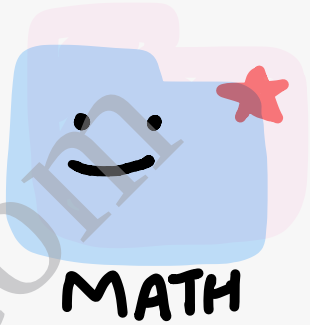
Factorisation
Ex. 12.2



Ex. 12.2

1. (D)

$x^2 + 18x + 81$

$= x^2 + 2 \times x \times 9 + 9^2$

$= (x+9)^2$

$= (x+9)(x+9)$

2. (B)

$25 - y^2 - 4x^2 + 4xy$

$= (5)^2 - (y^2 + 4x^2 - 2xy)$

$= (5)^2 - [y^2 + (2x)^2 - 2(y)(2x)]$

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

$= (5 + y - 2x)[5 - (y - 2x)]$ $[a^2 - b^2 = (a+b)(a-b)]$

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

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

3. (A)

$x^2 + 6x + 8$

$= x^2 + 4x + 2x + 8$

$= x(x+4) + 2(x+4)$

$= (x+4)(x+2)$

4. (C)

$3y^2 + 3y - 36$

$= 3(y^2 + y - 12)$

$= 3(y^2 + 4y - 3y - 12)$

$= 3[y(y+4) - 3(y+4)]$

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

5.a) $p^2+18p+81$

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

$= (p+9)^2$ $\quad [a^2+2ab+b^2=(a+b)^2]$

$= (p+9)(p+9)$

b) $a^2-16ay+64y^2$

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

$= (a-8y)^2$ $\quad [a^2-2ab+b^2=(a-b)^2]$

$= (a-8y)(a-8y)$

c) $36y^2-12y+1$

$= (6y)^2-2(6y)(1)+1^2$

$= (6y-1)^2$ $\quad [a^2-2ab+b^2=(a-b)^2]$

$= (6y-1)(6y-1)$

d) $121x^2-88xy+16y^2$

$= (11x)^2-2(11x)(4y)+(4y)^2$

$= (11x-4y)^2$ $\quad [a^2-2ab+b^2=(a-b)^2]$

$= (11x-4y)(11x-4y)$

e) $x^4-10x^2y^2+25y^4$

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

$= (x^2-5y^2)^2$ $\quad [a^2-2ab+b^2=(a-b)^2]$

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

f) $(a-b)^2+4ab$

$= a^2-2ab+b^2+4ab$

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

$= (a+b)^2$

a. $(2x-3y)^2+24xy$

$= (2x)^2 - 2(2x)(3y) + (3y)^2 + 24xy \quad [(a-b)^2 = a^2-2ab+b^2]$

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

$= (2x)^2 + 12xy + (3y)^2$

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

$= (2x+3y)^2 \quad [a^2+2ab+b^2 = (a+b)^2]$

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

6a. $4x^2-9$

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

$= (2x+3)(2x-3) \quad [a^2-b^2 = (a+b)(a-b)]$

b. $16x^2 - 25y^2$

$= (4x)^2 - (5y)^2$

$= (4x+5y)(4x-5y) \quad [a^2-b^2 = (a+b)(a-b)]$

c. $9a^3 - a$

$= a(9a^2-1)$

$= a[(3a)^2 - (1)^2]$

$= a(3a+1)(3a-1) \quad [a^2-b^2 = (a+b)(a-b)]$

d. $25x^2y^2 - 81$

$= (5xy)^2 - (9)^2$

$= (5xy+9)(5xy-9) \quad [a^2-b^2 = (a+b)(a-b)]$

e. $(l+m)^2 - (l-m)^2$

$= (l+m+l-m)[l+m-(l-m)] \quad [a^2-b^2 = (a+b)(a-b)]$

$= 2l(l+m-l+m)$

$= 2l \cdot 2m$

$= 4lm$

f. $25x^2 - 4y^2 + 28yz - 49z^2$

$= (5x)^2 - (2y)^2 + 2(2y)(7z) - (7z)^2$

$= (5x)^2 - [(2y)^2 - 2(2y)(7z) + (7z)^2]$

$= (5x)^2 - (2y - 7z)^2 \quad [a^2 - 2ab + b^2 = (a-b)^2]$

$= (5x + 2y - 7z)[5x - (2y - 7z)] \quad [a^2 - b^2 = (a+b)(a-b)]$

$= (5x + 2y - 7z)(5x - 2y + 7z)$

g. $(2x - 34y)^2 - 16z^2$

$= [2(x - 17y)]^2 - 4 \cdot 4z^2$

$= 4(x - 17y)^2 - 4 \cdot 4z^2$

$= 4[(x - 17y)^2 - 4z^2]$

$= 4[(x - 17y)^2 - (2z)^2]$

$= 4(x - 17y + 2z)(x - 17y - 2z) \quad [a^2 - b^2 = (a+b)(a-b)]$

h. $4a^2 - 4a + 1 - b^4$

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

