

**EXERCISE 12A**

Use direct method to evaluate the following products:

(i)  $(x+8)(x+3)$

**Solution:-**

$$(x+8)(x+3) = (x \times x) + (x \times 3) + (8 \times x) + (8 \times 3) = x^2 + 3x + 8x + 24 = x^2 + 11x + 24$$

(ii)  $(y+5)(y-3)$

**Solution:-**

$$(y+5)(y-3) = (y \times y) + (y \times -3) + (5 \times y) + (5 \times -3) = y^2 + (-3y) + (5y) - 15 \\ = y^2 - 3y + 5y - 15 = y^2 + 2y - 15$$

(iii)  $(a-8)(a+2)$

**Solution:-**

$$(a-8)(a+2) = (a \times a) + (a \times 2) + (-8 \times a) + (-8)(2) = a^2 + 2a - 8a - 16 = a^2 - 6a - 16$$

(iv)  $(b-3)(b-5)$

**Solution:-**

$$(b-3)(b-5) = (b \times b) + (b \times -5) + (-3 \times b) + (-3)(-5) = b^2 - 5b - 3b + 15 = b^2 - 8b + 15$$

(v)  $(3x-2y)(2x+y)$

**Solution:-**

$$(3x-2y)(2x+y) = (3x \times 2x) + (3x \times y) + (-2y \times 2x) + (-2y \times y) = 6x^2 + 3xy - 4xy - 2y^2 \\ = 6x^2 - xy - 2y^2$$

(vi)  $(5a+16)(3a-7)$

**Solution:-**

$$(5a+16)(3a-7) = (5a \times 3a) + (5a \times -7) + (16 \times 3a) + (16 \times -7)$$

$$= 15a^2 + (-35a) + 48a + (-112) = 15a^2 - 35a + 48a - 112 = 15a^2 + 13a - 112$$

(vii)  $(8-b)(3+b)$

**Solution:-**

$$(8-b)(3+b) = (8 \times 3) + (8 \times b) + (-b \times 3) + (-b \times b)$$

$$= 24 + 8b - 3b - b^2 = 24 + 5b - b^2$$

**Question 2.**

Use direct method to evaluate:

(i)  $(x+1)(x-1)$

**Solution:-**

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

(ii)  $(2+a)(2-a)$

**Solution:-**

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

(iii)  $(3b - 1)(3b + 1)$

**Solution:-**

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

(iv)  $(4+5x)(4-5x)$

**Solution:-**

$$(4 + 5x)(4 - 5x) = (4)^2 - (5)^2 = 16 - 25x^2$$

(v)  $(2a+3)(2a-3)$

**Solution:-**

$$(2a + 3)(2a - 3) = 2a^2 - 3^2 = 4a^2 - 9$$

(vi)  $(xy+4)(xy-4)$

**Solution:-**

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

(vii)  $(ab + x^2)(ab - x^2)$

**Solution:-**

$$(ab + x^2)(ab - x^2) = (ab)^2 - (x^2)^2 = a^2b^2 - x^4$$

(viii)  $(3x^2 + 5y^2)(3x^2 - 5y^2)$

**Solution:-**

$$(3x^2 + 5y^2)(3x^2 - 5y^2) = (3x^2)^2 - (5y^2)^2 = 9x^4 - 25y^4$$

(ix)  $(z - \frac{2}{3})(z + \frac{2}{3})$

**Solution:-**

$$(z - \frac{2}{3})(z + \frac{2}{3}) = (z)^2 - (\frac{2}{3})^2 = z^2 - \frac{4}{9}$$

(x)  $(\frac{3}{5}a + \frac{1}{2})(\frac{3}{5}a - \frac{1}{2})$

**Solution:-**

$$= (\frac{3}{5}a)^2 - (\frac{1}{2})^2 = \frac{9}{25}a^2 - \frac{1}{4}$$

(xi)  $(0.5-2a)(0.5+2a)$

**Solution:-**

$$= (0.5)^2 - (2a)^2 = 0.25 - 4a^2$$

$$(xii) \left(\frac{a}{2} - \frac{b}{3}\right) \left(\frac{a}{2} + \frac{b}{3}\right)$$

