Chapter # 8

FORMULA AND FACTORS

EXERCISE 8.1

Simplify the following expressions:

(The first questions should be done orally)

Q.1 $m(a+b)$

Solution:

$$m(a+b)$$
$$= ma+mb \qquad \textbf{Ans}$$

Q.2 $x(a+x)$

Solution:

$$x(a+x)$$
$$= xa+x^2 \qquad \textbf{Ans}$$

Q.3 $b(b-d)$

Solution:

$$b(b-d)$$
$$= b^2-bd \qquad \textbf{Ans}$$

Q.4 $7(3a-4b)$

Solution:

$$7(3a-4b)$$
$$= 21a-28b \qquad \textbf{Ans}$$

Q.5 $4a(2a-3b+4c)$

Solution:

$$4a(2a-3b+4c)$$
$$= 8a^2-12ab+16ac \qquad \textbf{Ans}$$

Q.6 $3x(xy-yz-zx)$

Solution:

$$3x(xy-yz-zx)$$
$$= 3x^2y-3xyz-3x^2z \quad \textbf{Ans}$$

Q.7 $5a(2a^2-5a+1)$

Solution:

$$5a(2a^2-5a+1)$$
$$= 10a^2-25a^2+5a \quad \textbf{Ans}$$

Q.8 $x^2(3y-2z-4x^3)$

Solution:

$$x^2(3y-2z-4x^3)$$
$$= 3x^2y-2x^2z-4x^2 \quad \textbf{Ans}$$

Q.9 $-4(3p-2q+4r)$

Solution:

$$-4(3p-2q+4r)$$
$$= -12p+8q-16r \quad \textbf{Ans}$$

Q.10 $-5ab(a^2b+2ab^2-3c)$

Solution:

$$-5ab(a^2b+2ab^2-3c)$$
$$= -5a^3b^2-10a^2b^3+15abc \quad \textbf{Ans}$$

Q.11 $a(a+b)+c(a+b)$

Solution:

$$a(a+b)+c(a+b)$$
$$= a^2+ab+ac+bc \quad \textbf{Ans}$$

Q.12 $d(m+n)+n(c-d)$

Solution:

$$d(m+n)+n(c-d)$$
$$= dm+dn+nc-nd$$
$$= dm+nc \quad \textbf{Ans}$$

Q.13 $ab(bc-cd)-ac(b^2+bd)$

Solution:

$$ab(bc-cd)-ac(b^2+bd)$$
$$= ab^2c-abcd-ab^2c-abcd \text{ Ans}$$
$$= -2abcd \quad \textbf{Ans}$$

Q.14 $x(x+y)-1(x+y)$

Solution:

$$x(x+y)-1(x+y)$$
$$= x^2+xy-x-y \quad \textbf{Ans}$$

Q.15 $lm(l+m)-1(l-m)$

Solution:

$$lm(l+m)-1(l-m)$$
$$= l^2m+lm^2-l+m \quad \textbf{Ans}$$

Q.16 $abc(ab^2c+abc^2+a^2bc)$

Solution:

$$abc(cb^2c+abc^2+a^2bc)$$
$$= a^2b^2c^2+a^2b^2c^3+a^3b^2c^2 \quad Ans$$

Q.17 $3xyz(x^2yz+xy^2z-xyz^2)$

Solution:

$$3xyz(x^2yz+xy^2z-xyz^2)$$
$$= 3x^3y^2z^2+3x^2y^3z^2-3x^2y^2z^3 \quad \textbf{Ans}$$

Q.18 $-4a^2k(5akc-3ak^2+2kb)$

Solution:

$$-4a^2k(5aKc-3aK^2+2Kb)$$
$$= -20a^3K^2c+12a^3K^3-8a^2K^2b \quad \textbf{Ans}$$

Q.19 $x^n(a^n+b^n-c^n)$

Solution:

$$x^n(a^n+b^n-c^n)$$
$$= x^n a^n + x^n b^n - x^n c^n) \qquad \textit{Ans}$$

Q.20 $a^m(a^m-b^n+c^m)$

Solution:

$$a^m(a^m-b^n+c^m)$$
$$= a^{m+m} - a^m b^n + a^m c^m$$
$$= a^{2m} - a^m b^n + a^m c^m \qquad \textit{Ans}$$



EXERCISE 8.2

Factorise (the first ten questions should be answered orally).

Q.1 $ab + bc$

Solution:

$$ab+ac$$
$$= b(a+c)$$ ***Ans***

Q.2 $bx + xy$

Solution:

$$bx + xy$$
$$= x(b + y)$$ ***Ans***

Q.3 a^2+2a

Solution:

$$a^2+2a$$
$$= a(a+b)$$ ***Ans***

Q.4 $xy+y^2$

Solution:

$$xy+y^2$$
$$= y(x+y)$$ ***Ans***

Q.5 $ax+x^2$

Solution:

$$ax+x^2$$
$$= x(a+x)$$ ***Ans***

Q.6 $15x^2+10xy$

Solution:

$$15x^2+10xy$$
$$= 5x(3x + 2y)$$ ***Ans***

Q.7 $-4c-16$

Solution:

$$-4c-16$$
$$= -4(c+4) \quad \textbf{Ans}$$

Q.8 $12x^2+24x$

Solution:

$$12x^2+24x$$
$$= 12x(x+2) \quad \textbf{Ans}$$

Q.9 $2x^2-2x$

Solution:

$$2x^2-2x$$
$$= 2x(x+1) \quad \textbf{Ans}$$

Q.10 $xy+yz-y^2$

Solution:

$$xy+yz-y^2$$
$$= y(x+z-y) \quad \textbf{Ans}$$

Q.11 $4ab-8ca-6ax$

Solution:

$$4ab-8ca-6ax$$
$$= 2a(2b-4c-3x) \quad \textbf{Ans}$$

Q.12 $6x^2yz+9xy^2z+12xyz^2$

Solution:

$$6x^2yz+9xy^2z+12xyz^2$$
$$= 3xyz(2x+3y+4z) \quad \textbf{Ans}$$

Q.13 $5x^3y+15x^2y^2-5xy$

Solution:

$$5x^2y+15x^2y^2-5xy$$
$$= 5xy(x^2+3xy-1) \quad \textbf{Ans}$$

Q.14 $x(p+q)+y(p+q)$

Solution:

$$x(p+q)+y(p+q)$$
$$= (p+q)(x+y) \quad \textbf{Ans}$$

Q.15 $ab(b-c)+bc(b-c)+ca(b-c)$

Solution:

$$ab(b-c)+bc(b-c)+ca(b-c)$$
$$= (b-c)(ab+bc+ca) \quad \textbf{Ans}$$

Q.16 $ac+bc+ax+bc$

Solution:

$$ac+bc+ax+bc$$
$$c(a+b)\ (a+b)$$
$$= (a+b)\ (c+x) \quad \textbf{Ans}$$

Q.17 $ax+ay-4x-4y$

Solution:

$$ax+ay-4x-4y$$
$$= a(x+y)-4(x+y)$$
$$(x+y)\ (a-4) \quad \textbf{Ans}$$

Q.18 $ab+a+bc+c$

Solution:

$$ab+a+bc+c$$
$$= (b+1)+c(b+1)$$
$$(b+1)(a+c) \quad \textbf{Ans}$$

Q.19 $ab+cd+bc+ad$

Solution:

$$ab+cd+bc+ad$$
$$= ab+ad+cd+bc$$

$= a(b+d)+c(d+b)$ (as $b+d=d+b$)

$(b+d)(a+c)$ **Ans**

Q.20 $ab+xy+by+xa$

Solution:

$ab+xy+by+xa$

$= ab+by + xa+xy$

$= b(a+y)+x(a+y)$

$= (b+y)(b+x)$ **Ans**

Q.21 $3a^2+5bc-5ab-3ac$

Solution:

$3a^2+5bc-5ab-3ac$

$= 3a2-5ab-3ac+5bc$

$= a(3a-5b)-c(3a-5b)$

$= (3a-5b)(a-c)$ **Ans**

Q.22 $4x-ay^2+4y-axy$

Solution:

$4x-ay^2+4y-axy$

$= 4x-axy + 4y-ay^2$

$= x(4-ay)+y(4-ay)$

$= (4-ay)(x+y)$ **Ans**

Q.23 $1+a+b+ab$

Solution:

$1+a + b+ab$

$= 1(1+a)+b(1+a)$

$= (1+a)(1+b)$ **Ans**

Q.24 $a^xb^x+b^{2x}+b^{x+y}$

Solution:

$a^xb^x+b^{2x}+b^{x+y}$

$= b^x(a^x+b^x+b^y)$ **Ans**

Q.25 ***Evaluate by using suitable formula?***

(i) $35\times37+35\times3$

Solution:

$$35\times37+35\times3$$
$$= 35(37+3)$$
$$= 35+40$$
$$= 1400 \quad \textbf{Ans}$$

(ii) $47\times21-47\times16$

Solution:

$$47\times21-47\times16$$
$$= 47(21-16)$$
$$= 47\times5$$
$$= 235 \quad \textbf{Ans}$$

(iii) $58\times71+17\times42$

Solution:

$$58\times71+17\times42$$
$$= 17\times2\times29+17\times2\times21$$
$$= 17\times2(29+21)$$
$$= 34\times50$$
$$= 1700 \quad \textbf{Ans}$$

(iv) $3.69\times63+3.69\times37$

Solution:

$$3.69\times63+3.69\times37$$
$$= 3.69(63+37)$$
$$= 3.69\times100$$
$$= 369 \quad \textbf{Ans}$$

EXERCISE 8.3

Q.1 Fill in the empty farmes to get true sentences. (Answer orally)?

