

A. Factor (GCF)

1. $6x^2 + 15xy$

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

2. $3a - 54a^4$

$$3a(1 - 18a^3)$$

3. $12 + 16(x+1) + 4(x+1)^2$

$$\rightarrow 4(3 + 4x + 4 + x^2 + 2x + 1)$$

$$\rightarrow 4(3 + 4(x+1) + (x+1)^2)$$

$$4(x^2 + 6x + 8)$$

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

C. Factor (Perfect Square Trinomials)

1. $9x^2 + 24xy^2 + 16y^4$

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

2. $x^2 - 6x + 9$

$$(x - 3)^2$$

3. $2x^2 - 12x + 18$

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

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

4. $4(x+1)^2 + 12(x+1) + 9$

B. Factor (Difference of Squares)

1. $x^2 - 81$

$$(x-9)(x+9)$$

2. $x^4 - 81$

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

3. $3x^2 - 12$

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

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

$$16(x^4y^4 - 1) = 16(x^2y^2-1)(x^2y^2+1)$$

5. $(a-b)^2 - c^2$

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

$$16(xy-1)(xy+1)(x^2y^2+1)$$

D. Factor Trinomials (Trial and error)

1. $6x^2 - 7x - 20$

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

2. $20x^2 + 29x + 6$

$$(5x + 6)(4x + 1)$$

3. $3y^2 + 6y + 3$

$$3(y^2 + 2y + 1)$$

$$3(y+1)^2$$

E. Factor 4 term polynomials (Box or grouping)

1. $3xy + 21x + ay + 7a$

2. $6a^2 - 2ay - 21a + 7y$

3. $x^3 + 9x^2 + 3x + 27$

4. $4x^2 - 4bx + 6ax - 6ab$

F. Factor (Sum or Difference of Cubes)

1. $(x - y)^3 - 27$

2. $8x^3y^3 - 216y^6$

3. $343x^3 + 1$

G. Factor completely

1. $7x^8 - 7$

$7(x^8 - 1)$

$7(x^4 - 1)(x^4 + 1)$

$7(x^2 - 1)(x^2 + 1)(x^4 + 1)$

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

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

3. $x^{12} - 8y^{21}$

$(x^4 - 2y^7)(x^8 + 2x^4y^7 + 4y^{14})$

H. Simplify

1. $\frac{7}{i^3}$

2. $\frac{4 + 3i}{-7 - i}$

3. $(4 - i^2 - i) - (3i + 5)$