**Solution:-**

$$= \frac{a^2}{4} - \frac{b^2}{9}$$

**Question 3.**

**Evaluate:**

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

**Solution:-**

$$= [(a)^2 - (1)^2] (a^2 + 1) = (a^2 - 1)(a^2 + 1) = (a^2)^2 - (1)^2 = a^4 - 1$$

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

**Solution:-**

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

$$(iii) (2a - b)(2a + b)(4a^2 + b^2)$$

**Solution:-**

$$= [(2a)^2 - (b)^2] (4a^2 + b^2) = (4a^2 - b^2)(4a^2 + b^2) = (4a^2)^2 - (b^2)^2 = 16a^4 - b^4$$

$$(iv) (3 - 2x)(3 + 2x)(9 + 4x^2)$$

**Solution:-**

$$= [(3)^2 - (2x)^2] (9 + 4x^2) = (9 - 4x^2)(9 + 4x^2) = (9)^2 - (4x^2)^2 = 81 - 16x^4$$

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

**Solution:-**

$$= [(3x)^2 - (4y)^2] (9x^2 + 16y^2) = (9x^2 - 16y^2)(9x^2 + 16y^2) = (9x^2)^2 - (16y^2)^2 \\ = 81x^4 - 256y^4$$

**Question 4.**

Use the product  $(a + b)(a - b) = a^2 - b^2$  to evaluate:

$$(i) (21 \times 19)$$

**Solution:-**

$$= 21 \times 19 = (20 + 1)(20 - 1) = (20)^2 - (1)^2 = 400 - 1 = 399$$

$$(ii) (33 \times 27)$$

**Solution:-**

$$= 33 \times 27 = (30 + 3)(30 - 3) = (30)^2 - (3)^2 = 900 - 9 = 891$$

$$(iii) (103 \times 97)$$

**Solution:-**

$$(103 \times 97 = (100 + 3)(100 - 3) = (100)^2 - (3)^2 = 10000 - 9 = 9991$$

$$(iv) (9.8 \times 10.2)$$

**Solution:-**

$$= 9.8 \times 10.2 = (10 - .2)(10 + .2) = (10)^2 - (.2)^2 = 100 - .04 = 99.96$$

$$(v) (7.7 \times 8.3)$$

**Solution:-**

$$= 7.7 \times 8.3 = (8 - .3)(8 + .3) = (8)^2 - (.3)^2 = 64 - .09 = 63.91$$

$$(vi) (4.6 \times 5.4)$$

**Solution:-**

$$= 4.6 \times 5.4 = (5 - .4)(5 + .4) = (5)^2 - (.4)^2 = 25 - .16 = 24.84$$

**Question 5.**

Evaluate:

$$(i) (6-xy)(6+xy)$$

**Solution:-**

$$(6-xy)(6+xy)=6(6+xy)-xy(6+xy)$$

$$= 36 + 6xy - 6xy + (xy)^2 = 36 - x^2y^2$$

$$(ii) \left(7x + \frac{2}{3}y\right) \left(7x - \frac{2}{3}y\right)$$

**Solution:-**

$$= 7x \left(7x - \frac{2}{3}y\right) + \frac{2}{3}y \left(7x - \frac{2}{3}y\right) = 49x^2 - \frac{14}{3}xy + \frac{14}{3}xy - \frac{4}{9}y^2 = 49x^2 - \frac{4}{9}y^2$$

$$(iii) \left(\frac{a}{2b} + \frac{2b}{a}\right) \left(\frac{a}{2b} - \frac{2b}{a}\right)$$

**Solution:-**

$$= \frac{a}{2b} \left(\frac{a}{2b} - \frac{2b}{a}\right) + \frac{2b}{a} \left(\frac{a}{2b} - \frac{2b}{a}\right) = \frac{a^2}{4b^2} - 1 + 1 - \frac{4b^2}{a^2} = \frac{a^2}{4b^2} - \frac{4b^2}{a^2}$$

$$(iv) \left(3x - \frac{1}{2y}\right) \left(3x + \frac{1}{2y}\right)$$

**Solution:-**

$$= 3x \left(3x + \frac{1}{2y}\right) - \frac{1}{2y} \left(3x + \frac{1}{2y}\right) = 9x^2 + \frac{3x}{2y} - \frac{3x}{2y} - \frac{1}{4y^2} = 9x^2 - \frac{1}{4y^2}$$

