Factoring Trinomials With 2 Variables Practice

1. The correct factoring of $x^2 + 11xy + 30y^2$ is

   A) (x + 6) (x + 5y)

   B) (x + 6y) (x + 5)

   C) (x + 6y) (x + 5y)

   D) (xy + 6) (xy + 5)

Use the following information to answer the next question.

Consider the 8 potential binomial factors below.

E	F	G	H	I	J	K	L
(x + 3y)	(x – 1)	(x + 9y)	(x + y)	$(x + 9y^2)$	(x – y)	(x – 9y)	(x – 3y)

2. The two correct binomials for the factoring of $x^2 + 8xy – 9y^2$ are represented by the letters _____ and _____.

Use the following information to answer the next question.

	x	-
x	x^2	-4xy
- 12y		$48y^2$

3. The correct factoring statement is

   A) $x^2 – 16xy + 48y^2 = (x – 4y) (x – 12y)$
   B) $x^2 – 16xy + 48y^2 = (x – 4) (x – 12y)$
   C) $x^2 + 8xy + 48y^2 = (x – 4y) (x + 12y)$
   D) $x^2 + 8xy + 48y^2 = (x – 4) (x + 12y)$

4. One of the factors of $2x^2 - 9xy - 5y^2$ is

A) $(2x - y)$ B) $(x + 5y)$ C) $(2x - 5y)$ D) $(x - 5y)$

Use the following information to answer the next question.

The statement below is true, but is missing two terms signified by A and B.
$2x^2 + 11xy + A = (2x + B)(x + 4y)$

5. The expression for A is ____ and the expression for B is _____.

6. The complete factorization of $2x^3 + 4x^2y - 70xy^2$ is

A) $2x(x^2 + 2xy - 35y^2)$
B) $(x^2 + 2xy - 35y^2)$
C) $2x(x - 5y)(x + 7y)$
D) $(x - 5y)(x + 7y)$

Use the following information to answer the next question.

Consider the two trinomials below.
① $m^2 - 6mn - 40n^2$
② $m^2 + 3mn - 4n^2$

7. The factor common to both of these trinomials is

A) $(m + 4n)$ B) $(m + n)$ C) $(m + 10n)$ D) $(m - 4n)$

8. Factor $3x^2y + 19xy^2 + 20y^3$ completely. Show all work.

Factoring Trinomials With 2 Variables Practice Solutions

1. The correct factoring of $x^2 + 11xy + 30y^2$ is

A) (x + 6) (x + 5y)

B) (x + 6y) (x + 5)

C) (x + 6y) (x + 5y)

D) (xy + 6) (xy + 5)

Solution

Rewrite $x^2 + 11xy + 30y^2$ as $x^2 + (11y)x + 30y^2$.

We are looking for two *expressions* that add to 11y and multiply to $30y^2$.

Products for $30y^2$:

(y) (30y)

(2y) (15y)

(3y) (10y)

(5y) (6y)

The only pair that will sum to 11y is (5y)(6y). These are the *expressions* that will be the second term in each binomial.

(x + 5y) (x + 6y)

The correct answer is C.

Use the following information to answer the next question.

Consider the 8 potential binomial factors below.

E	F	G	H	I	J	K	L
(x + 3y)	(x – 1)	(x + 9y)	(x + y)	$(x + 9y^2)$	(x – y)	(x – 9y)	(x – 3y)

2. The two correct binomials for the factoring of $x^2 + 8xy – 9y^2$ are represented by the letters __G__ and __J__.

Solution

Rewrite $x^2 + 8xy – 9y^2$ as $x^2 + (8y)x – 9y^2$

We are looking for two *expressions* that add to 8y and multiply to $-9y^2$.

Products of $-9y^2$ (where each term has the letter y)

(-y) (9y)

(y) (-9y)

(3y) (-3y)

The expressions are (-y) and (9y)

Thus, $x^2 + 8xy – 9y^2 = (x – y)(x + 9y)$

The letters are G and J.

Use the following information to answer the next question.

	x	- ■
x	x^2	-4xy
- 12y	■	$48y^2$

3. The correct factoring statement is

   A) $x^2 – 16xy + 48y^2 = (x – 4y)(x – 12y)$
   B) $x^2 – 16xy + 48y^2 = (x – 4)(x – 12y)$
   C) $x^2 + 8xy + 48y^2 = (x – 4y)(x + 12y)$
   D) $x^2 + 8xy + 48y^2 = (x – 4)(x + 12y)$

Solution

In order to get -4xy, that is in the upper right of the rectangle, (x) must be multiplied by some quantity. Therefore, $\frac{-4xy}{x} = unknown\ quantity$. The unknown quantity is -4y.

	x	$-4y$
x	x^2	$-4xy$
$-12y$		$48y^2$

The lower left hand box is the product of (x) (-12y), which is -12xy.

	x	$-4y$
x	x^2	$-4xy$
$-12y$	$-12xy$	$48y^2$

After combining like terms, the sum of the areas inside the big box is $x^2 - 16xy + 48y^2$.

The correct statement is $x^2 - 16xy + 48y^2 = (x - 4y)(x - 12y)$.

The correct answer is A.