(i) $(3x+5y)^2=\Delta^2+2\Delta\square+\square^2$

Solution:

$(3x+5y)^2$

$= (3x)^2+2(3x)(5y)+(5y)^2$

Ans $\therefore\ \Delta = 3x$

$\square = 5y$

(ii) $(3x-4y)^2=\Delta^2+2\Delta\square+\square^2$

Solution:

$(3x-4y)^2$

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

Ans $\therefore\ \Delta = 3x$

$\square = 4y$

(iii) $(ab-c)^2=ab^2\ \ 2\Delta c-\square^2$

Solution:

$(ab-c)^2$

$= (ab)^2-2(ab)(c)+(c)^2$

Ans $\therefore\ \Delta = ab$

$\square = c$

(iv) $(3x-\square)^2=(3x)^2-2\Delta y+\square^2$

Solution:

Since $(3x-y)^2$

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

Ans $\therefore\ \Delta = 3x$

$\square = y$

(v) $(m-1/m)^2=m^2-2\Delta\square+(1/m)^2$

Solution:

$$(m-1/m)^2$$
$$= (m)^2-2(m)(1/m)+(1/m)^2$$

Ans $\therefore\ \Delta = m$

$\square = 1/m$

Find the squares of the given expressions? (Questions No. 2 to 10 should be done orally)?

Q.2 $p+q$

Solution:

$$(p+q)^2$$
$$= p^2+2pq+q^2 \qquad \textbf{Ans}$$

Q.3 $a+4$

Solution:

$$(a+4)^2$$
$$= a^2+8a+16 \qquad \textbf{Ans}$$

Q.4 $b-5$

Solution:

$$(b-5)^2$$
$$= b^2-10b+25 \qquad \textbf{Ans}$$

Q.5 $6-c$

Solution:

$$(a-c)^2=(6)^2+2(6)(c)+c^2$$
$$= 36-12c+c^2 \qquad \textbf{Ans}$$

Q.6 $2a+3b$

Solution:

$$(2a+3b)^2$$
$$= 4a^2+12ab+9b^2 \qquad \textbf{Ans}$$

Q.7 $3x-y$

Solution:

$$(3x-y)^2$$
$$= 9x+6y+y^2 \qquad \textbf{Ans}$$

Q.8 $7+2y$

Solution:

$$(7+2y)^2$$
$$= 49 + 28y + 4y^2 \qquad \textbf{Ans}$$

Q.9 $x-(1/x)$

Solution:

$$x-(1/x)^2$$
$$= x^2-2\times x\times 1/x+(1/x)^2$$
$$= x^2 - 2x\frac{1}{x} + \frac{1}{x^2}$$
$$= x^2 - 2 + \frac{1}{x^2} \qquad \textbf{Ans}$$

Q.10 $y+1/y$

Solution:

$$(y-1/y)^2$$
$$= y^2+2 \times y \times 1/y + (1/y)^2$$
$$= y^2 + 2 + (1/y)^2 \qquad \textbf{Ans}$$

Q.11 $4c+\frac{1}{2}$

Solution:

$$(4c+\frac{1}{2})^2$$
$$= (4c)^2+2\times 4c + \frac{1}{2} + \left(\frac{1}{2}\right)^2$$
$$= 16c^2 + 4c + \frac{1}{4} \qquad \textbf{Ans}$$

Q.12 $2x - 3y$

Solution:

$$(2x + 3y)^2$$
$$= (2x)^2 - 12(2x)(3y) + (3y)^2$$
$$= 4x^2 - 12xy + 9y^2 \quad \textbf{Ans}$$

Q.13 $2x - 1/x$

Solution:

$$(2x - 1/x)^2$$
$$= (2x)^2 - 2 \times 2 \times x \times 1 \times + (1/x)^2$$
$$= 4x^2 - 4 + \frac{1}{x^2} \quad \textbf{Ans}$$

Q.14 $a - \frac{1}{2a}$

Solution:

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

Q.15 $x^m + y^m$

Solution:

$$(x^m + y^m)^2$$
$$= x^{2m} + 2\,x^m y^m + y^{2m} \quad \textbf{Ans}$$

What should be added or subtracted to make the given expression a perfect square?

Q.16 a^2+9

Solution:

$$a^2+9$$
$$= (a)^2 \pm 2\times 3\times a+(3)^2$$

or 6a may be added or subtracted. ***Ans***

Q.17 $y^2+\frac{1}{4}$

Solution:

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

i.e y to be added or subtracted. ***Ans***

Q.18 x^4+4

Solution:

$$x^4+4$$
$$= (x^2)^2+(2)^2 \pm 2\times 2\times x$$

i.e y may be added to extracted. ***Ans***

Q.19 $a+2ca$

Solution:

$$a+2ca$$
$$= (a)^2+2(a)(c)$$

i.e c^2 may be added ***Ans***

Q.20 $4a^2+4ab$

Solution:

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

$\therefore$ b^2 may be added. ***Ans***

EXERCISE 8.4

Q.1 $(101)^2$

Solution:

$$(101)^2$$
$$= (100 + 1)$$
$$= (100)^2 + 2(100)(1) + (1)^2$$
$$= 10000 + 200 + 1$$
$$= 10201 \quad \textbf{Ans}$$

Q.2 $(403)^2$

Solution:

$$(403)^2$$
$$(400 + 3)^2$$
$$= (400)^2 + 2(400)(3) + (3)^2$$
$$= 160000 + 2400 + 9$$
$$= 162409 \quad \textbf{Ans}$$

Q.3 $(495)^2$

Solution:

$$(495)^2$$
$$(400-5)^2$$
$$= (500)^2-2(500)(5)+(5)^2$$
$$= 250000-5000+25$$
$$= 245025 \quad \textbf{Ans}$$

Q.4 $(688)^2$

Solution:

$$(688)^2$$
$$(700 - 12)^2$$
$$= (490000)^2 - 2(700)(12) + (12)^2$$
$$= 490000 + 16800 + 144$$

$= 490000 + 144 - 16800$

$490144 - 16800 = 473344$ **Ans**

Find the value of a^2+b^2 when

Q.5 $a + b = 5$ *and* $ab = 6$

Solution:

$a + b = 5$

$(a + b)^2 = (5)^2$ (squaring both the sides)

$a^2 + 2ab + b^2 = 25$

$a^2 + 2(6) + 6^2 = 25$ (putting the values of ab)

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

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

$a^2 + b^2 = 13$ **Ans**

Q.6 $a - b = 7$, $ab = 18$

Solution:

$a - b = 7$

$(a - b)^2 = (7)^2$ (squaring both the sides)

or $a^2 - 2ab + b^2 = 49$

or $a^2 - 2(18) + b^2 = 49$ (putting the values of ab)

or $a^2 - 36 + b^2 = 49$

or $a^2 + b^2 = 49 + 36$

or $a^2 + b^2 = 85$ **Ans**

Q.7 $a + b = 6$, $ab = -16$

Solution:

$a + b = 6$

$(a + b)^2 = (6)^2$ (squaring both the sides)

or $a^2 + 2ab + b^2 = 36$

or $a^2 + 2(-16) + b^2 = 36$ (putting the values of ab)

or $a^2 - 32 + b^2 = 36$

or $a^2 + b^2 = 36 + 32$

or $a^2 + b^2 = 68$ **Ans**

Q.8 $a - b = 1, \quad ab = 20$

Solution:

$a - b = 1$

or $(a-b)^2 = (1)^2$ (squaring both the sides)

or $a^2 - 2ab + b^2 = 1$

or $a^2 - 2(20) + b^2 = 1$ (putting the values of ab)

or $a^2 - 40 + b^2 = 1$

or $a^2 + b^2 = 1 + 40$

or $a^2 + b^2 = 41$ ***Ans***

Find the value of $x^2 - y^2$ when?

Q.9 $x + y = 14, \; xy = 40$

Solution:

$x + y = 14$

$(x + yy)^2 = (14)^2$ (squaring both the sides)

or $x^2 + 2xy + y^2 = 196$

or $x^2 + 2(40) + y^2 = 196$ (putting the values of ab)

or $x^2 + 80 + y^2 = 196$

or $x^2 + y^2 = 196 - 80$

$x^2 + y^2 = 116$ ***Ans***

Q.10 $x - y = -4, \; xy = 21$

Solution:

$x - y = -4$

or $(x-y)^2 = (-4)^2$ (squaring both the sides)

or $x^2 - 2xy + y^2 = 16$

or $x^2 - 2 \times 21 + y^2 = 16$ (putting the values of ab)

or $x^2 - 4 + y^2 = 16$

or $x^2 + y^2 = 16 + 42$

or $x^2 + y^2 = 58$ ***Ans***

Find the value of $x^2 + \frac{1}{x^2}$ ***when?***

Q.11 $x + \frac{1}{x} = 5$

Solution:

$$x + \frac{1}{x} = 5$$

or $(x + 1/x)^2 = (5)^2$

or $x^2 + \frac{1}{x^2} + 2 = 25$ (squaring both the sides)

or $x^2 + \frac{1}{x^2} = 25 - 2 = 23$ Ans

Q.12 $x-1/x=7$

Solution:

$$x-1/x=7$$

or $(x-1/x)^2=(7)^2$

or $x^2 + \frac{1}{x^2} - 2 = 49$

or $x^2 + \frac{1}{x^2} = 49 + 2$

or $x^2 + \frac{1}{x^2} = 51$ ***Ans***

Q.13 $x+1/x=3$

Solution:

$$x+1/x=3$$

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

$$x^2 + \frac{1}{x^2} + 2 = 9$$

$$x^2 + \frac{1}{x^2} + 9 - 2$$

$$x^2 + \frac{1}{x^2} = 7$$ ***Ans***

Q.14 $x-1/x=m$

Solution:

$$x-1/x = m$$

or $(x-1/x)^2=(m)^2$

or $x^2+\frac{1}{x^2}-2=m^2$

or $x^2+\frac{1}{x^2}=m^2+2$ **Ans**

Find the value of $x^4+\frac{1}{x^4}$, **when?**

Q.15 $x+1/x=4$

Solution:

$x+1/x=4$

$(x+1/x)^2=(4)^2$

$x^2+\frac{1}{x^2}+2=16$

$x^2+\frac{1}{x^2}=16-2$

$(x^2+\frac{1}{x^2})^2=(14)^2$

$x^4+\frac{1}{x^4}+2=196$

$x^4+\frac{1}{x^4}=196-2$

$x^4+\frac{1}{x^4}=194$ **Ans**

Q.16

$x-1/x=1$

Solution:

$x-1/x=1$

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

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

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

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

$$x^4 + \frac{1}{x^4} + 2 = 9$$

$$x^4 + \frac{1}{x^4} = 9 - 2$$

$$x^4 + \frac{1}{x^4} = 7 \qquad \textbf{Ans}$$

Q.17 Find the value of:

