Multiplying Trinomials Practice

Use the following information to answer the next question.

A math student was asked to multiply the following trinomials.

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

1. An equivalent expression is

   A) $[(x^2)(3x^2)] + [(4x)(-x)] + [(9)(2)]$
   B) $x^2(3x^2 - x + 2)$
   C) $[(x^2)(3x^2 - x + 2)] + [4x(3x^2 - x + 2)]$
   D) $[(x^2)(3x^2 - x + 2)] + [4x(3x^2 - x + 2)] + [9(3x^2 - x + 2)]$

2. The expansion of $(w + 3)(3w^2 - w + 6)$ can be written as $3w^3 + Kw^2 + 3w + 18$, where K is an integer. The value of K is ____.

3. An equivalent expression for $c(5c^2 - c - 1) - 4(5c^2 - c - 1)$ is

   A) $(c + 4)(5c^2 - c - 1)$
   B) $(c - 4)(5c^2 - c - 1)$
   C) $(c + 4)(5c^2 + c + 1)$
   D) $(c - 4)(5c^2 + c + 1)$

Use the following information to answer the next question.

Consider the following expression that identifies operations (multiply, add, or subtract) by the letters A – G.

$$7(x + 1) - 3(x^2 + 6x - 2) + 5x^2$$

A B C D E F G

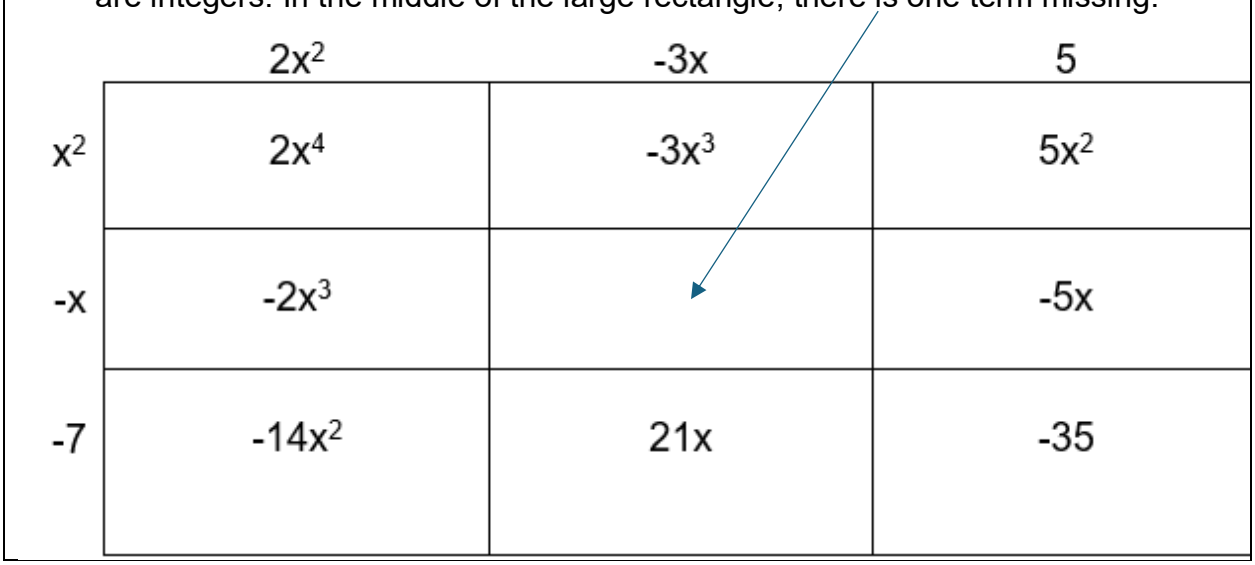
4. One possible order of operations used to simplify this expression could be

   A) ADCG B) ABCG C) GCFB D) DCBG

Use the following information to answer the next question.

One way to multiply two trinomials is a representational way using areas of rectangles. The expansion of $(2x^2 – 3x + 5)(x^2 – x – 7)$ is shown below.

The final expression can be simplified as $2x^4 – 5x^3 - Kx^2 + Mx – 35$, where K and M are integers. In the middle of the large rectangle, there is one term missing.



	$2x^2$	$-3x$	5
x^2	$2x^4$	$-3x^3$	$5x^2$
$-x$	$-2x^3$		$-5x$
-7	$-14x^2$	$21x$	-35

5. The missing term is _____ and the value of M is ____.

6. The product of $(x – 7)(x^2 + 3x + 10)$ is

   A) $x^3 + 4x^2 + 11x – 70$
   B) $x^3 - 4x^2 - 11x - 70$
   C) $-3x^2 + 11x + 70$
   D) $-3x^2 - 11x – 70$

7. When Marco multiplied the trinomials $(m^2 + m – 5)(m^2 – 2m + 1)$ he came up with an answer of $m^4 – 2m^2 – 5$. To check his result, he let $m = 1$ and substituted this value into both the original expression and his simplified answer.

