

Student Name:

Solving Quadratic Equations by Factoring

حل المعادلات التربيعية بالتحليل إلى عوامل

Today's Goals أهداف اليوم

- Solve quadratic equations by factoring.
- Solve quadratic equations by factoring special products.

Key Concepts مفاهيم أساسية

Zero Product Property: if $ab = 0$, then $a = 0$ or $b = 0$

Common factor: $ax^2 + bx = x(ax + b)$

Trinomials: $x^2 + bx + c = (x + m)(x + p)$ when $m + p = b$ and $m \cdot p = c$

Difference of squares: $a^2 - b^2 = (a - b)(a + b)$

Perfect square trinomial: $a^2 + 2ab + b^2 = (a + b)^2$

Example 1 Common factor

Solve $10x^2 - 4x = x$

$$10x^2 - 5x = 0$$

$$5x(2x - 1) = 0$$

$$5x = 0 \text{ or } 2x - 1 = 0$$

$$x = 0 \text{ or } x = 1/2$$

Example 3 Trinomial, $a \neq 1$

Solve $3x^2 + 7x + 12 = 10$

$$3x^2 + 7x + 2 = 0$$

$$3x^2 + 6x + x + 2 = 0$$

$$3x(x + 2) + 1(x + 2) = 0$$

$$(3x + 1)(x + 2) = 0$$

$$x = -1/3 \text{ or } x = -2$$

Check Solve $6x^2 + 7x - 5 = 1$

$$x = \dots \text{ or } x = \dots$$

Always check: substitute each solution into the original equation. تحقق بالتعويض.

Now go to your level page: ★ Basic · ★★ Medium · ★★★ Challenge

Example 2 Trinomial, $a = 1$

Solve $x^2 - 4x - 9 = 12$

$$x^2 - 4x - 21 = 0$$

$$(x - 7)(x + 3) = 0$$

$$x - 7 = 0 \text{ or } x + 3 = 0$$

$$x = 7 \text{ or } x = -3$$

Example 4 Special products

(a) Solve $144 = x^2$

$$x^2 - 144 = 0$$

$$(x - 12)(x + 12) = 0$$

$$x = 12 \text{ or } x = -12$$

(b) Solve $4y^2 - 5y + 14 = 7y + 5$

$$4y^2 - 12y + 9 = 0$$

$$(2y - 3)^2 = 0$$

$$y = 3/2$$

Check Solve $x^2 = 225$

$$x = \dots \text{ or } x = \dots$$

K-RACHID

تعليق

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LIVEWORKSHEETS

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المستوى الأول: أساسي | Level 1 • Basic

Solve each equation by factoring. Check your solution.

حل كل معادلة بالتحليل إلى عوامل، ثم تحقق من الحل.

تلميح Hint

- 1) Move all terms to one side so that the equation = 0.
- 2) Factor: common factor, or two numbers with product c and sum b , or $a^2 - b^2$.
- 3) Set each factor equal to 0 and solve.

Q1) $6x^2 - 12x = 0$

Q2) $x^2 = 9x$

x = _____ or x = _____

Q3) $10x^2 = -20x$

x = _____ or x = _____

Q4) $x^2 + 2x - 24 = 0$

x = _____ or x = _____

Q5) $x^2 + 12x + 35 = 0$

x = _____ or x = _____

Q6) $x^2 - 4x = 12$

x = _____ or x = _____

Q7) $x^2 = 49$

x = _____ or x = _____

Q8) $x^2 - 81 = 0$

x = _____ or x = _____

Check: substitute your answers of Q4 into $x^2 + 2x - 24 = 0 \rightarrow$ _____

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حل المعادلات التربيعية بالتحليل إلى عوامل

المستوى الثاني: متوسط | Level 2 • Medium

Solve each equation by factoring. Check your solution.

حل كل معادلة بالتحليل إلى عوامل، ثم تحقق من الحل.

Hint تلميح

When $a \neq 1$: multiply $a \cdot c$, find two numbers with that product and sum b , split the middle term, then factor by grouping.

A perfect square trinomial gives one repeated solution.

Q1) $2x^2 - 5x - 3 = 0$

Q2) $5x^2 + 13x - 6 = 0$

x = _____ or x = _____

Q3) $6x^2 + 5x - 4 = 0$

x = _____ or x = _____

Q4) $3x^2 + 4x = 15$

x = _____ or x = _____

Q5) $4x^2 - 20x + 25 = 0$

x = _____ or x = _____

Q6) $9x^2 + 12x = -4$

x = _____ or x = _____

Q7) The length of a rectangle is 4 feet more than its width. The area is 96 square feet. Find the dimensions of the rectangle.

Let w = width. Equation: _____

Answer: _____

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المستوى الثالث: تحدي | Level 3 - Challenge

Solve each equation by factoring. Check your solution.

حل كل معادلة بالتحليل إلى عوامل، ثم تحقق من الحل.

Q1) $12x^2 - 17x + 6 = 0$

Q2) $8x^2 + 2x = 15$

$x = \dots$ or $x = \dots$

$x = \dots$ or $x = \dots$

Q3) $9y^2 - 10y + 21 = 14y + 5$

Q4) $36x^2 + 5 = 30$

$y = \dots$ or $y = \dots$

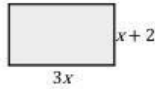
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Q5) A rectangular lawn is 20 feet wide and 30 feet long. A designer increases the length and the width by the same amount so that the total area is 875 square feet. By how many feet should each side be increased?

Answer:

Q6) The area of the rectangle shown is 72 square inches. What is the perimeter?

- a) 4 in b) 18 in
c) 36 in d) 72 in



Q7) A store's profit is $P(x) = -x^2 + 60x - 800$, where x is the price of each item. At which prices does the store make no profit?

- A) \$10 and \$80 B) \$20 and \$40 C) \$25 and \$32 D) \$16 and \$50

Answer:

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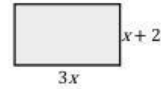
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