$a^2/b^2 + b^2/a^2$ when $a/b + b/a = 6$

Solution:

$a/b + b/a = 6$

or $(a/b + b/a)^2 = (6)^2$

$a^2/b^2 + b^2/a^2 + 2 = 36$

$a^2/b^2 + b^2/a^2 = 36 - 2$

$a^2/b^2 + b^2/a^2 = 34$ **Ans**

Q.18 If $x/y - y/x = 3$, show that $x^2/y^2 + y^2/x^2 = 11$

Solution:

$x/y - y/x = 3$

or $(x/y - y/x)^2 = (3)^2$

or $x^2/y^2 + y^2/x^2 - 2 = 9$

or $x^2/y^2 + y^2/x^2 = 9 + 2$

or $x^2/y^2 + y^2/x^2 = 11$ **Proved**

Q.19 Find the value of $4a^2 + 1/a^2$ when $2a - 1/a = 4$

Solution:

$2a - 1/a = 4$

or $(2a - 1/a)^2 = (4)^2$

or $4a^2 + 1/a^2 - 4 = 16$

or $4a^2 + 1/a^2 = 16 + 4$

or $4a^2 + 1/a^2 = 20$ **Ans**

Q.20 Find the value of:

$$x^2 = \frac{1}{4x^2} \text{ when } x - \frac{1}{2x} = 5$$

Solution:

$x - 1/2x = 5$

or $(x - 1/2x)^2 = (5)^2$

or $x^2 + 1/4x^2 - 1 = 25$

or $x^2 + 1/4x^2 = 25 + 1$

or $x^2 + 1/4x^2 = 26$ **Ans**



EXERCISE 8.5

Factorise. (First five questins to be answered orally):

Q.1 $x^2 + 2xy + y^2$

Solution:

$$x^2 + 2xy + y^2$$
$$= (x)^2 + 2(x)(y) - (y)^2$$
$$= (x + y)^2 \quad \textit{Ans}$$

Q.2 $p^2 - 2pq + q^2$

Solution:

$$p^2 - 2pq + q^2$$
$$= (p)^2 + 2(p)(q) + (q)^2$$
$$= (p + q)^2 \quad \textit{Ans}$$

Q.3 $4x^2 + 4xy + y^2$

Solution:

$$4x^2 + 2xy + y^2$$
$$= (2x)^2 + 2 \times (2x)(y) + (y)^2$$
$$= (2x + y)^2 \quad \textit{Ans}$$

Q.4 $9x^2 - 12xy + 4y^2$

Solution:

$$9x^2 - 12xy + 4y^2$$
$$= (3x)^2 - 2(3x)(2y) + (2y)^2$$
$$= (3x + 2y)^2 \quad \textit{Ans}$$

Q.5 $25a^2 - 20ab + 4b^2$

Solution:

$$25a^2 - 20ab + 4b^2$$
$$= (5a)^2 - 2(5a)(2b) + (2b)^2$$
$$= (5a + 2b)^2 \quad \textit{Ans}$$

Q.6 $25 - 10c + c^2$

Solution:

$$25 - 10c + c^2$$
$$= (5)^2 - 2(5)(c) + (c)^2$$
$$= (5 - c)^2 \quad \text{Ans}$$

Q.7 $n^2 + 8n + 16$

Solution:

$$n^2 + 8n + 16$$
$$= (n)^2 + 2(n)(4) + (4)^2$$
$$= (n + 4)^2 \quad \text{Ans}$$

Q.8 $36x^2 + 60xy + 25y^2$

Solution:

$$36x^2 + 60xy + 25y^2$$
$$= (6x)^2 + 2(6x)(5y) + (5y)^2$$
$$= (6x + 5y)^2 \quad \text{Ans}$$

Q.9 $a^4 - 6a^2b^2 + 9b^2$

Solution:

$$a^4 - 6a^2b^2 + 9b^2$$
$$= (a^2)^2 - 2(a^2)(3b^2) + (3b^2)^2$$
$$= (a^2 - 3b^2)^2 \quad \text{Ans}$$

Q.10 $25x^4y^4 - 10x^2y^2 + 1$

Solution:

$$25x^4y^4 - 10x^2y^2 + 1$$
$$= (5x^2y^2)^2 - 2(5x^2y^2)(1) + (1)^2$$
$$= (5x^2y^2 - 1)^2 \quad \text{Ans}$$

Q.11 $x^{2n} + 2x^ny^n + y^{2n}$

Solution:

$$x^{2n} + 2x^ny^n + y^{2n}$$
$$= (x^n)^2 + 2(x^n)(y^n) + (y^n)^2$$
$$= (x^n + y^n)^2 \quad \text{Ans}$$

Evaluate with the help of formula?

Q.12 $6.8^2 + 2 \times 6.8 \times 3.2 + 3.2^2$

Solution:

$$6.8^2 + 2 \times 6.8 \times 3.2 + 3.2^2$$
$$= (6.8 + 3.2)^2$$
$$= (10)^2$$
$$= 1000 \quad \textbf{Ans}$$

Q.13 $(535)^2 - 2(535)(485) + (485)^2$

Solution:

$$(535)^2 - 2(535)(485) + (485)^2$$
$$= (535 - 485)^2$$
$$= (50)^2$$
$$= 2500 \quad \textbf{Ans}$$

Q.14 $(3.65)^2 + 2(3.65)(2.35) + (2.35)^2$

Solution:

$$(3.65)^2 + 2(3.65)(2.35) + (2.35)^2$$
$$= (3.35 + 2.35)^2$$
$$= (6.00)^2$$
$$= 36 \quad \textbf{Ans}$$

EXERCISE 8.6

Use the formula to simplify (First ten question to b answered orally):

Q.1 $(x + 5)(x - 5)$

Solution:

$(x + 5)(x - 5)$

or $(x)^2 - (5)^2$

or $x^2 - 25$ ***Ans***

Q.2 $(x + a)(x - a)$

Solution:

$(x+a)(x-a)$

or $(x)^2-(a)^2$

or x^2-a^2 ***Ans***

Q.3 $(c + d)(c - d)$

Solution:

$(c+d)(c-d)$

or $(c)^2-(d)^2$

or c^2-d^2 ***Ans***

Q.4 $(x + 1/x)(x - 1/x)$

Solution:

$(x+1/x)(x-1/x)$

or $(x)^2-(1/x)^2$

or x^2-1/x^2 ***Ans***

Q.5 $\left(2a + \frac{1}{2a}\right)\left(2a - \frac{1}{2a}\right)$?

Solution:

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

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

or $4a^2 - \frac{1}{4a^2}$ ***Ans***

Q.6 $(3 + 2a)(3 - 2a)$

Solution:

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

or $(3)^2-(2a)^2$

or $9-4a^2$ ***Ans***

Q.7 $(a^2 + b^2)(a^2 - b^2)$

Solution:

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

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

or a^4-b^4 ***Ans***

Q.8 $(8 + a^2)(8 - a^2)$

Solution:

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

or $(8)^2-(a^2)^2$

or $64-a^4$ ***Ans***

Q.9 $(x + 3/4)(x - 3/4)$

Solution:

$(x + 3/4)(x - 3/4)$

or $(x)^2 - (3/4)^2$

or $x^2 - 9/16$ ***Ans***

Q.10 $(a + b/c)(a - b/c)$

Solution:

$(a + b/c)(a - b/c)$

or $(a)^2 - (b/c)^2$

or $a^2 - b^2/c^2$ ***Ans***

With the help of formula find the continued product:

Q.11 $(m+n)(m-n)(m^2+n^2)$

Solution:

$$(m+n)(m-n)(m^2+n^2)$$
$$= \{(m+n)(m-n)\}(m^2+n^2)$$
$$= \{m^2+n^2\}(m^2+n^2)$$
$$= m^4-n^4 \qquad \textit{Ans}$$

Q.12 $(2-x)(2+x)(4+x^2)$

Solution:

$$(2-x)(2+x)(4+x^2)$$
$$= \{(2-x)(2-x)\}(4+x^2)$$
$$= \{4-x^2\}(4+x^2)$$
$$= 16-x^4 \qquad \textit{Ans}$$

Q.13 $(x-y)(x+y)(x^2+y^2)(x^4+y^4)$

Solution:

$$(x-y)(x+y)(x^2+y^2)(x^4+y^4)$$
$$= (x^2-y^2)(x^2+y^2)(x^4+y^4)$$
$$= (x^4-y^4)(x^4+y^4)$$
$$= x^8-y^8 \qquad \textit{Ans}$$

Q.14 $(x+1)(x^2-1)(x^4+1)(x-1)$

Solution:

$$(x+1)(x^2-1)(x^4+1)(x-1)$$
or $$(x+1)(x-1)(x^2+1)(x^4+1)$$
or $$(x^2-1)(x^2+1)(x^4+1)$$
or $$(x^4-1)(x^4+1)$$
or $$x^8-1 \qquad \textit{Ans}$$

Use an appropriate formula to simplify?

Q.15 $(x^m + y^m)(x^m - y^m)$

Solution:

$(x^m + y^m)(x^m - y^m)$

or $(x^m)^2 - (y^m)^2$

or $x^{2m} - y^{2m}$ ***Ans***

Q.16 $(a^x + b^y)(a^x - b^y)$

Solution:

$(a^x + b^y)(a^x - b^y)$

or $(a^x)^2 - (b^y)^2$

or $a^{2x} - b^{2y}$ ***Ans***

Q.17 $\left(\sqrt{5} + \sqrt{3}\right)\left(\sqrt{5} - \sqrt{3}\right)$

Solution:

$\left(\sqrt{5} + \sqrt{3}\right)\left(\sqrt{5} - \sqrt{3}\right)$

or $(\sqrt{5})^2 - (\sqrt{3})^2$

or $5 - 3$

or 2 ***Ans***

Q.18 $\left(\sqrt{a} + \sqrt{b}\right)\left(\sqrt{a} - \sqrt{b}\right)$

Solution:

$(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$

or $(\sqrt{a})^2 - (\sqrt{b}^2)$

or $a - b$ ***Ans***

Q.19 1025 × 975

Solution:

1025×975

$= (1000 + 25)(1000 - 25)$

$= (1000)^2 - (25)^2$

$= 1000000 - 625$

$= 999375$ **Ans**

Q.20 590 × 610

Solution:

590×610

$= (600 - 10)(600 + 10)$

$= (600)^2 - (10)^2$

$= 36000 - 100$

$= 359900$ **Ans**



EXERCISE 8.7

Factoris: (First ten questions should be answered orally?

