

Factor the following trinomials:

$$1x^2 - 12x - 64$$

~~$$\begin{array}{|c|c|} \hline -16 & 4 \\ \hline \end{array}$$~~

-64  
-12

$$(x-16)(x+4)$$

$$40x^2 + x - 6$$

~~$$\begin{array}{|c|c|} \hline -15 & 16 \\ \hline \end{array}$$~~

-240

$$40x^2 - 15x + 16x - 6$$

$$5x(8x-3) + 2(8x-3)$$

$$(8x-3)(5x+2)$$

1)  $4n^2 + 24n - 108$

$$4(n^2 + 6n - 27)$$

$$4(n+9)(n-3)$$

2)  $6n^2 - 30n - 300$

$$6(n^2 - 5n - 50)$$

$$6(n+5)(n-10)$$

3)  $3x^2 - 3x - 36$

$$3(x^2 - x - 12)$$

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

4)  $2n^2 - 10n - 72$

$$2(n^2 - 5n - 36)$$

$$2(n+4)(n-9)$$

5)  $3b^2 - 2b - 16$

$$\begin{array}{r} -48 \\ -8 \\ -2 \end{array} \begin{array}{l} +6 \\ +6 \\ +6 \end{array}$$

$$3b^2 - 8b + 6b - 16$$

$$b(3b-8) + 2(3b-8)$$

$$(b+2)(3b-8)$$

6)  $7m^2 + 74m + 40$

$$\begin{array}{r} 280 \\ 4 \\ 74 \end{array} \begin{array}{l} 70 \\ 70 \\ 70 \end{array}$$

$$\begin{array}{l} 14280 \\ 2 \times 140 \\ 4 \vee 70 \end{array}$$

$$7m^2 + 4m + 70m + 40$$

$$m(7m+4) + 10(7m+4)$$

$$(m+10)(7m+4)$$

7)  $7v^2 + 71v + 72$

$$\begin{array}{r} 504 \\ 8 \times 63 \\ 71 \end{array}$$

$$\begin{array}{l} 1 \times 504 \\ 2 \times 252 \\ 3 \times 168 \\ 4 \times 126 \\ 6 \times 84 \\ 7 \times 72 \\ 8 \times 63 \end{array}$$

$7v^2 + 8v + 63v + 72$

$v(7v+8) + 9(7v+8)$

$(v+9)(7v+8)$

8)  $7a^2 + 31a + 12$

$$\begin{array}{r} 84 \\ 3 \times 28 \\ 31 \end{array} \quad \begin{array}{l} 1 \times 84 \\ 2 \times 42 \\ 3 \times 28 \end{array}$$

$7a^2 + 3a + 28a + 12$

$a(7a+3) + 4(7a+3)$

$(a+4)(7a+3)$

9)  $6n^2 + 31n + 35$

$$\begin{array}{r} 210 \\ 10 \times 21 \\ 31 \end{array}$$

$$\begin{array}{l} 1 \times 210 \\ 2 \times 105 \\ 5 \times 42 \\ 6 \times 35 \\ 7 \times 30 \\ 10 \times 21 \end{array}$$

$6n^2 + 10n + 21n + 35$

$2n(3n+5) + 7(3n+5)$

$(2n+7)(3n+5)$

10)  $10n^2 - 27n - 28$

$$\begin{array}{r} -280 \\ -35 \times 8 \end{array}$$

$$\begin{array}{l} 1 \times 280 \\ 2 \times 140 \\ 4 \times 70 \\ 5 \times 56 \\ 7 \times 40 \\ 8 \times 35 \end{array}$$

$10n^2 - 35n + 8n - 28$

$5n(2n-7) + 4(2n-7)$

$(5n+4)(2n-7)$

11)  $9m^2 + 33m + 10$

$$\begin{array}{r} 90 \\ 30 \times 3 \\ 33 \\ \hline 1 \times 90 \\ 2 \times 45 \\ 3 \times 30 \end{array}$$

$9m^2 + 30m + 3m + 10$

$3m(3m+10) + 1(3m+10)$

$(3m+1)(3m+10)$

12)  $9r^2 + 6r - 35$

$$\begin{array}{r} -315 \\ -15 \times 21 \\ 6 \\ \hline 1 \times 315 \\ 3 \times 105 \\ 5 \times 63 \\ 7 \times 45 \\ 15 \times 21 \end{array}$$

$9r^2 - 15r + 21r - 35$

$3r(3r-5) + 7(3r-5)$

$(3r+7)(3r-5)$

13)  $10n^2 - 17n + 3$

$$\begin{array}{r} 30 \\ -2 \times -15 \\ 17 \\ \hline 1 \times 30 \\ 2 \times 15 \end{array}$$