$$(v) (2a + 3)(2a - 3) (4a^2 + 9)$$

**Solution:-**

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

$$= (4a^2)^2 - (9)^2 [(a + b)(a - b) = a^2 - b^2] = 16a^4 - 81$$

$$(vi) (a + bc)(a - bc) (a^2 + b^2c^2)$$

**Solution:-**

$$= [(a)^2 - (bc)^2] (a^2 + b^2c^2) [(a + b)(a - b) = a^2 - b^2] = (a^2 - b^2c^2) (a^2 + b^2c^2)$$

$$= (a^2)^2 - (b^2c^2)^2 [\because (a + b)(c - b) = a^2 - b^2] = (a^2)^2 - (b^2c^2)^2 [\because (a + b)(c - b) = a^2 - b^2]$$

$$= a^4 - b^4c^4$$

$$(vii) (5x+8y)(3x+5y)$$

**Solution:-**

$$= 5x(3x+5y) + 8y(3x+5y)$$

$$= 15x^2 + 25xy + 24xy + 40y^2 = 15x^2 + 49xy + 40y^2$$

$$(viii) (7x+15y)(5x-4y)$$

**Solution:-**

$$= 7x(5x-4y) + 15y(5x-4y)$$

$$= 35x^2 - 28xy + 75xy - 60y^2 = 35x^2 + 47xy - 60y^2$$

$$(ix) (2a-3b)(3a+4b)$$

**Solution:-**

$$= 2a(3a+4b) - 3b(3a+4b)$$

$$= 6a^2 + 8ab - 9ab - 12b^2 = 6a^2 - ab - 12b^2$$

$$(x) (9a-7b)(3a-b)$$

**Solution:-**

$$= 9a(3a-b) - 7b(3a-b)$$

$$= 27a^2 - 9ab - 21ab + 7b^2 = 27a^2 - 30ab + 7b^2$$

**EXERCISE 12B****Question 1.****Expand:**

(i)  $(2a + b)^2$

**Solution:-**

$$(2a + b)^2 = (2a)^2 + (b)^2 + 2 \times 2a \times b [(a + b)^2 = a^2 + b^2 + 2ab] = 4a^2 + b^2 + 4ab$$

(ii)  $(a - 2b)^2$

**Solution:-**

$$(a - 2b)^2 = (a)^2 + (2b)^2 - 2 \times a \times 2b [(a - b)^2 = a^2 + b^2 - 2ab] = a^2 + 4b^2 - 4ab$$

(iii)  $(a + \frac{1}{2a})^2$

**Solution:-**

$$= (a)^2 + (\frac{1}{2a})^2 + 2 \times a \times \frac{1}{2a} = a^2 + \frac{1}{4a^2} + \frac{2a}{2a} = a^2 + \frac{1}{4a^2} + 1$$

(iv)  $(2a - \frac{1}{a})^2$

**Solution:-**

$$= (2a)^2 + (\frac{1}{a})^2 - 2 \times 2a \times \frac{1}{a} = 4a^2 + \frac{1}{a^2} - 4$$

(v)  $(a + b - c)^2$

**Solution:-**

$$= (a)^2 + (b)^2 + (-c)^2 (+2 \times a \times b + 2 \times b \times (-c) + 2 \times (-c) \times (a))$$

$$= a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$$

(vi)  $(a - b + c)^2$

**Solution:-**

$$= (a)^2 + (-b)^2 + (c)^2 + 2 \times a \times -b + 2(-b)(c) + 2 \times c \times a = a^2 + b^2 + c^2 - 2ab - 2bc + 2ca$$

(vii)  $(3x + \frac{1}{3x})^2$

**Solution:-**

$$= (3x)^2 + (\frac{1}{3x})^2 + 2 \times 3x \times \frac{1}{3x} = 9x^2 + \frac{1}{9x^2} + 2$$

(viii)  $(2x - \frac{1}{2x})^2$

**Solution:-**

$$= (2x)^2 + \left(\frac{1}{2x}\right)^2 - 2 \times 2x \times \frac{1}{2x} = 4x^2 + \frac{1}{4x^2} - 2$$

