



NOS

المدرسة
الوطنية الأرثوذكسية
الشميساني



The National
Orthodox School
Shmaisani

Objective : Multiplying algebraic expressions
ضرب المعادير الجبرية

Teacher: Wisam al mashni

Multiplying Algebraic Expressions

Distributive Law

قانون التوزيع

The **distributive law** for real numbers states that

$$a(b \pm c) = ab \pm ac$$

$$(a \pm b)c = ac \pm bc$$

for any real numbers a , b , and c .

Quick Example

$2(x - 3)$ is *not* equal to $2x - 3$ but is equal to

$$2x - 2(3) = 2x - 6.$$

$$2(x-3) = \boxed{2x-6}$$

Example :

Expand the following:

1. $a(3+t) = 3a + at$

2. $2(4t - 3k) = 8t - 6k$

3. $5(n + 3p) = 5n + 15p$

4. $2(4x + 5) = 8x + 10$

5. $2(3x - 4) = 6x - 8$

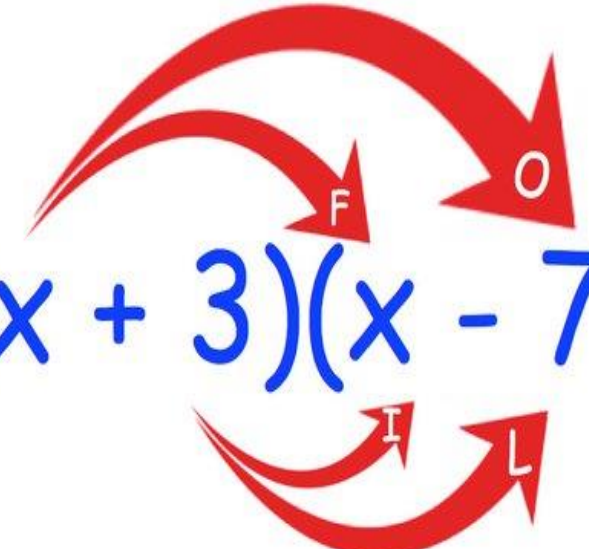
6. $6(2k + 3) = 12k + 18$

Expanding Two Brackets

To expand two brackets... use FOIL

First
Outer
Inner
Last

Expand: $(x + 3)(x - 7)$



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

$$= x^2 - 4x - 21$$

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

Expand and Simplify :

$$(a + 4)(a + 2)$$

$$= a^2 + 2a + 4a + 8$$

Like Terms

$$= a^2 + 6a + 8$$

Expanding Brackets - Example

Expand the Binomial: $(m + 4)(m + 1)$

$$(m + 4)(m + 1) =$$



$$m \times m + m \times 1 + 4 \times m + 4 \times 1$$

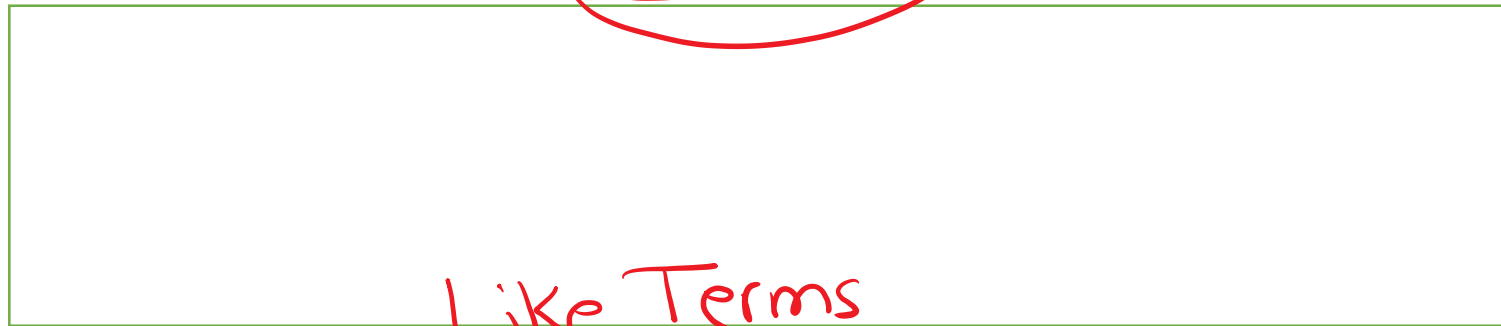
$$= m^2 + m + 4m + 4$$

$$= m^2 + 5m + 4 \checkmark$$

Simplify by Combining
the Like Term items.

Using the distributive property to find the product of two binomials.

Simplify: $(x - 6)(4x + 3)$



Like Terms

$$4x^2 + 3x - 24x - 18$$

$$4x^2 - 21x - 18$$

Example
: Expand and Simplify :

Linking Method - FOIL

FOIL stands for:

- F - First**
- O - Outside**
- I - Inside**
- L - Last**

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

$$x^2 - 10x + 2x - 20$$

$$x^2 - 8x - 20$$

Expand and simplify...