$10n^2 - 2n - 15n + 3$

$2n(5n-1) - 3(5n-1)$

$(2n-3)(5n-1)$

14)  $9x^2 - 43x - 10$

$$\begin{array}{r} -90 \\ 2 \times -45 \\ -43 \\ \hline 1 \times 90 \\ 2 \times 45 \end{array}$$

$9x^2 + 2x - 45x - 10$

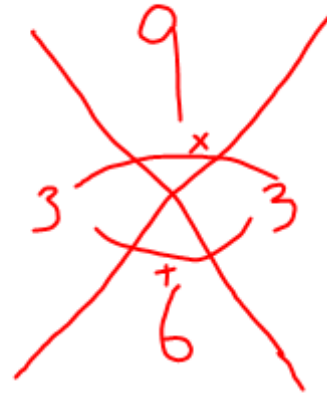
$x(9x+2) - 5(9x+2)$

$(x-5)(9x+2)$

# Perfect Squares

$$\boxed{x^2} + 6x + \boxed{9}$$

$$(x + 3)(x + 3)$$



$$\boxed{(x + 3)^2}$$

$$x \cdot x \quad 3 \cdot 3$$

$$2(3 \cdot x) = 6x$$

$$\underline{1}x^2 - \underline{8}x + \underline{16}$$

$$(x - 4)^2$$

A handwritten diagram showing the factoring process for the trinomial  $x^2 - 8x + 16$ . It features a large 'X' shape formed by two intersecting lines. The number '16' is written at the top vertex, '-8' at the bottom vertex, '-4' at the right vertex, and a crossed-out '4' at the left vertex.

$$(x - 4)(x - 4)$$

$$(x - 4)^2$$

$$\underbrace{4x^2}_{2x} + \underline{20x} + \underbrace{25}_5$$

~~$$\begin{array}{cc} & 100 & \\ 10 & & 10 \\ & 20 & \end{array}$$~~

$$4x^2 + 10x + 10x + 25$$

$$2x(2x+5) \quad 5(2x+5)$$

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

$$(2x+5)^2$$



$$\begin{array}{c} 9x^2 \\ \downarrow \\ (3x) \end{array} + \begin{array}{c} 54x \\ \hline \end{array} + \begin{array}{c} 81 \\ \downarrow \\ (9)^2 \end{array}$$

~~$$\begin{array}{c} 729 \\ \hline 54 \end{array}$$~~

$$\begin{array}{r} 3 \cdot 9 = 27 \\ \times 2 \\ \hline 54 \end{array}$$

11 · 11

7 · 7

$$121x^2 - \underline{154}x + 49$$

2 · 7 · 11

$$(11x - 7)^2$$

# Difference of Squares

$$x^2 + 0x - 4$$

$x^2$  is a perfect square.  
 $4$  is a perfect square.

$$\begin{array}{c}
 -4 \\
 -2 \quad +2 \\
 0
 \end{array}$$

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

$$\begin{array}{c} \textcircled{x^2} \\ x \end{array} \quad \text{---} \quad \begin{array}{c} \textcircled{100} \\ 10 \end{array}$$

$$(x - 10)(x + 10)$$

$$\begin{array}{ccc} & -100 & \\ -10 & \times & 10 \\ & 0 & \end{array}$$



$$\underbrace{100x^2} \quad \rightarrow \quad \underbrace{4}$$

$\downarrow$                        $\downarrow$

$$10x \qquad \qquad \qquad 2$$

$$(10x + 2)(10x - 2)$$

# Sum of Squares

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

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

$$F: x^2$$

$$O: -ix$$

$$I: +ix$$

$$L: -i^2$$

$$x^2 - ix + ix - i^2$$

$$x^2 - i^2$$

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

$$= x^2 + 1$$

$$1 \cdot 1$$

$$1 + 1 = 2$$

$$-1 \cdot -1 = 1$$

$$-1 + -1 = -2$$

$$-1 \cdot 1 = -1$$

$$x^2 + 36 = (x + 6i)(x - 6i)$$

$$x^2 - \underbrace{6ix + 6ix} - 36i^2$$

$-36(-1)$

$$x^2 + 36$$



$$49x^2 \overset{\star}{+} 64$$

$$(7x-8)(7x+8)$$

$$(7x + 8i)(7x - 8i)$$

$$\underline{\underline{49x^2 - 64}}$$

$$49x^2 - 64i^2$$

$$(7x+8)^2$$

$$\underline{\underline{49x^2 + 64}}$$

$$49x^2 + \underline{\underline{112x}} + 64$$

$$\underline{x}^2 \textcircled{+} \underline{64} = (x + 8i)(x - 8i)$$

$$25x^2 + 36 = (5x + 6i)(5x - 6i)$$

$$x^2 - 12x + 36$$

$$9x^2 + 30x + 25$$

$$x^2 - 121$$

$$4x^2 + 16$$

# HW #15

## Factoring Special Products