Original	Simplified Answer
$(m^2 + m – 5)(m^2 – 2m + 1)$	$m^4 – 2m^2 – 5$
$((1)^2 + (1) – 5)((1)^2 – 2(1) + 1)$	$(1)^4 – 2(1)^2 – 5$
$(1 + 1 – 5)(1 – 2 + 1)$	$1 – 2 – 5$
$(-3)(0)$	-6
0	-6

a) Marco's simplified answer is not correct. How does he know? Explain.

b) Determine the correct simplified answer showing all work. Verify using $m = 1$.

Multiplying Trinomials Practice Solutions

Use the following information to answer the next question.

A math student was asked to multiply the following trinomials.

$(x^2 + 4x + 9)(3x^2 – x + 2)$

1. An equivalent expression is

   A) $[(x^2)(3x^2)] + [(4x)(-x)] + [(9)(2)]$
   B) $x^2(3x^2 – x + 2)$
   C) $[(x^2)(3x^2 – x + 2)] + [4x(3x^2 – x + 2)]$
   D) $[(x^2)(3x^2 – x + 2)] + [4x(3x^2 – x + 2)] + [9(3x^2 – x + 2)]$

Solution

Each of the three terms in the first bracket (x^2, 4x, and 9) are to be multiplied by each term in the second bracket. When this is done, like terms are then combined to form the final simplified answer. Symbolically, this process is written as:

$$[(x^2)(3x^2 – x + 2)] + [4x(3x^2 – x + 2)] + [9(3x^2 – x + 2)]$$

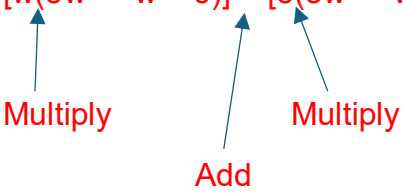
The correct answer is D.

2. The expansion of $(w + 3)(3w^2 – w + 6)$ can be written as $3w^3 + Kw^2 + 3w + 18$, where K is an integer. The value of K is _8_.

Solution

Multiply each term in the first bracket by each term in the second bracket.

$[w(3w^2 – w + 6)] + [3(3w^2 – w + 6)]$



Assess the operations (liked a skilled surgeon). Do the multiplications first, and then add.

$[3w^3 – w^2 + 6w] + [9w^2 – 3w + 18]$

$= \quad 3w^3 + 8w^2 + 3w + 18$

The value of K is 8.

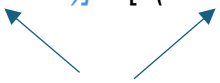
3. An equivalent expression for $c(5c^2 – c – 1) – 4(5c^2 – c – 1)$ is

   A) $(c + 4)(5c^2 – c – 1)$
   B) $(c - 4)(5c^2 – c – 1)$
   C) $(c + 4)(5c^2 + c + 1)$
   D) $(c - 4)(5c^2 + c + 1)$

Solution

We can think of this question as factoring by grouping.

$[c(5c^2 – c – 1)] – [4(5c^2 – c – 1)]$



Think of $(5c^2 – c – 1)$ as a common factor that can divided out of each term. When factoring it out of each term, we are left with $(c – 4)$.

Thus, the expression is $(c – 4)(5c^2 – c – 1)$.

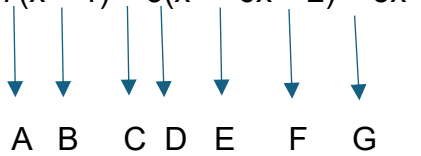
We can also think of this as the reversal of the distributive property. When multiplying the same trinomial by two different terms, we can rewrite as $(c – 4)(5c^2 – c – 1)$.

The correct answer is B.

Use the following information to answer the next question.

Consider the following expression that identifies operations (multiply, add, or subtract) by the letters A – G.

$7(x + 1) – 3(x^2 + 6x – 2) + 5x^2$



4. One possible order of operations used to simplify this expression could be
   A) ADCG B) ABCG C) GCFB D) DCBG

Solution

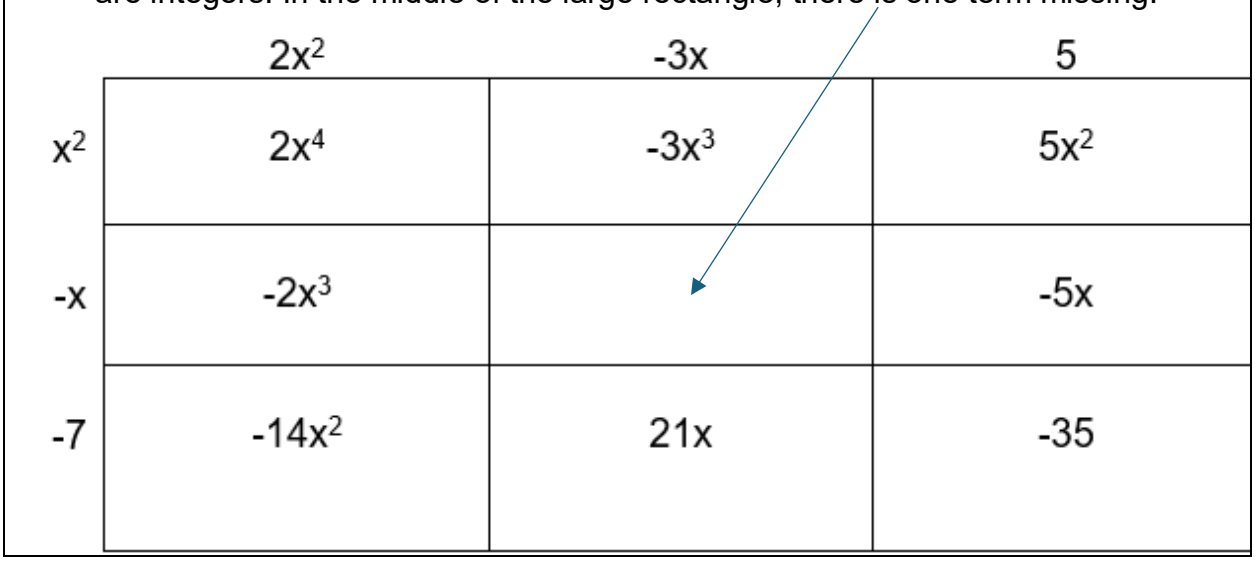
There are two numbers in front of brackets, implying multiplication at A and D. After performing multiplication, subtract at C and then add at G.

