

Grade 7 Math – Art of Problem Solving

3.4 Factoring Expressions

Work in class. Show reasoning, examples, or diagrams that support your conclusions.

1. Several correct products

Write $24x + 36$ as a product in three different ways using positive whole-number factors outside parentheses. Which way uses the GCF? Explain why the other products are still correct.

2. A negative choice

Factor $6x - 15$ in two ways: once with 3 outside and once with -3 outside. Explain why the two products are equal even though the expressions inside have opposite signs.

3. From area to fencing

A rectangular seed bed is 7 feet wide and has area $(21s + 35)$ square feet. Find its length and perimeter. Three identical beds are fenced separately. Write the total fence length as both a factored and an expanded expression.

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3.4 Factoring Expressions | Continued

Work in class. Show reasoning, examples, or diagrams that support your conclusions.

4. One amount, two fractions

Factor $\frac{3}{4}x + \frac{9}{8}$ first by taking out $\frac{3}{8}$ and then by taking out $\frac{3}{4}$. Which choice leaves whole-number coefficients inside parentheses? Verify both products.

5. A hidden common variable

Factor $12uv + 18u$ by taking out $6u$. Then explain how your product shows that the original expression is 0 whenever $u = 0$, regardless of v . You do not need to divide by u to justify this.

6. How many groups?

A makerspace has $36n + 48$ identical beads and divides them equally among g trays. The expression for beads per tray must have whole-number coefficients for *every* nonnegative whole number n . Find every possible positive whole-number value of g . Explain why there are no others.