An Alternative to Decomposition Factoring Practice

All the following questions relate to the ACE Method of Factoring.

1. When given the expression $2x^2 + 11x + 14$ to factor, the result after the first step will be

   A) $x^2 + 11x + 7$
   B) $x^2 + 11x + 12$
   C) $x^2 + 11x + 16$
   D) $x^2 + 11x + 28$

Use the following information to answer the next question.

A math student was asked to factor $20x^2 – 28x – 3$. His work is shown below.

Step 1	$x^2 – 28x - 60$
Step 2	$(x – 30)(x + 2)$
Step 3	$\left(x - \frac{30}{3}\right)\left(x + \frac{2}{3}\right)$
Step 4	$(x - 10)\left(x + \frac{2}{3}\right)$
Step 5	The final factoring is $(x – 10)(3x + 2)$.

2. Unfortunately, an error was made. The first error occurred in step

   A) 2 B) 3 C) 4 D) 5

3. The expression $24x^2 + 14x - 3$ can be factored in the form $(Dx – E)(Fx + G)$. The sum of D + G is ____.

4. One factor of $15x^2 – 2x – 8$ is

   A) $(5x + 4)$ B) $(3x + 2)$ C) $(3x – 2)$ D) $(5x – 8)$

Use the following information to answer the next question.

Marty's math teacher told him that when factoring, it is always a good idea to check for a common factor **first**. His teacher then gave him the expression to factor: $8x^2 – 28x – 16$ Marty got the answer correct.

5. Which of the following is Marty's answer?

   A) $4(2x – 1)(x + 4)$
   B) $4(2x + 1)(x – 4)$
   C) $2(2x – 1)(x + 16)$
   D) $2(2x + 1)(x – 16)$

6. At one point when using the ACE method, the trinomial is $x^2 – 13x + 42$. The ***previous*** step and the ***next*** step could have been:

   A) The ***previous*** step was $21x^2 – 13x + 2$, and the ***next*** step is $(x – 6)(x – 7)$.
   B) The ***previous*** step was $21x^2 – 13x + 1$, and the ***next*** step is $(x – 6)(x – 7)$.
   C) The ***previous*** step was $21x^2 – 13x + 2$, and the ***next*** step is $(x + 6)(x – 7)$.
   D) The ***previous*** step was $21x^2 – 13x + 1$, and the ***next*** step is $(x + 6)(x – 7)$.

7. If the final factored form of a trinomial is $(x – 5)(6x + 1)$, a ***previous*** step could have been

   A) $\left(x-\frac{30}{5}\right)\left(x+\frac{1}{5}\right)$
   B) $\left(x+\frac{30}{5}\right)\left(x-\frac{1}{5}\right)$
   C) $\left(x-\frac{30}{6}\right)\left(x+\frac{1}{6}\right)$
   D) $\left(x+\frac{30}{6}\right)\left(x-\frac{1}{6}\right)$

8. Factor $30x^2 + 19x + 3$. Show all work and explain.

An Alternative to Decomposition Factoring Practice Solutions

All the following questions relate to the ACE Method of Factoring.

1. When given the expression $2x^2 + 11x + 14$ to factor, the result after the first step will be

   A) $x^2 + 11x + 7$
   B) $x^2 + 11x + 12$
   C) $x^2 + 11x + 16$
   D) $x^2 + 11x + 28$

Solution

Given the original expression of $2x^2 + 11x + 14$, A = 2, B = 11 and C = 14. Our first step is to multiply (A) (C) and exchange (E) C with this product. In this question, (A) (C) is (2)(14) or 28. Instead of writing 14, write 28.

The correct answer is D.

Use the following information to answer the next question.

A math student was asked to factor $20x^2 - 28x - 3$. His work is shown below.

Step 1	$x^2 - 28x - 60$
Step 2	$(x - 30)(x + 2)$
Step 3	$\left(x - \frac{30}{3}\right)\left(x + \frac{2}{3}\right)$
Step 4	$(x - 10)\left(x + \frac{2}{3}\right)$
Step 5	The final factoring is $(x - 10)(3x + 2)$.

2. Unfortunately, an error was made. The first error occurred in step

   A) 2 B) 3 C) 4 D) 5

Solution

Steps 1 and 2 are correct. In step 3, the integers in the brackets are divided by 3. This is incorrect. It should show the integers in the brackets divided by 20.

The correct answer is B.

3. The expression $24x^2 + 14x - 3$ can be factored in the form $(Dx – E)(Fx + G)$. The sum of D + G is _9_.

Solution

Multiply (24)(3) to get 72 and exchange this value with 3.