**Question 2.**

**Find the square of:**

(i)  $x+3y$

**Solution:-**

$$(x + 3y)^2 = (x)^2 + (3y)^2 + 2 \times x \times 3y = x^2 + 9y^2 + 6xy$$

(ii)  $2x-5y$

**Solution:-**

$$(2x-5y)^2 = (2x)^2 + (5y)^2 - 2 \times 2x \times 5y = 4x^2 + 25y^2 - 20xy$$

(iii)  $\left(a + \frac{1}{5a}\right)$

**Solution:-**

$$\left(a + \frac{1}{5a}\right)^2 = (a)^2 + \left(\frac{1}{5a}\right)^2 + 2 \times a \times \frac{1}{5a} \left(a^2 + \frac{1}{25a^2} + \frac{2}{5}\right)$$

(iv)  $\left(2a - \frac{1}{a}\right)$

**Solution:-**

$$\left(2a - \frac{1}{a}\right)^2 = (2a)^2 + \left(\frac{1}{a}\right)^2 - 2 \times 2a \times \frac{1}{a} = 4a^2 + \frac{1}{a^2} - 4$$

(v)  $x-2y+1$

**Solution:-**

$$(x - 2y + 1)^2 = (x)^2 + (-2y)^2 + (1)^2 + 2 \times x \times (-2y) + 2 \times (-2y) \times 1 + 2 \times 1 \times x \\ = x^2 + 4y^2 + 1 - 4xy - 4y + 2x$$

(vi)  $3a-2b-5c$

**Solution:-**

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

(vii)  $\left(2x + \frac{1}{x} + 1\right)$

**Solution:-**

$$\left(2x + \frac{1}{x} + 1\right)^2 = (2x)^2 + \left(\frac{1}{x}\right)^2 + (1)^2 + 2 \times 2x \times \frac{1}{x} + 2 \times \frac{1}{x} \times 1 + 2 \times 1 \times 2x \\ = 4x^2 + \frac{1}{x^2} + 1 + 4 + \frac{2}{x} + 4x = 4x^2 + \frac{1}{x^2} + 5 + \frac{2}{x} + 4x$$

(viii)  $\left(5 - x + \frac{2}{x}\right)$

**Solution:-**

$$\begin{aligned}(5 - x + \frac{2}{x})^2 &= (5)^2 + (-x)^2 + (\frac{2}{x})^2 + 2 \times 5 \times (-x) + 2(-x) \times \frac{2}{x} + 2 \times \frac{2}{x} \times 5 \\&= 25 + x^2 + \frac{4}{x^2} - 10x - 4 + \frac{20}{x} = 21 + x^2 + \frac{4}{x^2} - 10x + \frac{20}{x}\end{aligned}$$

(ix)  $2x-3y+z$

**Solution:-**

$$\begin{aligned}(2x - 3y + z)^2 &= (2x)^2 + (-3y)^2 + (z)^2 + 2 \times 2xx (-3y + 2(-3y) \times z + 2 \times z \times 2x \\&= 4x^2 + 9y^2 + z^2 - 12xy - 6yz + 4zx\end{aligned}$$

(x)  $(x + \frac{1}{x} - 1)$

**Solution:-**

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

**Question 3.**

**Evaluate:**

Using expansion of  $(a + b)^2$  or  $(a - b)^2$

(i)  $(208)^2$

**Solution:-**

$$= (200 + 8)^2 = (200)^2 + (8)^2 + 2(200)(8) = 40000 + 64 + 3200 = 43264$$

(ii)  $(92)^2$

**Solution:-**

$$\begin{aligned}&= (100 - 8)^2 = (100)^2 + (8)^2 - 2(100)(8) \\&= 10000 + 64 - 1600 = 8464\end{aligned}$$

(iii)  $(415)^2$

**Solution:-**

$$(400 + 15)^2 = (400)^2 + (15)^2 + 2(400)(15) = 160000 + 225 + 12000 = 172225$$

(iv)  $(188)^2$

**Solution:-**

$$\begin{aligned}(200 - 12)^2 &= (200)^2 + (12)^2 - 2(200)(12) = 40000 + 144 - 4800 \\&= 35344\end{aligned}$$