Q.1 $p^2 - q^2$

Solution:

$$p^2 - q^2$$
$$= (p)^2 - (q)^2$$
$$= (p - q)(p + q) \quad \textit{Ans}$$

Q.2 $a^2 - (2b)^2$

Solution:

$$a^2 - (2b)^2$$
$$= (a)^2 - (2b)^2$$
$$= (a - 2b)(a + 2b) \quad \textit{Ans}$$

Q.3 $a^2 - 4$

Solution:

$$a^2 - 4$$
$$= (a)^2 - (2)^2$$
$$= (a - 2b)(a + 2) \quad \textit{Ans}$$

Q.4 $x^2 - 9$

Solution:

$$x^2 - 9$$
$$= (x)^2 - (3)^2$$
$$= (x - 3)(x + 3) \quad \textit{Ans}$$

Q.5 $81a^2 - 25b^2$

Solution:

$$81a^2 - 25b^2$$
$$= (9a) - (5b)^2$$
$$= (9a - 5b)(9a + 5b) \quad \textit{Ans}$$

Q.6 $a^2x^2 - 4$

Solution:

$$a^2x^2 - 4$$
$$= (ax)^2 - (2)^2$$
$$= (ax - 2)(ax + 2) \quad \textit{Ans}$$

Q.7 $1 - x^2y^2$

Solution:

$$1^2 - x^2y^2$$
$$= (1)^2 - (xy)^2$$
$$= (1 - xy)(1 + xy) \quad \textit{Ans}$$

Q.8 $a^2b^2 - c^2$

Solution:

$$a^2b^2 - c^2$$
$$= (ab)^2 - (c)^2$$
$$= (ab - c)(ab + c) \quad \textit{Ans}$$

Q.9 $x^2 - \frac{1}{x^2}$

Solution:

$$x^2 - \frac{1}{x^2}$$
$$= (x)^2 - \left(\frac{1}{2}\right)^2$$
$$= \left(x - \frac{1}{2}\right)\left(x + \frac{1}{2}\right) \quad \textit{Ans}$$

Q.10 $a^2 - \frac{1}{a^2}$

Solution:

$$a^2 - \frac{1}{a^2}$$

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

$$= \left(a - \frac{1}{a}\right)\left(a + \frac{1}{a}\right) \quad \textbf{Ans}$$

Q.11 $a^3 - ab^2$

Solution:

$$a^2 - ab^2$$
$$= a(a^2 - b^2)$$
$$= a\{(a)^2 - (b)^2\}$$
$$= a\{(a - b)(a + b)\}$$
$$= a\{(a - b)(a + b) \quad \textbf{Ans}$$

Q.12 $x^2y - xy^2$

Solution:

$$x^2y - xy^2$$
$$= xy\{(x^2 - y^2)\}$$
$$= xy\{(x - y)(x + y)\}$$
$$= xy(x - y)(x + y) \quad \textbf{Ans}$$

Q.13 $27 - 3a^2b^2$

Solution:

$$27 - 3a^2b^2$$
$$= 3\{9x - a^2b^2\}$$
$$= 3\{(2)^2 - (ab)^2\}$$
$$= 3\{(3 - ab)(3 + ab)\}$$
$$= 3\{(3 - ab)(3 + ab)\} \quad \textbf{Ans}$$

Q.14 $a^4 - b^4$

Solution:

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

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

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

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

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

Q.15 $a^4 - 64$

Solution:

$a^4 - 64$

$= (a^2)^2 - (8)^2$

$= (a^2 - 8)(a^2 + 8)$ **Ans**

Q.16 $3x^4 - 48$

Solution:

$3x^4 - 48$

$= 3\{x^4 - 16\}$

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

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

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

$= 3(x + 2)(x - 2)(x^2 + 4)$ **Ans**

Q.17 $16x^5 - x$

Solution:

$16x^5 - x$

$= x\{16x^4 - 1\}$

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

$= x\{(4x^2 - 1)(4x^2 + 1)\}$

$= x\{(2x - 1)(2x + 1)(4x^2 + 1)$

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

Q.18 $(x + y)^2 - z^2$

Solution:

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

$= (x + y - z)(x + y + z)$ **Ans**

Q.19 $(a-by)^2-c^2$

Solution:

$$a-by^2-c^2$$
$$=(a-b-c)(a-b+c)\ \textbf{Ans}$$

Simplify by using appropriate formula:

Q.20 (i) $635\times 635-365\times 365$

Solution:

$$635\times 635-365\times 365$$
$$=(635^2-365)^2$$
$$=(635-365)(635+365)$$
$$=(270)(1000)$$
$$=2700000)\qquad \textbf{Ans}$$

(ii) $\dfrac{0.599\times 0.599-0.401\times 0.401}{0.599-0.401}$

Solution:

$$\frac{0.599\times 0\ 599-0.401\times 0.401}{0.599-0.401}$$
$$=\frac{(0.599)^2-(0.401)^2}{(0.599-0.401)}$$
$$=\frac{(0.599+0.401)(0.599+0.401)}{0.599-0.401}$$
$$=0.599+0.401$$
$$=1\ \textbf{Ans}$$

(iii) $\dfrac{2.36\times 2.36-0.4\times 0.4}{2.36+0.4}$

Solution:

$$\frac{2.36\times 2.36-0.4\times 0.4}{2.36+0.4}$$

$$= \frac{(2.36)^2 - (0.4)^2}{2.36 + 0.4}$$

$$= \frac{(2.36 - 0.4)(2.36 + 0.4)}{2.36 + 0.4}$$

$$= 2.36 - 0.4$$

$$= 2.32 \quad \textbf{Ans}$$

(iv) $\dfrac{4.67 - 3.33}{4.67 \times 4.67 - 3.33 \times 3.33}$

Solution:

$$\frac{4.67 - 3.33}{4.67 \times 4.67 - 3.33 \times 3.33}$$

$$= \frac{4.67 - 3.33}{(4.67)^2 - (3.33)^2}$$

$$= \frac{4.67 - 3.33}{4.67 - 3.33)(4.67 + 3.33)}$$

$$= \frac{1}{4.60 + 3.33}$$

$$= \frac{1}{8.00}$$

$$= 1/8 \qquad \textbf{Ans}$$



EXERCISE 8.8

Factorise:

Q.1 $a^2 + 2ab + b^2 - c^2$

Solution:

$$a^2 + 2ab + b^2 - c^2$$
$$= (a + b)^2 - c^2$$
$$= (a + b + c)(a + b - c) \quad \textbf{Ans}$$

Q.2 $x^2 - 2xy + y^2 - z^2$

Solution:

$$x^2 - 2xy + y^2 - z^2$$
$$= (x - y)^2 - z^2$$
$$= (x - y - z)(x - y + z) \quad \textbf{Ans}$$

Q.3 $a^2 - 2a + 1 - b^2$

Solution:

$$a^2 + 2a + 1 - b^2$$
$$= (a - 1)^2 - b^2 = (a - 1 - b)(a - 1 + b)$$
$$= (a - 1 + b)(a - 1 - b) \quad \textbf{Ans}$$

Q.4 $a^2 - 2ax + b^2 - x^2$

Solution:

$$a^2 - 2ax + b^2 - x^2$$
$$= a - 2ax + x^2 - b^2$$
$$= (a - x + b)(a - x - b) \quad \textbf{Ans}$$

Q.5 $c^2 + 2bc - a^2 + b^2$

Solution:

$$c^2 + 2bc + a^2 + b^2$$
$$= c^2 + 2bc + b^2 - a^2$$
$$= (c + b)^2 - a^2$$
$$= (c + b + a)(c + b - a) \quad \textbf{Ans}$$

Q.6 $1 - a^2 - b^2 + 2ab$

Solution:

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

Q.7 $b^2 - c^2 - a^2 - 2ac$

Solution:

$$\begin{aligned} & b^2 - c^2 - a^2 - 2ac \\ &= b^2 - (c^2 + a^2 + 2ac) \\ &= b^2 + (c + a)^2 \\ &= (a + b + c)(b - c - a) \quad \textbf{Ans} \end{aligned}$$

Q.8 $4a^2 - b^2 + 12ax + 9x^2$

Solution:

$$\begin{aligned} & 4a^2 - b^2 + 12ax + 9x^2 \\ &= 4a^2 + 12ax + 9x^2 \\ &= 2a + 3x^2 - b^2 \\ &= (2a + 3x - b)(2a + 3x + b) \quad \textbf{Ans} \end{aligned}$$

Q.9 $x^4 + 64$

Solution:

$$\begin{aligned} & x^4 + 64 \\ &= (x)^2 + (8)^2 \\ &= (x^2)^2 + 2(x^2)(8) + (8)^2 - 2(x^2)(8) \\ &= x^4 + 16x^2 + 64 - 16x^2 \\ &= (x^2 + 8)^2 - (4x)^2 \\ &= (x^2 - 4x + 8)(x^2 + 4x + 8) \quad \textbf{Ans} \end{aligned}$$

Q.10 $4x^4 + 81$

Solution:

$$\begin{aligned} & 4x^4 + 81 \\ &= (2x^2)^2 + (9)^2 \end{aligned}$$

$= (2x^2)^2 + 2(2x^2)(9) + (9)^2 - 2(2x^2)(9)$

$= (2x^2 + 9)^2 - 36x^2$

$= (2x^2 + 9)^2 - (6x)^2$

$= (2x^2 - 6x + 9)(2x^2 + 6x + 9)$ **Ans**

Q.11 $x^4 + 4y^4$

Solution:

$x^4 + 4y^4$

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

$= x^4 + 4x^2y^2 + 4y^4 - 4x^2y^2$

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

$= (x^2 + 2y^2 - 2xy)(x^2 + 2y^2 + 2xy)$ **Ans**

Q.12 $ax^4 + 4a$

Solution:

