

RD SHARMA

Solutions

Class 8 Maths

Chapter 7

Ex 7.8

Solve: Q1. $p^2 + 6p + 8$

Soln:

$$p^2 + 6p + 8$$

$$= p^2 + 6p + \left(\frac{6}{2}\right)^2 - \left(\frac{6}{2}\right)^2 + 8 \quad \text{[Adding and subtracting } \left(\frac{6}{2}\right)^2, \text{ that is } 3^2\text{]}$$

$$= p^2 + 6p + 3^2 - 3^2 + 8$$

$$= p^2 + 2 \times p \times 3 + 3^2 - 9 + 8$$

$$= p^2 + 2 \times p \times 3 + 3^2 - 1$$

$$= (p + 3)^2 - 1^2 \quad \text{[Completing the square]}$$

$$= [(p + 3) - 1][(p + 3) + 1]$$

$$= (p + 3 - 1)(p + 3 + 1)$$

$$= (p + 2)(p + 4)$$

Q2. $q^2 - 10q + 21$

Soln:

$$q^2 - 10q + 21$$

$$= q^2 - 10q + \left(\frac{10}{2}\right)^2 - \left(\frac{10}{2}\right)^2 + 21 \quad \text{[Adding and subtracting } \left(\frac{10}{2}\right)^2, \text{ that is } 5^2\text{]}$$

$$= q^2 - 2 \times q \times 5 + 5^2 - 5^2 + 21$$

$$= (q - 5)^2 - 4 \quad \text{[Completing the square]}$$

$$= [(q - 5) - 2][(q - 5) + 2]$$

$$= (q - 5 - 2)(q - 5 + 2)$$

$$= (q - 7)(q - 3)$$

Q3. $4y^2 + 12y + 5$

Soln:

$$4y^2 + 12y + 5$$

$$4\left(y^2 + 3y + \frac{5}{4}\right) \quad \text{[Making the co-efficient of } y^2\text{]} \quad = 4\left(y + \frac{3}{2} - 1\right)\left(y + \frac{3}{2} - 1\right)$$

$$4\left[y^2 + 3y + \left(\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2 + \frac{5}{4}\right] \quad \text{[Adding and subtracting } \left(\frac{3}{2}\right)^2\text{]} \quad = 4\left(y + \frac{3}{2}\right)\left(y + \frac{3}{2}\right)$$

$$= 4\left[\left(y + \frac{3}{2}\right)^2 - \frac{9}{4} + \frac{5}{4}\right] \quad = (2y + 1)(2y + 5)$$

$$= 4\left[\left(y + \frac{3}{2}\right)^2 - 1\right] \quad \text{[Completing the square]}$$

$$= 4\left[\left(y + \frac{3}{2} - 1\right)\left(y + \frac{3}{2} + 1\right)\right]$$

Q4. $p^2 + 6p - 16$

Soln:

$$p^2 + 6p - 16$$

$$p^2 + 6p + \left(\frac{6}{2}\right)^2 - \left(\frac{6}{2}\right)^2 - 16 \quad \text{[Adding and subtracting } \left(\frac{6}{2}\right)^2, \text{ that is } 3^2\text{]}$$

$$= p^2 + 6p + 3^2 - 9 - 16$$

$$= (p + 3)^2 - 25 \quad \text{[Completing the square]}$$

$$= (p + 3)^2 - 5^2$$

$$= [(p + 3) - 5][(p + 3) + 5]$$

$$= (p + 3 - 5)(p + 3 + 5)$$

$$= (p - 2)(p + 8)$$

Q5. $x^2 + 12x + 20$

Soln:

$$x^2 + 12x + 20$$

$$= x^2 + 12x + \left(\frac{12}{2}\right)^2 - \left(\frac{12}{2}\right)^2 + 20 \quad \text{[Adding and subtracting } \left(\frac{12}{2}\right)^2, \text{ that is } 6^2\text{]}$$

$$= x^2 + 12x + 6^2 - 6^2 + 20$$

$$= (x + 6)^2 - 16 \quad \text{[completing the square]}$$

$$= (x + 6)^2 - 4^2$$

$$= [(x + 6) - 4][(x + 6) + 4]$$

$$= (x + 6 - 4)(x + 6 + 4)$$

$$= (x + 2)(x + 10)$$

Q6. $a^2 - 14a - 51$

Soln:

