Tasks 02-03 - Quadratic & Biquadratic Equations

Section 02: Equations & Problem-Solving Strategies

Instructions

Complete these problems to master solving quadratic and biquadratic equations. Practice choosing the appropriate method (factoring, quadratic formula, or completing the square) based on the equation's structure.

Problem 1: Converting to Zero Form (x)

Convert each equation to the form "expression = 0" and then solve:

a) $5x + 15 = 30$

b) $3x - 7 = 2x + 8$

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

d) $\frac{2x+6}{3} = x - 1$

e) $0.5x + 2.5 = 1.5x - 3.5$

Problem 2: Zero Product Property (x)

Use the zero product property to solve each equation:

a) $(x - 5)(x + 3) = 0$

b) $(2x - 8)(3x + 6) = 0$

c) $x(x - 7) = 0$

d) $(4x + 12)(x - 1)(x + 2) = 0$

e) $3x(2x - 10) = 0$

Problem 3: Discriminant Analysis (x)

For each quadratic equation, calculate the discriminant and predict the number of solutions. Then solve using the quadratic formula.

a) $3x^2 - 7x + 2 = 0$

b) $x^2 + 4x + 4 = 0$

c) $2x^2 - 3x + 5 = 0$

d) $-x^2 + 6x - 9 = 0$

Problem 4: Method Selection Practice (x)

Solve each equation using the indicated method:

a) Factor: $x^2 - 11x + 30 = 0$

b) Complete the square: $x^2 + 8x + 3 = 0$

c) Quadratic formula: $3x^2 + 5x - 7 = 0$

d) Your choice: $4x^2 - 12x + 9 = 0$

Problem 5: Biquadratic Equations (xx)

Solve each biquadratic equation:

a) $x^4 - 10x^2 + 9 = 0$

b) $x^4 + 3x^2 - 28 = 0$

c) $2x^4 - 9x^2 + 4 = 0$

Problem 6: Break-Even Analysis (xx)

A small bakery has the following monthly financial structure:

- Fixed costs (rent, utilities, salaries): $8,000
- Variable cost per dozen pastries: $4
- Selling price per dozen: $12

a) Write the profit equation P in terms of x dozens sold
b) Convert the break-even condition (P = 0) to standard zero form
c) Solve for the break-even quantity
d) If they currently sell 800 dozen, what is their profit?
e) How many dozen must they sell for a profit of $4,000?

Problem 7: Complex Zero Form Applications (xxx)

A manufacturing company produces two products, A and B, with the following relationships:

- Combined production: $x + y = 100$ units
- Revenue difference: The revenue from A exceeds revenue from B by $500
- Product A sells for $30 per unit, Product B sells for $25 per unit

a) Express y in terms of x using the production constraint
b) Write the revenue difference equation
c) Substitute and convert to zero form
d) Solve for the production quantities
e) What would happen if the revenue difference requirement changed to $1,000?

Problem 8: Work Rate Problems (xxx)

Two painters can paint a house together in 12 hours. Painter A works twice as fast as Painter B.

a) Let x = hours for Painter B to paint alone. Express Painter A's time in terms of x
b) Write the combined work rate equation

c) Solve for x
d) How long would each painter take working alone?
e) If they work together for 8 hours, what fraction of the house remains unpainted?