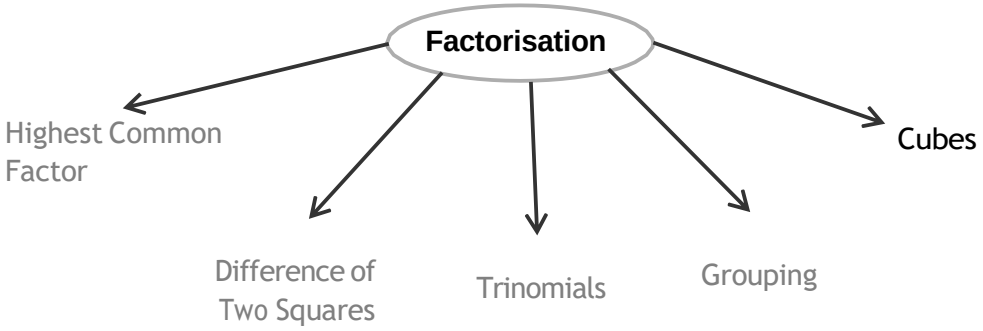
Grade 10 **Workbook**



Taking out a common factor

1. $6a^3 - 8a^2$

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

2. $2xy^2 + x$

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

3. $2x(x - 5) - 3(x - 5)$

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

4. $2x(x - 5) - 3(5 - x)$

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

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

Difference of squares

1. $x^2 - 4$

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

2. $25p^2 - 64q^2$

$= (5p - 8q)(5p + 8q)$

3. $16x^8 - 1$

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

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

4. $(x + y)^2 - 16$

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

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

5. $\frac{1}{16}x^6 - \frac{1}{4}y^4$

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

$= \frac{1}{4}\left(\frac{1}{4}x^6 - y^4\right)$

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

6. $2 - 50(x + 1)^2$

$= 2\left(1 - 25(x+1)^2\right)$

$= 2(1 + 5(x+1))(1 - 5(x+1))$

$= 2(5x + 2)(-5x - 4)$

Trinomial Factorisation

1. $x^2 + 3x + 2$

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

2. $y^2 - 2y - 8$

$= (y - 4)(y + 2)$

3. $2x + 15 - x^2$

$= -(x^2 - 2x - 15)$

$= -(x - 5)(x + 3)$

4. $x^2 - 8xy + 15y^2$

$= (x - 5y)(x - 3y)$

5. $2y^2 - 5y + 3$

$= (2y - 3)(y - 1)$

6. $6x^2 - 23x - 18$

$= (2x - 9)(3x + 2)$

7. $(x + 1)^2 + 2(x + 1) + 1$

$= [(x+1) + 1][(x+1) + 1]$

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

Grouping

1. $5x + 5y - ty - tx$

$= (5x + 5y) - (ty + tx)$

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

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

2. $4x^3 - 3x^2 - 16x + 12$

$= (4x^3 - 3x^2) - (16x - 12)$

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

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

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

3. $a - b + ab - 1$

$= (a-1) - (b - ab)$

$= (a-1) - b(1-a)$

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

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

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

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

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

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

5. $x^2(p-q) - 2x(p-q) - q + p$

$= x^2(p-q) - 2x(p-q) + (p-q)$

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

$= (p-q)(x-1)(x-1)$

Cubes

1. $y^3 - 8$

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

2. $y^{12} - 1$

$= (y^4 - 1)(y^8 + y^4 + 1)$

3. $16x^6 + 54y^3$

$= 2(8x^6 + 27y^3)$

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

Mixed examples

Hints: Always look for a common factor first. Make sure that the expression is factorised fully.

1. $10a^{20} - 40$

$= 10(a^{20} - 4)$

$= 10(a^{10} + 2)(a^{10} - 2)$

2. $a^8 - 1$

$= (a^4 - 1)(a^4 + 1)$

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

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

3. $x^2 + 3x - 10$

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

4. $\frac{64}{9} - y^2$

$= (\frac{8}{3} + y)(\frac{8}{3} - y)$

5. $3y^2 + 12y - 63$

$= 3(y^2 + 4y - 21)$

$= 3(y - 3)(y + 7)$

6. $7x - 4 + x^2 - 2x - 2$

$= x^2 + 5x - 6$

$= (x + 6)(x - 1)$

7. $(a - 2b)^3 - 4(a - 2b)$

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

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

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

8. $2x(a + x) - 2y(a + x) - 2a - 2x$

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

$= 2(a+x)(x - y - 1)$

9. $4x^2 + 20x + 25$

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

10. Use factorisation to calculate $28^2 - 8^2$. Do not use a calculator and show all steps.

$= (28 + 8)(28 - 8)$

$= (36)(20)$

$= 720$

11. If $(2x - 1)$ is a factor of $8x^2 + kx - 3$, determine the value of k

$(2x-1)(4x+3) = 8x^2 + kx - 3$

(-3; $8x^2$)

$(2x-1)(4x+3)$

$= 8x^2 + 6x - 4x - 3$

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

$\therefore k = 2$