The correct answer is A.

Use the following information to answer the next question.

One way to multiply two trinomials is a representational way using areas of rectangles. The expansion of $(2x^2 – 3x + 5)(x^2 – x – 7)$ is shown below.

The final expression can be simplified as $2x^4 – 5x^3 - Kx^2 + Mx – 35$, where K and M are integers. In the middle of the large rectangle, there is one term missing.



	$2x^2$	$-3x$	5
x^2	$2x^4$	$-3x^3$	$5x^2$
$-x$	$-2x^3$		$-5x$
-7	$-14x^2$	$21x$	-35

5. The missing term is __$3x^2$__ and the value of M is _16_.

Solution

The missing term should be the product of (-3x) and (-x) since these are expressions representing the length and width of the rectangle (we are finding areas of rectangles here).

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

Adding the areas of the nine rectangles:

$2x^4 + -3x^3 + 5x^2 + -2x^3 + \mathbf{3x^2} + -5x + -14x^2 + 21x + -35$,

We combine like terms and arrive at a simplified answer of, $2x^4 – 5x^3 - \mathbf{6}x^2 + \mathbf{16}x – 35$

The missing term is $3x^2$ and the value of M is 16.

6. The product of $(x - 7)(x^2 + 3x + 10)$ is

   A) $x^3 + 4x^2 + 11x - 70$
   B) $x^3 - 4x^2 - 11x - 70$
   C) $-3x^2 + 11x + 70$
   D) $-3x^2 - 11x - 70$

Solution

Use the distributive property to multiply each term in the binomial by each term in the trinomial.

$[x(x^2 + 3x + 10)] - [7(x^2 + 3x + 10)]$

$[x^3 + 3x^2 + 10x] - [7x^2 + 21x + 70]$

Subtract every term in the brackets.

$x^3 + 3x^2 + 10x - 7x^2 - 21x - 70$

Combine like terms.

$x^3 - 4x^2 - 11x - 70$

The correct answer is B.

7. When Marco multiplied the trinomials $(m^2 + m – 5)(m^2 – 2m + 1)$ he came up with an answer of $m^4 – 2m^2 – 5$. To check his result, he let m = 1 and substituted this value into both the original expression and his simplified answer.

Original	Simplified Answer
$(m^2 + m – 5)(m^2 – 2m + 1)$	$m^4 – 2m^2 – 5$
$((1)^2 + (1) – 5)((1)^2 – 2(1) + 1)$	$(1)^4 – 2(1)^2 – 5$
$(1 + 1 – 5)(1 – 2 + 1)$	$1 – 2 – 5$
$(-3)(0)$	-6
0	-6

a) Marco's simplified answer is not correct. How does he know? Explain.

Solution

When two trinomials are multiplied and then simplified by combining like terms, the original expression should be equivalent to the simplified expression. Since they should be equivalent, substituting any value for the variable should produce the same number.

In this case, when m = 1 for the original expression, the number produced is 0. Since the simplified answer produces a different number (-6), Marco knows that his simplified answer is incorrect.

b) Determine the correct simplified answer showing all work. Verify using m = 1.

Solution

$[m^2(m^2 – 2m + 1)] + [m(m^2 – 2m + 1)] – [5(m^2 – 2m + 1)]$

$[m^4 – 2m^3 + m^2] + [m^3 – 2m^2 + m] – [5m^2 – 10m + 5]$

$m^4 – 2m^3 + m^2 + m^3 – 2m^2 + m – 5m^2 + 10m – 5$

Combine like terms.

$m^4 – m^3 – 6m^2 + 11m – 5$

Verify using m = 1.

$(1)^4 – (1)^3 – 6(1)^2 + 11(1) – 5$

$= \quad 1 – 1 – 6 + 11 – 5$

$= \quad 1 + -1 + -6 + 11 + -5$

$= \quad 12 + -12$

$= \quad 0$

Since the substitution of m = 1 into the original expression is also equal to 0 (as illustrated in the question above), it has been shown that the simplified answer is correct.