CLASS → IX
SUB → MATHS
PHASE → I
CH → 3 [EXPANSION]

The total chapter is based on $(a \pm b)^2$, $(a \pm b)^3$, $(a+b+c)^2$ ... so on.

3.1

1) i) $\left(\frac{x}{2}+\frac{2y}{3}\right)^2 = \left(\frac{x}{2}\right)^2 + \cancel{2} \times \frac{x}{\cancel{2}} \times \frac{2y}{3} + \left(\frac{2y}{3}\right)^2$
$= \frac{x^2}{4} + \frac{2xy}{3} + \frac{4y^2}{9}$

9) i) $\left(3x+\frac{1}{x}\right)^3 = (3x)^3 + \left(\frac{1}{x}\right)^3 + 3 \times 3\cancel{x} \times \frac{1}{\cancel{x}}\left(3x+\frac{1}{x}\right)$
$= 27x^3 + \frac{1}{x^3} + 27x + \frac{9}{x}$

15) ii) $(5-2x)(5+2x)(25+4x^2) = (25-4x^2)(25+4x^2)$ $[\because a^2-b^2=(a+b)(a-b)]$
$= 625 - 16x^4$

19) ii) $\left(x-\frac{3}{x}\right)\left(x^2+3+\frac{9}{x^2}\right) = x^3 - \left(\frac{3}{x}\right)^3$ $[\because a^3-b^3=(a-b)(a^2+ab+b^2)]$
$= x^3 - \frac{27}{x^3}$

27) $a+b+2c=0$
or, $a+b=-2c$
or, $(a+b)^3 = (-2c)^3$ [Cubing both the sides]
or, $a^3+b^3+3ab(a+b) = -8c^3$
or, $a^3+b^3+3ab(-2c) = -8c^3$ [Substituting the value of $(a+b)$]
or, $a^3+b^3-6abc = -8c^3$
or, $a^3+b^3+8c^3 = 6abc$ [Proved]

[H.W. → 6, 22, 30]

3.2

2) $x+y=10, \quad xy=21$

$(x+y)^2 = 100$ [Squaring both the sides]

or, $x^2+2xy+y^2 = 100$

or, $x^2+y^2+2\times21 = 100$

or, $x^2+y^2 = 100-42 = 58$

$\therefore 2(x^2+y^2) = 2\times58 = 116$

11) $x+y=8, \quad xy=\frac{15}{4}$

$\therefore (x+y)^2 = 8^2$ [Squaring both the sides]

or, $x^2+2xy+y^2=64$

or, $x^2+y^2+\cancel{2}\times\frac{15}{\cancel{4}_2}=64$

or, $x^2+y^2 = 64-\frac{15}{2} = \frac{128-15}{2} = \frac{113}{2} = 56.5$

i) $(x-y)^2 = (x+y)^2-4xy$

$= 64 - \cancel{4}\times\frac{15}{\cancel{4}} = 49$

$\therefore x-y = \pm 7$

ii) $3(x^2+y^2) = 3\times\frac{113}{2} = \frac{339}{2} = 169\frac{1}{2}$

iii) $5(x^2+y^2)+4(x-y) = 5\times\frac{113}{2} \pm 28 = \frac{565}{2} \pm 28$

$= \frac{565\pm56}{2} = \frac{621}{2}$ or $\frac{509}{2}$

$= 310\frac{1}{2}$ or $254\frac{1}{2}$

22) $a+\frac{1}{a}=p$

Cubing both the sides

$a^3+\frac{1}{a^3}+3.\cancel{a}.\frac{1}{\cancel{a}}(a+\frac{1}{a}) = p^3$

or, $a^3+\frac{1}{a^3}+3p = p^3$ [Substituting the value of $a+\frac{1}{a}$]

or, $a^3+\frac{1}{a^3} = p^3-3p$

$= p(p^2-3)$ [Proved]

[H.W. → 4, 12, 30, 35

CH. Test → 5, 8, 14]

CH-4.1

Children have already done factorisation in std. 8

1) ii) $15ax^3 - 9ax^2$

$= 3ax^2(5x - 3)$

6) ii) $27a^3b^3 - 18a^2b^3 + 75a^3b^2$

$= 3a^2b^2(9ab - 6b + 25a)$

9) ii) $x(x^2+y^2-z^2) + y(-x^2-y^2+z^2) - z(x^2+y^2-z^2)$

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

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

4.2

3) ii) $x^3 - 3x^2 + x - 3$

$= x^2(x-3) + 1(x-3)$

$= (x-3)(x^2+1)$

8) ii) $x^2 - x(a+2b) + 2ab$

$= x^2 - ax - 2bx + 2ab$

$= x(x-a) - 2b(x-a) = (x-a)(x-2b)$

12) $ax^2 - bx^2 + ay^2 - by^2 + az^2 - bz^2$

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

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

4.3

4) ii) $9x^2 - 4(y+2x)^2$

$= (3x)^2 - \{2(y+2x)\}^2 = (3x)^2 - (2y+4x)^2 = (3x+2y+4x)(3x-2y-4x)$

$= (7x+2y)(-x-2y) = -(7x+2y)(x+2y)$

11) i) $9x^4 - x^2 - 12x - 36 = (3x^2)^2 - \{(x)^2 + 2.x.6 + (6)^2\} = (3x^2)^2 - (x+6)^2$

$= (3x^2+x+6)(3x^2-x-6)$

14) ii) $x^2 - 2xy + y^2 - a^2 - 2ab - b^2 = (x-y)^2 - (a+b)^2 = (x-y+a+b)(x-y-a-b)$

[H.W. → 5, 16]