$= (2a - 1)^2 - (b^2)^2 \quad [a^2 - 2ab + b^2 = (a-b)^2]$

$= (2a - 1 + b^2)(2a - 1 - b^2) \quad [a^2 - b^2 = (a+b)(a-b)]$

i. $(a + 2b)^2 - 8ab$

$= a^2 + 2(a)(2b) + (2b)^2 - 8ab \quad [(x+y)^2 = x^2 + 2xy + y^2]$

$= a^2 + 4ab + (2b)^2 - 8ab$

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

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

$= (a - 2b)^2 \quad [x^2 - 2xy + y^2 = (x-y)^2]$

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

7a. $x^4 - 1$

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

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

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

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

b. $a^4 - 16b^4$

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

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

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

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

c. $x^4 - y^4$

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

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

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

d. $x^4y^4 - 16c^4$

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

$= (x^2y^2+4c^2)(x^2y^2-4c^2)$ $[a^2-b^2 = (a+b)(a-b)]$

$= (x^2y^2+4c^2)[(xy)^2-(2c)^2]$

$= (x^2y^2+4c^2)(xy+2c)(xy-2c)$ $[a^2-b^2 = (a+b)(a-b)]$

e. $x^4 - (x+y)^4$

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

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

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

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

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

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

f. $81m^4-(n-m)^4$

$= (9m^2)^2-[(n-m)^2]^2$

$= [9m^2+(n-m)^2][9m^2-(n-m)^2]$ $[a^2-b^2=(a+b)(a-b)]$

$= (9m^2+n^2+m^2-2mn)[(3m)^2-(n-m)^2]$

$= (10m^2+n^2-2mn)(3m+n-m)[3m-(n-m)]$

$= (10m^2+n^2-2mn)(2m+n)(3m-n+m)$

$= (10m^2+n^2-2mn)(2m+n)(4m-n)$

8. a. $x^2+10x+24$

$= x^2+6x+4x+24$

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

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

b. y^2-5y+4

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

$= y(y-4)-1(y-4)$

$= (y-4)(y-1)$

c. a^2+8a+7

$= a^2+7a+a+7$

$= a(a+7)+1(a+7)$

$= (a+7)(a+1)$

d. $b^2-10b+9$

$= b^2-9b-b+9$

$= b(b-9)-1(b-9)$

$= (b-9)(b-1)$

e. $x^2 - 10x + 21$

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

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

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

f. $m^2 + 6m - 16$

$= m^2 + 8m - 2m - 16$

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

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

g. $z^2 - 9z + 14$

$= z^2 - 7z - 2z + 14$

$= z(z-7) - 2(z-7)$

$= (z-7)(z-2)$

h. $3x^2 - 9x - 12$

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

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

$= 3[x(x-4) + 1(x-4)]$

$= 3(x-4)(x+1)$