$ax^4 + 4a$

$= a\{x^4 + 4\}$

$= a\{(x^2)^2 + 2(x^2)(2) + (2)^2 - 2(x^2)(2)\}$

$= a\{x^2 + 2^2 - 4x^2\}$

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

$= a\{(x^2 + 2 + 2x)(x^2 + 2 - 2x)\}$

$= a(x^2 + 2x + 2)(x^2 - 2x + 2)$ **Ans**

Q.13 $12a^4 + 3b^4$

Solution:

$12a^4 + 3b^4$

$= 3\{4a^4 + b^4\}$

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

$= 3\{4a^2 + 4a^2b^2 + b^2 - 4a^2b^2\}$

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

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

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

Q.14 $a^4 + a^2b^2 + ba^4$

Solution:

$$a^4 + a^2b^2 + ba^4$$
$$= (a^2)^2 + 2(a^2)(b^2) + (b^2)^2 - (a^2)(b^2)$$
$$= a^4 + 2a^2b^2 + b^4 - a^2b^2$$
$$= (a^2 + b^2)^2 - a^2b^2$$
$$= (a^2 - ab + b^2)(a^2 + b^2 + ab)$$ **Ans**

Q.15 $x^4 + x^2y^2 + y^4$

Solution:

$$x^4 + x^2y^2 + y^4$$
$$= x^4 + 2x^2y^2 + y^4 - x^2y^2$$

(by adding and substracting x^2y^2)

$$= (x^2 + y^2)^2 - x^2y^2$$
$$= (x^2 + xy + y^2)(x^2 - xy + y^2)$$ **Ans**

Q.16 $a^4 + a^2 + 1$

Solution:

$$a^4 + a^2 + 1$$
$$= a^4 + a^2 + a^2 + 1 - a^2$$
$$= a^4 + 2a^2 + 1 - a^2$$
$$= (a^2 + 1)^2 - a^2$$
$$= (a^2 - a + 1)(a^2 + a + 1)$$ **Ans**

Q.17 $x^4 + 2x^2 + 9$

Solution:

$$x^4 + 2x^2 + 9$$
$$= x^4 + 2x^2 + 4x + 9 - 4x^2$$
$$= x^4 + 6x^2 + 9 - 4x^2$$
$$= (x^2 + 3)^2 - 4x^2 = (x^2+3)^2 - (2x)^2$$
$$= (x^2 - 2x + 3)(x^2 + 2x + 3)$$ **Ans**

Q.18 $x^4 - 6x^2y^2 + y^4$

Solution:

$$x^4 - 6x^2y^2 + y^4$$
$$= x^4 - 2x^2y^2 + y^4 - 4x^2y^2$$
$$= (x^2 - y^2)^2 - 4x^2y^2 = (x^2 - y^2)^2 - (2xy)^2$$
$$= (x^2 - y^2 - 2xy)(x^2 - y^2 + 2xy)$$ **Ans**

Q.19 $a^4 - 7a^2b^2 + 9b^4$

Solution:

$$a^4 - 7a^2b^2 + 9b^4$$
$$= a^4 - 6a^2b^2 + 9b^4 - a^2b^2$$
$$= (a^2 - 3b^2)^2 - a^2b^2$$
$$= (a^2 - 3b^2 + ab)(a^2 - 3b^2 - ab)$$ Ans

Q.20 $a^4 - 27a^2 + 1$

Solution:

$$a^4 - 27a^2 + 1$$
$$= a^4 - 2a^2 + 1 - 25a^2$$
$$= (a^2 - 1)^2 - (5a)^2$$
$$= (a^2 - 5a - 1)(a^2 + 5a - 1)$$ **Ans**



EXERCISE 8.9

Q.1 $(x + 2)(x + 3)$

Solution:

$$(x + 2)(x + 3)$$
$$= (x)^2 + (2 + 3)x + (3)(2)$$
$$= x^2 + 5x + 6 \quad \textbf{Ans}$$

Q.2 $(x + 4)(x + 5)$

Solution:

$$(x + 4)(x + 5)$$
$$= (x)^2 + (4 + 5)x + (4)(5)$$
$$= x^2 + 9x + 20 \quad \textbf{Ans}$$

Q.3 $(x - 4)(x - 3)$

Solution:

$$(x - 4)(x - 3)$$
$$= (x)^2 + (-4 - 3)x + (4)(-3)$$
$$= x^2 - 7x + 12 \quad \textbf{Ans}$$

Q.4 $(x + 1)(x - 5)$

Solution:

$$(x + 1)(x - 5)$$
$$= (x)^2 + (-1 - 5)x + (-1)(-5)$$
$$= x^2 - 6x + 5 \quad \textbf{Ans}$$

Q.5 $(x + 4)(x - 1)$

Solution:

$$(x + 4)(x - 1)$$
$$= x^2 + (4 - 1) + (4)(-1)$$
$$= x^2 + 3x + 1 \quad \textbf{Ans}$$

Q.6 $(x+12)(x-5)$

Solution:

$$(x + 12)(x - 5)$$
$$= x^2 + (12 - 5) + (12)(-5)$$
$$= x^2 + 7x - 60 \quad \textbf{Ans}$$

Q.7 $(x - 15)(x + 12)$

Solution:

$$(x - 15)(x + 12)$$
$$= x^2 + x(-15 + 12) + (-15)(12)$$
$$= x^2 - 3x - 180 \quad \textbf{Ans}$$

Q.8 $(x - 18)(x + 3)$

Solution:

$$(x - 18)(x + 3)$$
$$= x^2 + x(-18 + 3) + (-18)(3)$$
$$= x^2 - 15x - 54 \quad \textbf{Ans}$$

Q.9 $(x - 5)(x + 1)$

Solution:

$$(x - 5)(x - 1)$$
$$= x^2 + x(-5 + 1) + (-5)(+1)$$
$$= x^2 - 4x - 5 \quad \textbf{Ans}$$

Q.10 $(x - 6)(x - 5)$

Solution:

$$(x - 6)(x - 5)$$
$$= x^2 - x(-6 - 5) + (-6)(-5)$$
$$= x^2 + 11x + 30 \quad \textbf{Ans}$$

EXERCISE 8.10

Fill in the blanks: (Orally):

Q.1 $x^2+9x+20 = (x+\Delta)(x+\square)$

$= x^2 + 9x + 20$

$= x^2 + 5x + 4x + 20$

$= x(x+5) + 4(x+5)$

$= (x+5)(x+4)$

$\Delta = 5.\ \square = 4.$ ***Ans***

Q.2 $x^2 - 5x + 4 = (x-\Delta)(x-\square)$

$= x^2 - 4x - x + 4$

$= x(x-4) - 1(x-4)$

$= (x-4)(x-1)$

$\therefore \quad = +\Delta = 4. + \square = 1.$ ***Ans***

Q.3 $x^2 + 5x - 24 = (x+\Delta)(x-\square)$

$= x^2 + 8x - 3x - 24$

$= x(x+8) - 3(x+8)$

$= (x+8)(x-3)$

$\therefore \quad \Delta = 8.\ \square = +3.$ ***Ans***

Q.4 $x^2 - 4x - 12 = (x-\Delta)(x+\square)$

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

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

$(x-6)(x+2)$

$\therefore \quad \Delta = 6.\ \square = 2.$ ***Ans***

Factorise (question 5 to 10 to be answered orally):

Q.5 $x^2 + 7x + 10.$

$= x^2 + 5x + 2x + 10$

$= x(x+5) + 2(x+5)$

$(x+5)(x+2)$ ***Ans***

Q.6 $x^2 + 12x + 35$

$= x^2 + 5x + 7x + 10$

$= x(x + 5) + 2(x + 5)$

$(x + 5)(x + 7)$ **Ans**

Q.7 $x^2 - 10x + 21$

$= x^2 - 7x - 3x + 21$

$= x(x - 2) - 3(x - 7)$

$(x - 7)(x - 1)$ **Ans**

Q.8 $x^2 - 8x + 7$

$= x^2 - 7x - x + 7$

$= x(x - 7) - 4(x - 7)$

$(x - 7)(x - 3)$ **Ans**

Q.9 $x^2 + 2x - 99$

$= x^2 + 11x - 9x - 99$

$= x(x + 11) - 9(x + 11)$

$(x + 11)(x - 9)$ **Ans**

Q.10 $x^2 + 13x + 30$

$= x^2 + 3x + 10x + 30$

$= x(x + 3) + 10(x + 3)$

$(x + 3)(x + 10)$ **Ans**

Q.11 $p^2 + 10pq + 24q^2$

$= p^2 + 6pq + 4pq + 24q^2$

$= p(p + 6q) + 4q(p + 6q)$

$= (p + 6q)(p + 4q)$ **Ans**

Q.12 $x^2 - x - 6$

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

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

$(x - 3)(x + 2)$ **Ans**

Q.13 $x^2 - 17x + 60$

$= x^2 + 12x - 5x + 60$

$= x(x - 12) - 5(x - 12)$

$(x - 12)(x - 5)$ **Ans**

Q.14 $x^2 + 17x - 60$

$= x^2 + 20x - 9x - 60$

$= x(x + 20) - 3(x + 20)$

$(x + 20)(x - 3)$ **Ans**

Q.15 $x^2 - 25x - 84$

$= x^2 - 28x + 3x - 84$

$= x(x - 28) + 3(x - 28)$

$(x - 28)(x - 3)$ **Ans**

Q.16 $x^2 + 15x - 54$

$= x^2 + 18x - 3x - 54$

$= x(x + 18) - 3(x + 18)$

$(x + 18)(x - 3)$ **Ans**

Q.17 $2x^2 + 8x + 6$

$= 2x^2 + 18x + 2x + 6$

$= 2x(x + 3) + 2(x + 3)$

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

$= 2(x + 1)(x + 3)$ **Ans**

Q.18 $3x^2 - 30x - 72$

$= 3(x^2 - 10x - 24)$

$= 3(x^2 - 12x + 2x - 24)$

$= 3\{(x - 12) + 2(x - 12)\}$

$= 3\{(x - 12)(x + 2)\}$

$= 3(x - 12)(x + 2)$ **Ans**

Q.19 $x^3y^3 - 9x^2y^2 + 20xy$

$= xy\{x^2y^2 - 9xy + 20\}$
$= xy\{x^2y^2 - 5xy + 4xy + 20\}$
$= xy\{xy(xy - 5) - 4(xy - 5)\}$
$= xy\{(xy - 5)\ (xy - 5)\}$
$= xy(xy - 5)\ (xy - 4)$ **Ans**