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

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

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

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



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Expand and Simplify:

① $(x-1)(3x+4) =$

② $(7m+5)(3+m) =$

③ $(b-8)^2 =$

④ $(n+10)^2 =$

⇨ answer

~~★~~ Expand and simplify: ~~★~~ answer

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

② $(7m+5)(3+m) = 21m + 7m^2 + 15 + 5m$
 $= 26m + 7m^2 + 15$

★ Expand and simplify: ★

answer

$$\begin{aligned} \textcircled{3} (b-8)^2 &= (b-8)(b-8) \\ &= b^2 - 8b - 8b + 64 \\ &= b^2 - 16b + 64 \end{aligned}$$

$$\begin{aligned} \textcircled{4} (n+10)^2 &= (n+10)(n+10) \\ &= n^2 + 10n + 10n + 100 \\ &= n^2 + 20n + 100 \end{aligned}$$

Think

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

$$2x^5 - 5x^2 + 6x^3 - 15$$

Remember

$$x^2 * 2 * x^3 = 2x^5$$

stop

Think

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

$$= 49m^2 + \underbrace{21m - 21m}_{\text{Like Term}} - 9$$

$$= \boxed{49m^2 - 9}$$

stop

$$\begin{aligned} & \textcircled{21m} - \textcircled{21m} \\ &= 0 * m \\ &= 0 \end{aligned}$$

Special Cases

★ $(a+b)^2 = a^2 + 2ab + b^2$... ①

★ $(a-b)^2 = a^2 - 2ab + b^2$... ②

★ $(a+b)(a-b) = a^2 - b^2$... ③



Special Binomial Products to Memorize

- When a **binomial** is **squared**, the result is always a “**perfect square trinomial**”

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

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

- Both of these can be summarized as a formula:
 - **Square** the **first** term
 - **Multiply 2** times **first** term times **second** term
 - **Square** the **last** term

$$(3x + 2)^2 = 9x^2 + 12x + 4$$

$$(4x - 5)^2 = 16x^2 - 40x + 25$$



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➤ **Square of a Sum** مربع المجموع


The square of $(a + b)$ is equal to the square of the first term (a) , plus twice the product of the first and second terms (a, b) , plus the square of the second term (b) .

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

$$(a + b)(a + b)$$

$$(a)(a) + (a)(b) + (b)(a) + (b)(b)$$

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


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

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1 $(3k + 5)^2$

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

$$(3k + 5)^2 = (3k)^2 + (2 \times 3k \times 5) + (5)^2$$

$$= 9k^2 + 30k + 25$$

قانون مربع مجموع حدين

$$a = 3k, b = 5$$

أبسط



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

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

$$(y^2 + 3)^2 = (y^2)^2 + (2 \times y^2 \times 3) + 3^2$$

$$= y^4 + 6y^2 + 9$$

قانونُ مربعِ مجموعِ حدينِ

$$a = y^2, b = 3$$

أبسطُ



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


مربع الفرق

Square of a difference

$$\begin{aligned}(a-b)^2 &= [a+(-b)]^2 = (a)^2 + 2(a)(-b) + (b)^2 \\ &= a^2 - 2ab + b^2\end{aligned}$$

مربع مجموع حدين

أبسط



1 $(2h - z)^2$

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

$$\begin{aligned}(2h-z)^2 &= (2h)^2 - (2 \times 2h \times z) + (z)^2 \\ &= 4h^2 - 4hz + z^2\end{aligned}$$

قانونُ مربعِ الفرقِ بينَ حدَّينِ

$$a = 2h, b = z$$

أبسطُ

2 $(6 - 5y^3)^2$

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

$$\begin{aligned}(6-5y^3)^2 &= (6)^2 - (2 \times 6 \times 5y^3) + (5y^3)^2 \\ &= 36 - 60y^3 + 25y^6\end{aligned}$$

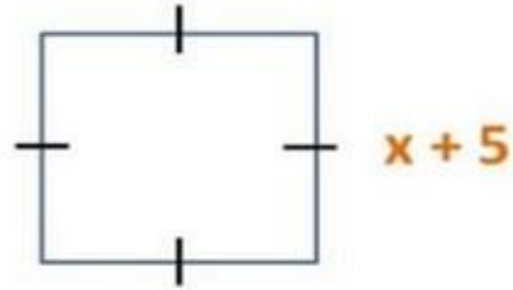
قانونُ مربعِ الفرقِ بينَ حدَّينِ

$$a = 6, b = 5y^3$$

أبسطُ

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What is the area of the following shape?



- a) $x^2 + 25$ c) $4x + 20$
b) $x^2 + 10x + 25$ d) not enough info

$$A_{\square} = (\text{side length})^2 = (x + 5)^2 = x^2 + 10x + 25 \quad \star \quad b$$



③

ضرب مجموع حدين في الفرق بينهما

مفهوم أساسي



• **بالكلمات:** ناتج ضرب $(a-b)(a+b)$ يساوي مربع a مطروحاً منه مربع b .

• **بالرموز:** $(a+b)(a-b) = a^2 - b^2$

Sum * difference

الفرق * المجموع

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مثال 3

أجدُ ناتجَ كلِّ ممَّا يأتي:

1 $(2c + 3)(2c - 3)$

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

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

$$= 4c^2 - 9$$

قانونُ ضربِ مجموعِ حدَّينِ في الفرقِ بينهما

أعوُضُ $a = 2c, b = 3$

أبسُطُ



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$$2 \quad (4x^2 + d^5)(4x^2 - d^5)$$

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

$$\begin{aligned}(4x^2 + d^5)(4x^2 - d^5) &= (4x^2)^2 - (d^5)^2 \\ &= 16x^4 - d^{10}\end{aligned}$$

قانونُ مربعِ مجموعِ حدَّينِ

$$a = y^2, b = 3$$

أبسطُ



Determine whether this statement is true or false,
explain your answer

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

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

False,

$$\begin{aligned}(3x-4)^2 &= (3x)^2 - \underline{2*3x*4} + (4)^2 \\ &= 9x^2 - 24x + 16\end{aligned}$$



The End

