5x - 1 - 6y)(5x - 1 + 6y)
\end{aligned}
$$

Answer.25. $a - b - a^2 + b^2$

$$
\begin{aligned}
a - b - a^2 + b^2 &= a - b - 1(a^2 - b^2) \\
&= (a - b) - 1(a - b)(a + b) \\
&= (a - b)(1 - a - b)
\end{aligned}
$$

Answer.26. $a^2 - b^2 - 4ac + 4c^2$

$$
\begin{aligned}
.a^2 - b^2 - 4ac + 4c^2 &= (a^2 - 4ac + 4c^2) - b^2 \\
&= (a - 2c)^2 - b^2 \\
&= (a - 2c - b)(a - 2c + b)
\end{aligned}
$$

Answer.27. $9 - a^2 + 2ab - b^2$

$$
\begin{aligned}
9 - a^2 + 2ab - b^2 &= (3)^2 - (a^2 - 2ab + b^2) \\
&= (3)^2 - (a - b)^2 \\
&= \{3 - (a - b)\}\{3 + (a - b)\} \\
&= (3 - a + b)(3 + a - b)
\end{aligned}
$$

Answer.28. $x^3 - 5x^2 - x + 5$

$$
\begin{aligned}
.x^3 - 5x^2 - x + 5 &= x^2(x - 5) - 1(x - 5) \\
&= (x - 5)(x^2 - 1) \\
&= (x - 5)(x - 1)(x + 1)
\end{aligned}
$$

Answer.29. $1 + 2ab - (a^2 + b^2)$

$$
\begin{aligned}
1 + 2ab - (a^2 + b^2) &= 1 - \{(-2ab\} + (a^2 + b^2)\} \\
&= 1 - (a - b)^2 \\
&= \{1 - (a - b)\}\{1 + (a - b)\} \\
&= (1 - a + b)(1 + a - b)
\end{aligned}
$$

Answer.30. $9a^2 + 6a + 1 - 36b^2$

$$
\begin{aligned}
9a^2 + 6a + 1 - 36b^2 &= (9a^2 + 6a + 1) - (6b)^2 \\
&= (3a + 1)^2 - (6b)^2 \\
&= (3a + 1 - 6b)(3a + 1 + 6b)
\end{aligned}
$$

Answer.31. $x^2 - y^2 + 6y - 9$

$$
\begin{aligned}
.x^2 - y^2 + 6y - 9 &= x^2 - (y^2 - 6y + 9) \\
&= x^2 - (y - 3)^2 \\
&= \{x - (y - 3)\}\{x + (y - 3)\} \\
&= (x - y + 3)(x + y - 3)
\end{aligned}
$$

Answer.32. $4x^2 - 9y^2 - 2x - 3y$

$4x^2 - 9y^2 - 2x - 3y = (2x)^2 - (3y)^2 - 1(2x + 3y)$
$$= (2x - 3y)(2x + 3y) - 1(2x + 3y)$$
$$= (2x + 3y)(2x - 3y - 1)$$

Answer.33. $9a^2 + 3a - 8b - 64b^2$

$9a^2 + 3a - 8b - 64b^2 = (3a)^2 - (8b)^2 + 3a - 8b$
$$= (3a - 8b)(3a + 8b) + 1(3a - 8b)$$
$$= (3a - 8b)(3a + 8b + 1)$$

Answer.34. $x^2 + \frac{1}{x^2} - 3$

$.x^2 + \frac{1}{x^2} - 3 = \left(x^2 + \frac{1}{x^2} - 2.x.\frac{1}{x}\right) - 1$
$$= \left(x + \frac{1}{x}\right)^2 - 1^2$$
$$= \left(x + \frac{1}{x} - 1\right)\left(x + \frac{1}{x} + 1\right)$$

Answer.35. $x^2 - 2 + \frac{1}{x^2} - y^2$

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

Answer.36. $x^4 + \frac{4}{x^4}$

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

Answer.37. $x^8 - 1$

$.x^8 - 1 = (x^4)^2 - 1^2$
$$= (x^4 - 1)(x^4 + 1)$$
$$= (x^2 - 1)(x^2 + 1)(x^4 + 1 + 2.x^2.1 - 2.x^2.1)$$
$$= (x - 1)(x + 1)(x^2 + 1)\left\{(x^2 + 1)^2 - \left(\sqrt{2}x\right)^2\right\}$$
$$= (x - 1)(x + 1)(x^2 + 1)(x^2 + 1 - \sqrt{2}x)(x^2 + 1 + \sqrt{2}x)$$

Answer.38. $16x^4 - 1$

$16x^4 - 1 = (4x^2)^2 - 1^2$
$$= (4x^2 - 1)(4x^2 + 1)$$
$$= (2x - 1)(2x + 1)(4x^2 + 1)$$

Answer.39. $81x^4 - y^4$

$81x^4 - y^4 = (9x^2)^2 - (y^2)^2$
$$= (9x^2 - y^2)(9x^2 + y^2)$$
$$= (3x - y)(3x + y)(9x^2 + y^2)$$

Answer.40. $x^4 - 625$

$.x^4 - 625 = (x^2)^2 - (25)^2$
$$= (x^2 - 25)(x^2 + 25)$$
$$= (x - 5)(x + 5)(x^2 + 25)$$