$x^2 + 14x – 72$

Factor using basic sum/product rules. We are looking for two numbers that multiply to

(-72) and add to 14. The numbers are -4 and 18.

$(x – 4)(x + 18)$

Since our original step was multiplying by 24, we now divide each of the integers in the brackets by 24.

$$\left(x-\frac{4}{24}\right)\left(x+\frac{18}{24}\right), and\ simplify\ \left(x-\frac{1}{6}\right)\left(x+\frac{3}{4}\right)$$

Multiply each of the denominators by the coefficients of the variables in the respective brackets.

$(6x – 1)(4x + 3)$

The value of D is 6 and the value of G is 3.

The sum of D + G is 9.

4. One factor of $15x^2 – 2x – 8$ is

A) (5x + 4) B) (3x + 2) C) (3x – 2) D) (5x – 8)

Solution

Multiply 15 by 8, and exchange 8 with this product.

$x^2 – 2x – 120$

We are looking for two numbers that have a product of -120 and a sum of -2. The numbers are -12 and 10.

$(x – 12)(x + 10)$

Divide each integer by 15.

$$\left(x-\frac{12}{15}\right)\left(x+\frac{10}{15}\right), and\ simplify, \left(x-\frac{4}{5}\right)\left(x+\frac{2}{3}\right)$$

The final factoring is $(5x - 4)(3x + 2)$.

The correct answer is B.

Use the following information to answer the next question.

Marty's math teacher told him that when factoring, it is always a good idea to check for a common factor **first**. His teacher then gave him the expression to factor: $8x^2 - 28x - 16$ Marty got the answer correct.

5. Which of the following is Marty's answer?

   A) $4(2x - 1)(x + 4)$
   B) $4(2x + 1)(x - 4)$
   C) $2(2x - 1)(x + 16)$
   D) $2(2x + 1)(x - 16)$

Solution

Begin by factoring out a common 4 from each term.

$4(2x^2 - 7x - 4)$

Multiply (A) (C) and perform the exchange (E).

$4(x^2 - 7x - 8)$

$4(x - 8)(x + 1)$

$$4\left(x - \frac{8}{2}\right)\left(x + \frac{1}{2}\right)$$

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

The correct answer is B.

6. At one point when using the ACE method, the trinomial is $x^2 - 13x + 42$. The ***previous*** step and the ***next*** step could have been:

   A) The ***previous*** step was $21x^2 - 13x + 2$, and the ***next*** step is $(x - 6)(x - 7)$.
   B) The ***previous*** step was $21x^2 - 13x + 1$, and the ***next*** step is $(x - 6)(x - 7)$.
   C) The ***previous*** step was $21x^2 - 13x + 2$, and the ***next*** step is $(x + 6)(x - 7)$.
   D) The ***previous*** step was $21x^2 - 13x + 1$, and the ***next*** step is $(x + 6)(x - 7)$.

Solution

The previous must have an (A) (C) product of 42. Options A and C above satisfy this requirement. The correct factoring of $x^2 - 13x + 42$ is $(x - 6)(x - 7)$.

The correct answer is A.

7. If the final factored form of a trinomial is $(x - 5)(6x + 1)$, a ***previous*** step could have been

   $A)\ \left(x - \frac{30}{5}\right)\left(x + \frac{1}{5}\right)$
   $B)\ \left(x + \frac{30}{5}\right)\left(x - \frac{1}{5}\right)$
   $C)\ \left(x - \frac{30}{6}\right)\left(x + \frac{1}{6}\right)$
   $D)\ \left(x + \frac{30}{6}\right)\left(x - \frac{1}{6}\right)$

Solution

When multiplying the denominator by the coefficient on the variable in the respective brackets, the only option yielding a correct factoring of $(x - 5)(6x + 1)$ is $\left(x - \frac{30}{6}\right)\left(x + \frac{1}{6}\right)$.

The correct answer is C.

8. Factor $30x^2 + 19x + 3$. Show all work and explain.

Solution

Multiply (A) (C) to get 90, and exchange (E) 3 with 90.

$x^2 + 19x + 90$

Find two numbers that multiply to 90 and add to 19. The numbers are 9 and 10.

$(x + 9)(x + 10)$

Divide each of the integers by 30.

$$\left(x+\frac{9}{30}\right)\left(x+\frac{10}{30}\right), and\ simplify, \left(x+\frac{3}{10}\right)\left(x+\frac{1}{3}\right)$$

Multiply each denominator by the coefficient of the variable in the respective brackets.

(10x + 3) (3x + 1).

The final factored form of $30x^2 + 19x + 3$ is (10x + 3) (3x + 1).