Q.20 $x^3 + 2x^2 - 24x$

Solution:

$= \{x^2 + 2x - 24x\}$
$= x\{x^2 + 6x - 4x - 24\}$
$= x\{x(x + 6) - 4\ (x + 6)\}$
$= x\{(x + 6)\ (x - 4\}$
$= x(x + 6)\ (x - 4)$ **Ans**

EXERCISE 8.11

Fill in the blanks to complete the sentences. (Orally):

Q.1 $(a + 2b)^3 = (.....)^3 + 3(a)^2 - 2b + 3a\ (2b)^2 + (.....)^3$

Solution:

$(a + 2b)^3$

$= (a)^3 + 3(a)^2 - 2b + 3a.\ (2b)^2 + (2b)^2$ ***Ans***

Q.2 $(2x - y)^3 = (.....)^3 - 3(.....)^2.\ y + 3(x)(y)^2 - y^3$

Solution:

$(2x - y)^3$

$= (2x)^3 - 3(2x)^3y - 3(2x)(y)^2 + y^3$ ***Ans***

Q.3 $(5 + x)^3 = 5^3 + 3(....)^2(....) + 3(....)(....)^2 + x^3$

Solution:

$(5 + x)^3$

$= 5^3 + 3(5)^2x + 3(5)x^2 + x^3$ ***Ans***

Q.4 $(3x - 2a)^3 = (3x)^3 - 3(.....)^2(.....) + 3(....)(2a)^2 - (2a)^3$

Solution:

$(3x - 2a)$

$= (3x)^3 - 3(3x)^2(2a) + 3(3x)(2a) + (2a)^3$ ***Ans***

Find the cube of:

Q.5 $5(m + n)$

Solution:

$(m + n)^3$

or $(m)^3 + 3(m)^2\ (m) + 3(n)\ (n)^2 + (n)^3$

$= m^3 + n^3 + 3mn\ (m+n)$ ***Ans***

Q.6 $2 + c$

Solution:

$(2 + c)$

$= (2)^3 + 3(3)^2(c) + (3)^2(c)2 + (c)^3$

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

$= 8 + c^3 + 6c\ (2 + c)$ **Ans**

Q.7 $3a - 2b$

Solution:

$(3a\ .\ 2b)$

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

$= 27a^3 - 34a^2b + 36ab^2 - 86^3$

$= 27a^3 - 18ab(3a - 2b) - 86^3$ Ans

Q.8 $4 - 2x$

Solution:

$(4 - 2x)^3$

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

$= 64 - 96x + 48x^2 - 8x^3$

$= 64 - 8x^3 - 18x(2 - x) - 8x^3$ **Ans**

Q.9 $x + \frac{1}{x}$

Solution:

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

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

$$= x^3 + \frac{x \times x \times x \times 1}{x} + 3x\frac{x \times 1}{x \times x} + \frac{1}{x^3}$$

$$= x^3 + 3x + \frac{3}{x} + \frac{1}{x^3}$$ **Ans**

Q.10 $x/y - y/x$

Solution:

$(x/y - y/x)^3$

$= x^3/y^3 - 3(x/y)(y/x) + 3(x/y)(y/x)^2 + (y/x)^3$

$= \frac{x^3}{y^3} 3\frac{x^2}{y^2} \cdot \frac{y}{x} + 3\frac{x}{y} \cdot \frac{y^2}{x^2} - \frac{y^3}{x^3}$

$= \frac{x^3}{y^3} - \frac{3x}{y} + \frac{3y}{x} - \frac{y^3}{x^3}$ **Ans**

Find the value of:

Q.11 $x^3 + y^3$ **when** $x + y = 5$. $xy = 6$

Solution:

$x + y = 5$

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

$x^3 + y^3 + 3 \times 6 \times 5 = 125$

$x^3 + y^3 + 90 = 125$

$x^3 + y^3 = 125 - 90$

$x^3 + y^3 + 35$ **Ans**

Q.12 $x^3 + y^3$, **when** $x + y = 1$ **and** $xy = 12$

Solution:

$x + y = 1$

or $(x + y)^3 = (1)^3$

$= x^3 + y^3 + 3xy\,(x + y) = 1$

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

$= x^4 + y^3 + 35 = 1$

$= x^3 + y^3 = -36 + 1$

$= x^3 + y^3 = -35$ **Ans**

Q.13 $a^3 + b^3$ **when** $a + b = 2$, $ab = -8$.

Solution:

$a + b = 2$

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

$= a^3 + b^3 + 3ab\,(a + b) = 8$

$= a^3 + b^3 + 3\,(-8)\,(2) = 8$

$= a^3 + b^3 - 43 = 8$

$= a^3 + b^3 = 8 + 48$

$= a^3 + b^3 = 56$ **Ans**

Q.14 $x^3 - y^3$ **when** $x - y = 2$, $xy = 15$

Solution:

$x - y = 2$

or $(x - y)^3 = (2)^3$

$= x^3 - y^3 - 3xy\,(x - y) = 8$

$= x^3 - y^3 - 3\,(15)\,(2) = 8$

$= x^3 - y^3 - 90 = 8$

$= x^3 - y^3 = 90 + 8$

$= x^3 - y^3 = 98$ **Ans**

Q.15 $a^3 - b^3$ **when** $a - b = 3$ **and** $ab = 28$

Solution:

$a - b = 3$

or $(a - b)3 = (3)2$

or $a^3 - b^3 - 3ab\,(a - b) = 27$

or $a^3 - b^3 - 3\,(28)(3) = 27$

or $a^3 - b^3 - 252 = 27$

or $a^3 - b^3 = 27 + 252$

or $a^3 - b^3 = 279$ **Ans**

Q.16 (i) $x^3 + \frac{1}{x^3}$ **when** $x + \frac{1}{x} = 4$

Solution:

$x + \frac{1}{x} = 4$

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

$x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right) = 64$

$x^3 + \frac{1}{x^3} + 3 \times 4 = 64$

$x^3 + \frac{1}{x^3} = 12 = 64$

$x^3 + \frac{1}{x^3} = 64 - 12$

$x^3 + \frac{1}{x^3} = 52$ **Ans**

(ii) $x+\frac{1}{x}=3$

Solution:

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

$$x^3+\frac{1}{x^3}+3\left(x+\frac{1}{x}\right)=(5)^2$$

$$x^3+\frac{1}{x^3}+3(3)=27$$

$$x^3+\frac{1}{x^3}+9=27$$

$$x^3+\frac{1}{x^3}=27-9=18 \quad \textit{Ans}$$

Q.17 (i) $x^3-\frac{1}{x^3}$ *when (i)* $x-\frac{1}{x}=4$

Solution:

$$x-\frac{1}{x}=4$$

or $$\left(x-\frac{1}{x}\right)^3=(4)^3$$

or $$x^3-\frac{1}{x^3}-12=64$$

or $$x^3-\frac{1}{x^3}=64=+12$$

or $$x^3+\frac{1}{x^3}=76 \quad \textit{Ans}$$

(ii) $x-\frac{1}{x}=-4$

Solution:

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

$= x^3 - 1/x^3 - 3\left(x - \frac{1}{x}\right) = -64$

$= x^3 - 1/x^3 (-3) \times (4) = -64$

$= x^3 + 1/x^3 + 12 = -64$

$= x^3 + 1/x^3 = -64 - 12 = -76$

$= x^3 1/x^3 = -76$ **Ans**

Q.18 If $x + y = 2$ show that $x^3 + y^3 + 6xy = 8$

Solution:

$(x + y) = 2$

$(x + y)^3 = (2)^3$

$x^3 + y^3 + 3xy\,(x + y) = 8$

$x^3 + y^3 + 3xy\,(2) = 8$

or $x^3 + y^3 + 6xy = 8$ **(Proved)**

Q.19 If $a - b = 3$ show that $a^3 - b^3 - 9ab = 27$

Solution:

$a - b = 3$

$(a - b)3 = (3)^3$

$a^3 - b^3 - 3ab\,(a - b) = 27$

$a^3 - b^3 = 3\,(3)ab = 27$

$a^3 - b^3 - 9ab = 27$ **(Proved)**

Q.20 If $x = 2 - \frac{1}{x}$

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

Solution:

$x = 2 - 1/x$

or $2 = x + 1/x$

or $x + 1/x = 2$

or $(x + 1/x)^3 = (2)3$

or $x^3 + 1/x^3 + (x + 1/x) = 8$

or $x^3 + 1/x^3 + 3(2) = 8$

$x^3 + 1/x^3 + 6 = 8$

or $x^3 + 1/x^3 = 8 - 6$

$x^3 + 1/x^3 = 2$

again $x + 1/x = 2$

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

$x^2 + 1/x^2 + 2 = 4$

$x^2 + 1/x^2 = 4 - 2$

$x^2 + 1/x^2 = 2$

again $x + 1/x = 2$

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

$x^2 + 1/x^2 = 4$

$x^2 + 1/x^2 = 4 - 2 = 2$

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

$x^4 + 1/x^4 + 2 = 4$

$x^4 + 1/x^4 = 4 - 2$

$x^4 + 1/x^4 = 2$

Now $x^4 + 1/x^3 = 2$

$x^2 + 1/x^2 = 2$

$x^4 + 1/x^4 = 2$

Hence $x^3 + 1/x^3 = x^2 + 1/x^2 = x^4 + 1/x^4$

EXERCISE 8.12

Express in the form of cube (orally):

Q.1 $x^3 + 3x^2.4y + 3x \cdot (4y)^2 + (4y)^3$

$= (x + 4y)^3$ ***Ans***

Q.2 $(2a)^3 - 3(2a)^2 (3b) + 3(2a) (3b)^2 - (3b)^3$

$= (2a - 3b)^3$ ***Ans***

Q.3 $(1)^3 - 3(1)^2 (x) + 3(1) (x)^2 - (x)^3$

$= (1 - x)^3$ ***Ans***

Factorise:

Q.4 $x^3 + 3x^2gy + 3xy^2 + y^3$

$= (x)^3 + 3(x)^2(y(+3(x)(y)^2 + (y)^3$

$= (x + y)^3$ ***Ans***

Q.5 $p^3 + 9p^2 + 27p + 27$

$= (p)^3 + 3(p) (3) + 3(p) (9) + (3)^2$

$= (p + 3)^3$ ***Ans***

Q.6 $x^3 - 15x^2y + 75xy^2 - 125y^3$

Solution:

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

$= (x - 5y)^3$ ***Ans***

Q.7 $1 - 3x + 3x^2 - x^3$

Solution:

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

$= (1 - x)^3$ ***Ans***

Q.8 $x^3 + 3x + 3/x + 1/x^3$

Solution:

$= (x)^3 + 3(x)^3 (3/x) + 3(x) (3/x)^3 + (1/x)^3$

$= (x + 1/x)^3$ ***Ans***

Q.9 $m^3 - 3m + 3/m - 1/m^3$

$= (m)^3 - 3(m)^2(1/m) + 3(m)^1/m)^2 - (1m)^3$

$= (m - 1/m)^3$ **Ans**

Q.10 $1000 - 300xy + 3x^2y^2 - x^3y^3$

Solution:

$= (10)^3 - 3(10)^2\, xy - 3(10)(xy)^2 - (xy)^2$

$= (10 - xy)^3$ **Ans**



EXERCISE 8.13

Simplify with the help of formulae (answer first five questions orally).