$$a^2 - 14a - 51$$

$$= a^2 - 14a + \left(\frac{14}{2}\right)^2 - \left(\frac{14}{2}\right)^2 - 51 \quad \text{[Adding and subtracting } \left(\frac{14}{2}\right)^2, \text{ that is } 7^2\text{]}$$

$$= a^2 - 14a + 7^2 - 7^2 - 51$$

$$= (a - 7)^2 - 100 \quad \text{[Completing the square]}$$

$$= (a - 7)^2 - 10^2$$

$$= [(a - 7) - 10][(a - 7) + 10]$$

$$= (a - 7 - 10)(a - 7 + 10)$$

$$= (a - 17)(a + 3)$$

Q7. $a^2 + 2a - 3$

Soln:

$$a^2 + 2a - 3$$

$$= a^2 + 2a + \left(\frac{2}{2}\right)^2 - \left(\frac{2}{2}\right)^2 - 3 \quad \text{[Adding and subtracting } \left(\frac{2}{2}\right)^2, \text{ that is } 1^2\text{]}$$

$$= a^2 + 2a + 1 - 1 - 3$$

$$= (a + 1)^2 - 4 \quad \text{[Completing the square]}$$

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

$$= [(a + 1) - 2][(a + 1) + 2]$$

$$= (a + 1 - 2)(a + 1 + 2)$$

$$= (a - 1)(a + 3)$$

Q8. $4x^2 - 12x + 5$

Soln:

$$4x^2 - 12x + 5$$

$$= 4\left(x^2 - 3x + \frac{5}{4}\right) \quad \text{[Making the co-efficient of } x^2 = 1\text{]}$$

=

$$\begin{aligned}
& 4 \left[x^2 - 3x + \left(\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2 + \frac{5}{4} \right] \quad \text{[Adding and subtracting } \left(\frac{3}{2}\right)^2 \text{]} \\
& = 4 \left[\left(x - \frac{3}{2}\right)^2 - \frac{9}{4} + \frac{5}{4} \right] \quad \text{[Completing the square]} \\
& = 4 \left[\left(x - \frac{3}{2}\right)^2 - 1 \right] \\
& = 4 \left[\left(x - \frac{3}{2}\right) - 1 \right] \left[\left(x - \frac{3}{2}\right) + 1 \right] \\
& = 4 \left(x - \frac{3}{2} - 1\right) \left(x - \frac{3}{2} + 1\right) \\
& = 4 \left(x - \frac{5}{2}\right) \left(x - \frac{1}{2}\right) \\
& = (2x - 5)(2x - 1)
\end{aligned}$$

Q9. (y - 3)(y - 4)

Soln:

$$= y^2 - 7y + 12$$

(Adding and subtracting $\left(\frac{7}{2}\right)^2$)

$$= y^2 - 7y + \left(\frac{7}{2}\right)^2 - \left(\frac{7}{2}\right)^2 + 12$$

Completing the square

$$= \left(y - \frac{7}{2}\right)^2 - \frac{49}{4} + \frac{48}{4}$$

$$= \left(y - \frac{7}{2}\right)^2 - \frac{1}{4}$$

$$= \left(y - \frac{7}{2}\right)^2 - \left(\frac{1}{2}\right)^2$$

$$= \left[y - \left(\frac{7}{2} - \frac{1}{2}\right)\right] \left[y - \left(\frac{7}{2} + \frac{1}{2}\right)\right]$$

$$= \left[y - \left(\frac{7}{2} - \frac{1}{2}\right)\right] \left[y - \left(\frac{7}{2} + \frac{1}{2}\right)\right]$$

$$= (y - 4)(y - 3)$$

Q10. (z - 6)(z + 2)

Soln:

$$= z^2 - 4z - 12$$

(Adding and subtracting $\left(\frac{4}{2}\right)^2$)

$$= z^2 - 4z + \left(\frac{4}{2}\right)^2 - \left(\frac{4}{2}\right)^2 - 12$$

$$= z^2 - 4z + (2)^2 - (2)^2 - 12$$

$$= (z - 2)^2 - 16$$

Completing the squares

$$= (z - 2)^2 - (4)^2$$

$$= [(z - 2) - 4][(z - 2) + 4]$$

$$= (z - 6)(z + 2)$$