(v)  $(9.4)^2$

**Solution:-**



$$= (10 - .6)^2 = (10)^2 + (.6)^2 - 2(10)(.6) = 100 + .36 - 12$$

$$= 88 + .36 = 88.36$$

(vi)  $(20.7)^2$

**Solution:-**

$$= (20 + .7)^2 = (20)^2 + (.7)^2 + 2(20)(.7)$$

$$= 400 + .49 + 28 = 428 + .49 = 428.49$$

**Question 4.**

**Expand:**

(i)  $(2a + b)^3$

**Solution:-**

$$= (2a)^3 + (b)^3 + 3 \times 2a \times b(2a + b) [(a + b)^3 = a^3 + b^3 + 3ab(a + b)] = 8a^3 + b^3 + 6ab(2a + b)$$

$$= 8a^3 + b^3 + 12a^2b + 6ab^2$$

(ii)  $(a - 2b)^3$

**Solution:-**

$$= (a)^3 - (2b)^3 - 3 \times a \times 2b(a - 2b) [(a - b)^3 = a^3 - b^3 - 3ab(a - b)] = a^3 - 8b^3 - 6ab(a - 2b)$$

$$= a^3 - 8b^3 - 6a^2b + 12ab^2$$

(iii)  $(3x - 2y)^3$

**Solution:-**

$$= (3x)^3 - (2y)^3 - 3 \times 3x \times 2y(3x - 2y) = 27x^3 - 8y^3 - 18xy(3x - 2y)$$

$$= 27x^3 - 8y^3 - 54x^2y + 36xy^2$$

(iv)  $(x + 5y)^3$

**Solution:-**

$$= (x)^3 + (5y)^3 + 3 \times x \times 5y(x + 5y) = x^3 + 125y^3 + 15xy(x + 5y)$$

$$= x^3 + 125y^3 + 15x^2y + 75y^2$$

(v)  $\left(a + \frac{1}{a}\right)^3$

**Solution:-**

$$= a^3 + \left(\frac{1}{a}\right)^3 + 3 \times a \times \frac{1}{a} \times \left(a + \frac{1}{a}\right) = a^3 + \frac{1}{a^3} + 3 \left(a + \frac{1}{a}\right) = a^3 + \frac{1}{a^3} + 3a + \frac{3}{a}$$

(vi)  $\left(2a - \frac{1}{2a}\right)^3$

**Solution:-**

$$= (2a)^3 - \left(\frac{1}{2a}\right)^3 - 3 \times 2a \times \frac{1}{2a} \left(2a - \frac{1}{2a}\right) = 8a^3 - \frac{1}{8a^3} - 3 \left(2a - \frac{1}{2a}\right) = 8a^3 - \frac{1}{8a^3} - 6a + \frac{3}{2a}$$

Question 5.

Find the cube of:

(i)  $a+2$

**Solution:-**

$$(a+2)^3 = (a)^3 + (2)^3 + 3 \times a \times 2(a+2) = a^3 + 8 + 6a(a+2) = a^3 + 8 + 6a^2 + 12a$$

$$= a^3 + 6a^2 + 12a + 8$$

(ii)  $2a-1$

**Solution:-**

$$(2a-1)^3 = (2a)^3 - (1)^3 - 3 \times 2a \times 1(2a-1) = 8a^3 - 1 - 6a(2a-1) = 8a^3 - 1 - 12a^2 + 6a$$

$$= 8a^3 - 12a^2 + 6a - 1$$

(iii)  $2a+3b$

**Solution:-**

$$(2a+3b)^3 = (2a)^3 + (3b)^3 + 3 \times 2a \times 3b$$

$$(2a+3b)^3$$

$$= 8a^3 + 27b^3 + 18ab(2a+3b) = 8a^3 + 27b^3 + 36a^2b + 54ab^2 = 8a^3 + 36a^2b + 54ab^2 + 27b^3$$

(iv)  $3b-2a$

**Solution:-**

$$(3b-2a)^3 = (3b)^3 - (2a)^3 - 3 \times 3b \times 2a(3b-2a) = 27b^3 - 8a^3 - 18ab(3b-2a)$$

$$= 27b^3 - 8a^3 - 54ab^2 + 36a^2b = 27b^3 - 8a^3 - 54ab^2 + 36a^2b = 27b^3 - 54b^2a + 36ba^2 - 8a^3$$

(v)  $\left(2x + \frac{1}{x}\right)^3$

**Solution:-**

$$\left(2x + \frac{1}{x}\right)^3 = (2x)^3 + \left(\frac{1}{x}\right)^3 + 3 \times 2x \times \frac{1}{x} \left(2x + \frac{1}{x}\right) = 8x^3 + \frac{1}{x^3} + 6 \left(2x + \frac{1}{x}\right)$$

$$= 8x^3 + \frac{1}{x^3} + 12x + \frac{6}{x} = 8x^3 + 12x + \frac{6}{x} + \frac{1}{x^3}$$