Q.1 $(c + d)(c^2 - cd + d^2)$

$= c^3 + d^3$ **Ans**

Q.2 $(l + m)(l^2 - lm + m^2)$

$= (l^3 + m^3)$ **Ans**

Q.3 $(x - y)(x^2 + xy + y^2)$

$= x^3 - y^3$ **Ans**

Q.4 $(p - q)(p^2 + pq + q^2)$

$= p^3 - q^3$ **Ans**

Q.5 $(x + 3)(x^2 - 3x + 9)$

$= x^3 + 27$ **Ans**

Q.6 $(2a - 3)(4a^2 + 6a + 9)$

$= 8a^3 - 27$ **Ans**

Q.7 $(a^2 - 1)(a^4 + a^2 + 1)$

$= a^6 - 1$ **Ans**

Q.8 $\left(x + \frac{1}{x}\right)\left(x^2 - 1 + \frac{1}{x^2}\right)$

$= x^3 + \frac{1}{x^3}$ **Ans**

Q.9 $(x/y - y/x)\left(\frac{x^2}{y^2} + 1 + \frac{y^2}{x^2}\right)$

$= \frac{x^3}{y^3} + 1 + \frac{y^3}{x^3}$ **Ans**

Q.10 $(x^n + y^n)(x^{2n} - x^n y^n + y^{2n})$

$= x^{3n} + y^{3n}$ **Ans**

Q.11 $(a^m - y)(a^{2m} + a^m y + y^2)$

$= a^2m - y^3$ **Ans**

Using formulae find the continued products of:

Q.12 $(x + y)(x^2 - xy + y^2)\ (x - y)\ (x^2 + xy + y^2)$

$= (x^3 + y^3)\ (x^3 - y^3)$

$= x^3 - y^3$ ***Ans***

Q.13 $(a + b)\ (a^2 - ab + b^2)\ (a - b)\ (a^2 + ab + b^2)$

Solution:

$(a^3 + b^3)\ (a^3 - b^3) = (a^6 - b^6)$ ***Ans***

Q.14 $(a + 3)\ (a - 3)\ (a^2 - 3a + 9)\ (a^2 + 3a + 9)$

$= (3 + 27)\ (a^3 - 27)$

$= a^6 - 729$ ***Ans***

Q.15 $(3a + 2b)\ (3a - 2b)\ (9a^2 - 6ab + 4b^2)\ (9a^2 - 6ab + 4b^2)$

Solution:

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

$(27a^3 - 8b^3)\ (27a^3 + 8b^3)$

$= 729a^6 - 64b^6$ ***Ans***

EXERCISE 8.14

Factorize: (First five questions to be answered orally):

Q.1 $x^3 + y^3$

$= (x + y)(x^2 - xy + y^2)$ ***Ans***

Q.2 $x^3 + 64$

$= x^3 + (4)^3$

$= (x + 4)(x^2 - 4x + 16)$ ***Ans***

Q.3 $a^3 + 8$

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

$= (x + 2)(a^2 - 2a + 4)$ ***Ans***

Q.4 $x^3 - z^3$

$= (x - 5)(x^2 + 5x + 25)$ Ans

Q.5 $x^3 - 125$

$= (x - 5)(x^2 + 5x + 25)$ ***Ans***

Q.6 $27x^3 + 64$

$= (3x)^3 + (4)^3$

$= (3x + 4)(9x^2 - 12x + 16)$ ***Ans***

Q.7 $x^3 - y^3z^3$

$= (x - yz)(x^2 + xyz + y^2z^2)$ ***Ans***

Q.8 $a^4b - ab^4$

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

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

Q.9 $a^2b^2 - a^5b^2$

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

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

Q.10 $x^6 + y^6$

$= (x^3)^3 + (y^2)^3$

$= (x^2 + y^2)(x^4 - x^2y^2 + y^4)$ ***Ans***

Q.11 $x^6 + 64y^5$

$= (x^3 - y^3)(x^3 + y^3)$

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

Q.12 $x^6 - y^6$

$= (x^3 - y^3)(x^3 + y^3)$

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

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

Q.13 $y^6 - 1$

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

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

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

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

Q.14 $a^7b - ab^7$

$= ab(a^6 - b^6)$

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

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

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

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

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

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

Q.15 $x^3y^6 - 64$

$= (xy^2)^3 - (4)^3$

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

Q.16 $a^6 - b^9$

$= (a^3)^3 - (b^3)^3$

$= (a^3 - b^3)(a^6 + a^3b^3 + b^6)$

$= (a - b)(a - ab - b^2)(a^6 + a^3b^3 + b^6)$ **Ans**

Q.17 $a^6 - 729$

$= (a^3)^2 - (27)^2$

$= (a^3 - 27)(a^3 + 27)$

$= (a - 3)(a^2 + 3a + 9)(a + 3)(a^2 - 3a + 9)$ **Ans**

Evaluate the help of formula:

Q.18 $\dfrac{(416)^3 + (84)^3}{(416)^2 - 416 \times 84 + (84)^2}$

$$= \frac{(416 + 84)\{(416)^2 - 416 \times 84 + (84)^2\}}{(416)^2 - 146 \times 84 + (84)^2}$$

$= (616 + 84) = 500$ ***Ans***

Q.19 $\dfrac{(652)^3 - (252)^3}{(652)^2 + 652 \times 252 + (252)^2}$

$$= \frac{(652 - 252)\{(652)^2 + 652 \times 252 + (252)^2\}}{(652)^2 + 65^2 \times 252 + (252)^2}$$

$= (652 - 252)$

$= 400$ ***Ans***

Q.20 $\dfrac{(4.49)3 + 3.51 \times 3.51 \times 3.51}{4.49 \times 4.49 - 3.51 \times 4.49 - (4.51)^2}$

$$= \frac{(4.49)^3 + (3.51)^3}{(4.49)^2 - 3.51 \times 4.49 + (3.51)^2}$$

$= 4.49 + 3.51$

$= 8.00$

$= 8$ ***Ans***

EXERCISE 8.15

Find the value of:

Q.1 $x^2 + y^2$, *when* $x - y = 2$ *and* $xy = 8$.

Solution:

$x - y = 2$

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

or $x^2 + y^2 - 2xy = 4$

or $x^2 + y^2 - 2(8) = 4$

or $x^2 + y^2 - 16 = 4$

or $x^2 + y^2 = 4 + 16$

or $x^2 + y^2 = 20$ ***Ans***

Q.2 $4d^2 + 1/d^2$ *when* $2d - 1/d = 3$

Solution:

$2d - 1/d = 3$

or $(2d - 1/d)^2 = (3)^2$

or $4d^2 + 1/d^2 = 9 + 4$

or $4d^2 + 1/d^2 = 13$ ***Ans***

Q.3 $x^4 + a/x^4$ *when* $x - 1/x = 2$.

Solution:

$x - 1/x = 2$

or $(x - 1/x)^2 = (2)^2$

or $x^2 + 1/x^2 - 2 = 4$

or $x^2 + 1/x^2 = 4 + 2$

or $x^2 + 1/x^2 = 6$

or $(x^2 + 1/x^2)^2 = (6)^2$

or $x^4 + 1/x^5 + 2 = 36$

or $x^4 + 1/x^4 = 36 - 2$

or $x^4 + 1/x^4 = 34$ ***Ans***

Q.4 $a^3 + b^3$ *when* $a + b = 5$ *and* $ab = -6$

Solution:

$a + b = 5$

or $(a + b)^3 = (5)^3$

or $a^3 + b^3 - 3ab\,(a + b) = 125$

or $a^3 + b^3 + 3 \times (-6)\,(5) = 125$

or $a^3 + b^3 + (-90) = 125$

or $a^3 + b^3 - 90 = 125$

or $a^3 + b^3 = 125 + 90$

or $a^3 + b^3 = 215$ **Ans**

Q.5 $x^3 - y^3$ **when** $x - y = 3$, $xy = 20$.

Solution:

$x - y = 3$

or $(x - y)^3 = (3)^3$

or $x^3 - y^3 - 3xy\,(x - y) = 27$

or $x^3 - y^3 - 3(10)(3) + 27$

or $x^3 - y^3 = 90 = 27$

or $x^3 - y^3 = 27 + 90$

or $x^3 - y^3 = 117$ **Ans**

Q.6 $x^3 - 1/x^3$ **when** $x - 1/x = 4$.

