Name _____ Date _____

Factoring Special Products: Find the Error

Directions: Each question shows a student's work factoring a special product. The patterns are $a^2 - b^2 = (a + b)(a - b)$, $a^2 + 2ab + b^2 = (a + b)^2$ and $a^2 - 2ab + b^2 = (a - b)^2$, each true for all values of a and b. In each worked solution exactly one step is wrong, and every step after it follows from the wrong one.

1. Jamal factored $2x^2 + 18$, and one step in his work is wrong.

1. $2(x^2 + 9)$
2. $2(x^2 + 3^2)$
3. $2(x + 3)(x - 3)$

Which step is wrong?

A. From $2(x^2 + 3^2)$ to $2(x + 3)(x - 3)$ B. From $2(x^2 + 9)$ to $2(x^2 + 3^2)$

C. From $2x^2 + 18$ to $2(x^2 + 9)$

2. Elena factored $3x^2 - 30x + 75$ completely, but one step is wrong.

1. $3(x^2 - 10x + 25)$
2. $3(x^2 - 2(5)x + 5^2)$
3. $3(x - 5)(x + 5)$

Which step is wrong?

A. From $3(x^2 - 10x + 25)$ to $3(x^2 - 2(5)x + 5^2)$

B. From $3x^2 - 30x + 75$ to $3(x^2 - 10x + 25)$

C. From $3(x^2 - 2(5)x + 5^2)$ to $3(x - 5)(x + 5)$

3. Noah's work for factoring $2x^2 - 18$ completely has a mistake.

1. $2(x^2 - 18)$
2. 18 is not a perfect square, so $x^2 - 18$ cannot be factored with integers.
3. So $2x^2 - 18$ factors completely as $2(x^2 - 18)$.

Where does his work first go wrong?

A. Saying $x^2 - 18$ cannot be factored with integers because 18 is not a perfect square

B. Writing $2x^2 - 18$ as $2(x^2 - 18)$

C. Concluding that $2x^2 - 18$ factors completely as $2(x^2 - 18)$

4. Ivy factored $9x^2 - 16$, and one step is wrong.

1. $9x^2 - 4^2$
2. $(9x)^2 - 4^2$
3. $(9x + 4)(9x - 4)$

Which step is wrong?

A. From $(9x)^2 - 4^2$ to $(9x + 4)(9x - 4)$ B. From $9x^2 - 4^2$ to $(9x)^2 - 4^2$

C. From $9x^2 - 16$ to $9x^2 - 4^2$

5. Omar wanted to factor $4x^2 + 12x + 9$, but his work has a mistake.

1. $4x^2 + 12x + 9$ is $(2x)^2 + 12x + 9^2$.
2. For a perfect square, the middle term would be $2(2x)(9) = 36x$, not $12x$.
3. So $4x^2 + 12x + 9$ is not a perfect square trinomial.

Where does his work first go wrong?

A. Concluding that $4x^2 + 12x + 9$ is not a perfect square trinomial
B. Finding that the middle term would be $2(2x)(9) = 36x$
C. Writing $4x^2 + 12x + 9$ as $(2x)^2 + 12x + 9^2$

6. Kai factored $x^4 - 16$ completely, and his work has one error.

1. $(x^2 + 4)(x^2 - 4)$
2. $(x + 2)(x - 2)(x + 2)(x - 2)$

Which expression is equivalent to $x^4 - 16$ and factored completely?

A. $(x^2 + 4)(x + 2)(x - 2)$
B. $(x^2 - 4)^2$
C. $(x^2 + 4)(x^2 - 4)$
D. $(x + 2)^2(x - 2)^2$

7. Rae factored $4x^2 - 100$ completely, but one step is wrong.

1. $(2x)^2 - 10^2$
2. $(2x - 10)^2$
3. $4(x - 5)^2$

Correct the error. The complete factorization has the form $a(x + b)(x - b)$, where a and b are positive integers, and it is equivalent to $4x^2 - 100$ for every value of x. What is b?

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8. Dee factored $x^2 + 6x + 9$ and then checked her answer, but one step is wrong.

1. $x^2 + 6x + 9$ factors as $(x + 3)^2$.
2. Check: $(x + 3)^2$ is $x^2 + 9$.
3. Since $x^2 + 9$ is not $x^2 + 6x + 9$, $(x + 3)^2$ must be wrong.

Where does her work first go wrong?

A. Deciding that $(x + 3)^2$ is wrong because $x^2 + 9$ is not $x^2 + 6x + 9$
B. Multiplying out $(x + 3)^2$ as $x^2 + 9$
C. Factoring $x^2 + 6x + 9$ as $(x + 3)^2$