

$$1. \text{ (i) } (a+b)^2 = (a+b)(a+b) = a^2 + 2ab + b^2 = (a-b)^2 + 4ab$$

$$\text{(ii) } (a+b)^2 - 2ab = a^2 + b^2$$

$$\text{(iii) } (a+b)^2 - (a^2 + b^2) = 2ab$$

$$2. \text{ (i) } (a-b)^2 = (a-b)(a-b) = a^2 - 2ab + b^2 = (a+b)^2 - 4ab$$

$$\text{(ii) } (a-b)^2 + 2ab = a^2 + b^2$$

$$\text{(iii) } (a-b)^2 - (a^2 + b^2) = 2ab$$

$$3. \text{ (i) } (a+b)^2 - (a-b)^2 = 4ab$$

$$\text{(ii) } (a-b)^2 - (a+b)^2 = -4ab$$

$$\text{(iii) } (a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$$

$$4. \text{ (i) } a^2 - b^2 = (a-b)(a+b)$$

$$\text{(ii) } (a-b) = \frac{(a^2 - b^2)}{(a+b)}$$

$$\text{(iii) } (a+b) = \frac{(a^2 - b^2)}{(a-b)}$$

$$\text{(iv) } a^4 - b^4 = (a^2 + b^2)(a+b)(a-b)$$

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

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

$$5. \text{ (i) } (a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$$

$$\text{(ii) } a^2 + b^2 + c^2 = (a+b+c)^2 - 2(ab + bc + ca)$$

$$\text{(iii) } a^2 + b^2 + c^2 - ab - bc - ca = \frac{1}{2} [(a-b)^2 + (b-c)^2 + (c-a)^2]$$