Solution:

$x - 1/3 = 4$

or $(x - 1/x)^3 = (4)^3$

or $x^3 - 1/x^3 - 3(x - 1/x) = 64$

or $x^3 - 1/x^3 - 3(4) = 64$

or $x^3 - 1/x^3 - 12 = 64$

or $x^3 - 1/x^3 = 64 + 12$

or $x^3 - 1/x^3 = 76$ **Ans**

Simplify using the formula

Q.7(i) $(1005)^2$

$= (1000 + 5)^2$

$= (1000)^2 + 2/(1000)\,(5) + (5)^2$

$= 1000000 + 10000 + 25$

$= 1010025$ **Ans**

Q.7(ii) $(698)^2$

$= (7000 - 2)^2$

$= (700)^2 + (2)^2 - 2(700)(2)$

$= 490000 + 4 - 2800$

$= 490004 - 2800$

$= 487204$ **Ans**

Q.8 $(7.8)^2 - 2 \times 3.9 \times 2 \times 4.8 + (4.8)^2$

or $(7.8)^2 - 2(3.9)(4.8) + (4.8)^2$

or $(7.8 - 4.8)^2$

or $(3)2$

$= 9$ **Ans**

Q.9 $\dfrac{.321 \times 321 - .179 \times .179}{.321 - .179}$

$= \dfrac{(.321)^2 - (.179)^2}{.321 - 179}$

$= \dfrac{\{(.321) - (.179)\}\ \{(.321) + (.179)\}}{(.321 - .179)}$

$= .321 + 179$

$= .500$

$= .5$ **Ans**

Q.10 $\dfrac{45 \times 45 + 2 \times 35 \times 45 + (35)^2}{45 \times 45 - 35 \times 35}$

$= \dfrac{(45)^2 + 2(45)(35) + (35}{(45)^2 - (35)^2}$

$= \dfrac{(45 + 35)^2}{(45 + 35)(45 - 35)}$

$= \dfrac{(45 + 35)(45 + 35)}{(45 + 35)(45 - 35)}$

$= \dfrac{(45 + 35)}{(45 - 35)}$

$= \dfrac{80}{10}$

$= 8$ **Ans**

Q.11 $(3.75)^3 + 3(3.75)^2 \times 1.25 + 3 \times 3.75 \times (1.25)^2 + (1.25)^3$

$= (3.75)^3 + 3(3.75)^3(1.25) + 3(3.75)(1.25)^2 + (1.25)^2$

$= (3.75 + 1.25)^3$

$= (5.00)^3$

$= 125$ **Ans**

Q.12 $\dfrac{.89 \times .89 \times .89 - .64 \times .64 \times .64}{.89 \times .89 + .89 \times .64 + .64 \times .64}$

$= \dfrac{(.89)^3 - (.64)^3}{(.89)^2 + (.89)(.64) + (.64)^2}$

$= \dfrac{(.89 - .64)\{(.89)^2 + (.89)(.64) + (.64)^2\}}{\{(.89)^2 + (.89)(.64) + (.64)^2\}}$

$= .89 - .64$

$= .25$ **Ans**

Factorise:

Q.13 $x^3 - x^2y + xy^2$

$= x(x^2 - xy + y^2)$ **Ans**

Q.14 $x^2 - xy - 3x + 3y$

$= x(x - y) - 3(x - y)$

$= (x - y)(x - 3)$ **Ans**

Q.15 $1 + a^2b^2 + a^2 + b^2$

$= a^2b^2 + b^2 + a^2 + 1$

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

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

$= (1 + a^2)(1 + b^2)$ **Ans**

Q.16 $(a + b)^2 + 3(a + b)$

Suppose $a + b = x$

$\therefore$ $x^2 + 3x$

$= x(x + 3)$

putting the value of x

$(a + b)(a + b + 3)$ **Ans**

Q.17 $ab(x^2 + y^2) - xy(a^2 + b^2)$

$= abx^2 + aby^2 - xya^2 - xyb^2$

$= abx^2 - xyb^2 - xya^2 - aby^2$

$= xb(ax - by) - ay(ax - by)$

$= (ax - by)(xb - ay)$ **Ans**

Q.18 $(ax + by)^2 + (bx - ay)^2$

$= a^2x^2 + 2axby + b^2y^2 + b^2y^2 - 2axby + a^2y^2$

$= a^2x^2 + b^2y^2 + b^2x^2 + a^2y^2$

$= a^2x^2 + b^2x^2 + a^2y^2 + b^2y^2$

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

$= (a^2 + b^2)(x^2 + y^2)$ **Ans**

Q.19 $(ab + cd)^2 + (ac - bd)^2$

$= a^2b^2 + 2abcd + c^2d^2 + a^2c^2 - 2abcd + b^2d^2$

$= a^2b^2 + c^2d^2 + a^2c^2 + b^2d^2$

$= a^2x^2 + b^2x^2 + a^2y^2 + b^2y^2$

$= a^2(b^2 + c^2) + d^2(b^2 + c^2)$

$= (b^2 + c^2)(a^2 + d^2)$ **Ans**

Q.20 $25a^2b^2 - 20abc + 4c^2$

$= (5ab)^2 - 2(5ab)(2c) + (2c)^2$

$= (5ab - 2c)^2$ **Ans**

Q.21 $a^{2x} - 2a^xb^y + b^{2y}$

$= (a^x)^2 - 2(ax)(by) + (by)^2$

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

Q.22 $81a^2 - 25$

$= (9a)^2 - (5)^2$

$= (9a - 5)(9a + 5)$ **Ans**

Q.23 $a^3 - 9ab^2$

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

$= a(a - 3b)(a + 3b)$ **Ans**

Q.24 $x^4 - 81$

$= (x^2 - 9)(x^2 + 9)$

$= (x - 3)(x + 3)(x^2 + 9)$ **Ans**

Q.25 $x^8 - y^8$

$= (x^4 - y^4)(x^4 + y^4)$

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

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

Q.26 $a^{4x} - b^{4x}$

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

$= (a^2x - b^{2x})(a^{2x} + b^{2x})$

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

$= (a^x - b^x)(a^x + b^x)(a^{2x} + b^{2x})$

Q.27 $c^2 - 2bc - a^2 + b^2$

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

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

$= (c - b - a)(c - b + a)$ **Ans**

Q.28 $2xy - x^2 - y^2 + z^2$

$= z^2 + 2xy - x^2 - y^2$

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

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

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

$= (z - x + y)(z + x - y)$ **Ans**

Q.29 $8ax + x^2 - b^2 + 16a^2$

$= 16a^2 + 8ax + x^2 - b^2$

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

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

$= (4a + x + b)(4a + x - b)$ **Ans**

Q.30 $4x^4 + 1$

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

$= 4x^4 + 1 + 4x^2 - 4x^2$

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

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

Q.31 $a^4 + 64$

$= (a^2)^2 + (8)^2 + 2(a^2)(8) - 2(a^2)(8)$

$= a^4 + 64 + 16a^2 - 16a^2$

$= (a^2 + 8)^2 - 16a^2$

$= (a^2 + 4a + 8)(a^2 - 4a + 8)$ **Ans**

Q.32 $a^4 + 14a^2b^2 + 81b^4$

$= (a^2)^2 + 14a^2b^2 + (9b^2)^2$

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

$= a^2 + 18a^2b^2 + 9b^2 - 4a^2b^2$

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

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

$= (a^2 - 2ab + 9b^2)(a^2 + 2ab + 9b^2)$ **Ans**

Q.33 $x^4 + 17x^2 + 81$

$= x^4 + 18x^2 + 81 - x^2$

$= (x^2 + 9)^2 - x^2$

$= (x^2 + 9 + x)(x^2 + 9 - x)$

$= (x^2 + x - 9)(x^2 - x + 9)$ **Ans**

Q.34 $x^4 - 3x^2y^2 + y^4$

$= x^4 - 2x^2y^2 + y^4 - x^2y^2$

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

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

$= (x^2 - xy - y^2)(x^2 + xy - y^2)$ **Ans**

Q.35 $64 - 25b^2 + b^4$

$= 64 - 16b^2 + b^4 - 9b^2$

$= (8 - b^2)^2 - 9b^2$

$= (8 - b^2 - 3ab)(8 - b^2 + 3b)$

$= (8 + 3b - b^2)(8 - 3b - b^2)$ **Ans**

Q.36 $a^3b^3 - 10a^2b^2 + 24ab$

$= ab(a^2b^2 - 10ab + 24)$

$= ab(a^2b^2 - 6ab - 4ab + 24)$

$= ab\{ab(ab - 6) - 4(ab - 6)\}$

$= ab(ab - 6)(ab - 4)$ **Ans**

Q.37 $x^2 - x - 2$

$= x^2 - 2x + x - 2$

$= x(x - 2) + 1\,(x - 2)$

$= (x - 2)\,(x + 1)$ **Ans**

Q.38 $a^2 + ab - 12b^2$

$= a^2 + 4ab - 3ab - 12b^2$

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

$= (a + 4b)\,(a - 3b)$ **Ans**

Q.39 $a^3 + 27b^3$

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

$= (a + 3b)\,(a^2 - 3ab + 9b^2)$ **Ans**

Q.40 $x^4 - 27x$

$= x(x^3 - 27)$

$= x\{(x)^3 - (3)^3\}$

$= x\{(x - 3)\,(x^2 + 3x + 9)\}$

$= x(x - 3)\,(x^2 + 3x + 9)$ **Ans**

Q.41 $x^{3m} + y^{3m}$

$= (x^m)^3 + (y^m)^3$

$= (x^m + y^m)\,(x^{2m} + x^m y^m + y^{2m})$ **Ans**

Q.42 $64a^6 - 729$

$= (8a^3)^2 - (27)^2$

$= (8a^3 - 27)\,(8a^3 + 27)$

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

$= \{(2a-3)(4a^2+6a + 9)\}\,\{(2a + 3)(4a^2 - 6a + 9)\}$

$= \{(2a-3)(2a + 3)\,(4a^2 + 6a + 9)(4a^2 - 6a + 9)$

Ans

Q.43 $x^3 + 2x^2 - x - 2$

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

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

$= (x + 2)\,(x - 1)\,(x + 1)$ **Ans**

Q.44 $x^3 - 5x^2 - x + 5$

$= x^2(x - 5) - 1(x - 5)$
$= (x - 5)(x^2 - 1)$
$= (x - 5)(x - 1)(x + 1)$ **Ans**

Q.45 $x^4 - x^3 + 8x - 8$

$= x^3(x - 1) + 8(x - 1)$
$= (x - 1)(x^3 + 8)$
$= (x - 1)\{(x)^3 + (2)^3\}$
$= (x - 1)\{(x + 2)(x^2 - 2x + 4)\}$
$= (x - 1)(x + 2)(x^2 - 2x + 4)$ **Ans**