(vi)  $\left(x - \frac{1}{2}\right)^3$

**Solution:-**

$$\left(x - \frac{1}{2}\right)^3 = (x)^3 - \left(\frac{1}{2}\right)^3 - 3 \times x \times \frac{1}{2} \left(x - \frac{1}{2}\right) = x^3 - \frac{1}{8} - \frac{3x}{2} \left(x - \frac{1}{2}\right) = x^3 - \frac{1}{8} - \frac{3x^2}{2} + \frac{3x}{4}$$

$$= x^3 - \frac{3x^2}{2} + \frac{3x}{4} - \frac{1}{8}$$

**EXERCISE 12C****Question:1**

If  $a+b=5$  and  $ab=6$ ; find  $(a^2 + b^2)$

**Solution:-**

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

$$\Rightarrow (5)^2 = a^2 + b^2 + 2 \times 6$$

$$\Rightarrow 25 = a^2 + b^2 + 12$$

$$\Rightarrow 25 - 12 = a^2 + b^2$$

$$\Rightarrow 13 = a^2 + b^2$$

$$\therefore a^2 + b^2 = 13$$

**Question:2**

If  $a-b=6$  and  $ab=16$ ; find  $(a^2 + b^2)$

**Solution:**

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

$$\Rightarrow (6)^2 = a^2 + b^2 - 2 \times 16$$

$$\Rightarrow 36 = a^2 + b^2 - 32$$

$$\Rightarrow 36 + 32 = a^2 + b^2$$

$$\Rightarrow 68 = a^2 + b^2$$

$$\therefore a^2 + b^2 = 68$$

**Question:3**

If  $(a^2 + b^2) = 29$  and  $ab = 10$ ; find :

(i)  $a+b$

**Solution:-**

$$(a + b)^2 = 29 + 2 \times 10$$

$$\Rightarrow (a + b)^2 = 29 + 20$$

$$\Rightarrow (a + b)^2 = 49$$

$$\Rightarrow a + b = \sqrt{49}$$

$$\Rightarrow a + b = 7$$

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

(ii)  $a - b$

$$\Rightarrow (a - b)^2 = 29 - 2 \times 10$$

$$\Rightarrow (a - b)^2 = 29 - 20$$

$$\Rightarrow (a - b)^2 = 9$$

$$\Rightarrow a - b = \sqrt{9}$$

$$\Rightarrow a - b = 3$$

**Question:4**

If  $(a^2 + b^2) = 10$  and  $ab = 3$ ; find

(i)  $a - b$

**Solution:-**

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

$$\Rightarrow (a - b)^2 = 10 - 2 \times 3$$

$$\Rightarrow (a - b)^2 = 10 - 6$$

$$\Rightarrow (a - b)^2 = 4$$

$$\Rightarrow (a - b) = \sqrt{4} \Rightarrow a - b = 2$$

(ii)  $a + b$

**Solution:-**

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

$$\Rightarrow (a + b)^2 = 10 + 2 \times 3$$

$$\Rightarrow (a + b)^2 = 10 + 6$$

$$\Rightarrow (a + b)^2 = 16$$

$$m(a + b) = \sqrt{16}$$
$$\Rightarrow (a+b)=4$$

**Question:5**

If  $(a + \frac{1}{a}) = 3$ ; find  $a^2 + \frac{1}{a^2}$

**Solution:-**

$$(a + \frac{1}{a})^2 = a^2 + \frac{1}{a^2} + 2$$

$$\Rightarrow (3)^2 = a^2 + \frac{1}{a^2} + 2$$

$$\Rightarrow 9 = a^2 + \frac{1}{a^2} + 2$$

$$\Rightarrow 7 = a^2 + \frac{1}{a^2}$$

$$\therefore a^2 + \frac{1}{a^2} = 7$$

**Alternative Method:**

$$a + \frac{1}{a} = 3$$

$$\Rightarrow (a + \frac{1}{a})^2 = (3)^2$$

$$\Rightarrow a^2 + \frac{1}{a^2} + 2 = 9$$

$$\Rightarrow a^2 + \frac{1}{a^2} = 9 - 2$$

$$\Rightarrow a^2 + \frac{1}{a^2} = 7$$