4. One of the factors of $2x^2 - 9xy - 5y^2$ is

A) $(2x - y)$ B) $(x + 5y)$ C) $(2x - 5y)$ D) $(x - 5y)$

Solution

The only difference between $2x^2 - 9xy - 5y^2$ and $2x^2 - 9x - 5$, is that the second term in each binomial has the letter 'y'. The plan here is to first factor $2x^2 - 9x - 5$, and then insert the letter 'y' in the appropriate spot.

With $2x^2 - 9x - 5$ being the form of $ax^2 + bx + c$, $a \neq 1$, I will use an alternative to decomposition, that I call ACE. We will multiply (A) (C), and then exchange (E) this product with C.

$(2)(-5) = -10$

The trinomial is now written as $x^2 - 9x - 10$. Use the sum/product to factor.

$x^2 - 9x - 10 = (x - 10)(x + 1)$. Now divide each constant by the original 'a' value of 2.

$$\left(x-\frac{10}{2}\right)\left(x+\frac{1}{2}\right)$$

Rewrite the first bracket with an equivalent integer, and in the second bracket, multiply each term by 2.

$(x – 5) (2x + 1)$.

$2x^2 – 9x – 5 = (x – 5) (2x + 1)$

Now place ‘y’ as part of each second term in each binomial.

$(x – 5y) (2x + y)$

$2x^2 – 9xy – 5y^2 = (x – 5y) (2x + y)$

The correct answer is D.

Use the following information to answer the next question.

The statement below is true, but is missing two terms signified by A and B.

$2x^2 + 11xy + A = (2x + B) (x + 4y)$

5. The expression for A is _<u>12y²</u>_ and the expression for B is __<u>3y</u>___.

Solution

In order to get 11xy, sum the product of (2x)(4y) and (B) (x). Thus, 11xy = 8xy + Bx.

Bx has to be 3xy. Therefore, B = 3y.

A is the product of (B) and (4y). Since B = 3y, A = (3y) (4y), or $12y^2$.

The expression for A is $12y^2$ and the expression for B is 3y.

6. The complete factorization of $2x^3 + 4x^2y – 70xy^2$ is

A) $2x(x^2 + 2xy – 35y^2)$
B) $(x^2 + 2xy – 35y^2)$
C) $2x(x – 5y)(x + 7y)$
D) $(x – 5y)(x + 7y)$

Solution

When factoring, always look for a common factor first. The term (2x) is common is each of these three terms.

$2x^3 + 4x^2y – 70xy^2 = 2x(x^2 + 2xy – 35y^2)$

Now factor $x^2 + 2xy – 35y^2$. We are looking for two expressions that multiply to $-35y^2$ and add to 2y.

These expressions are (7y) and (-5y). Place these terms in the appropriate position in each of the binomials.

The complete factorization of $2x^3 + 4x^2y – 70xy^2$ is $2x(x – 5y)(x + 7y)$.

The correct answer is C.

Use the following information to answer the next question.

Consider the two trinomials below.
① $m^2 – 6mn – 40n^2$
② $m^2 + 3mn – 4n^2$

7. The factor common to both of these trinomials is

A) $(m + 4n)$ B) $(m + n)$ C) $(m + 10n)$ D) $(m – 4n)$

Solution

When factoring the first expression, $m^2 – 6mn – 40n^2$, we are looking for two expressions that add to (-6n) and multiply to ($-40n^2$). The possible products of $-40n^2$ (where each term has the letter n) are:

(-n) (40n)

(n) (-40n)

(-2n) (20n)

(2n) (-20n)

(-4n) (10n)

(4n) (-10n)

(-5n) (8n)

(5n) (-8n)

Since (4n) + (-10n) = -6n, the expressions needed are (4n) and (-10n).

Thus, the factoring of $m^2 – 6mn – 40n^2$ is (m + 4n) (m – 10n).

When factoring the second expression, $m^2 + 3mn – 4n^2$, we are looking for two expressions that add to (3n) and multiply to ($-4n^2$). The possible products of ($-4n^2$) (where each term has the letter n) are:

(-n) (4n)

(n) (-4n)

(2n) (-2n)

Since (-n) + (4n) = 3n, the expressions needed are (-n) and (4n).

Thus the factoring of $m^2 + 3mn – 4n^2$ is (m – n) (m + 4n).

The common factor of each trinomial is (m + 4n).

The correct answer is A.

8. Factor $3x^2y + 19xy^2 + 20y^3$ completely. Show all work.

Solution

Always check for a common factor first. There is no integer that divides into the coefficients of (3), (19), or (20), but there is a common 'y'.

$y(3x^2 + 19xy + 20y^2)$. The trinomial is now in the form $ax^2 + bxy + cy^2$.

Since a = 3, we will use the ACE method. First multiply (A) (C) , which is (3) (20) or 60. Exchange (E) 60 with the value of C, or 20.

Now we have $x^2 + 19xy + 60y^2$.

Rearrange the middle term. $x^2 + (19y)x + 60y^2$. We are looking for two expressions that multiply to $60y^2$, and add to (19y).

(15y) and (4y) will satisfy the requirements.

(x + 15y) (x + 4y)

Since we initially multiplied 3 by 20, we now divide the constants by 3.

$$\left(x + \frac{15y}{3}\right)\left(x + \frac{4y}{3}\right)$$

In the first binomial, 15/3 simplifies to an integer of 5.

In the second binomial, multiply (3) by (x).

(x + 5y) (3x + 4y).

Since factoring and multiplying (or expanding) are opposites, check the factoring by multiplying the binomials.

	x	+ 5y
3x +	$3x^2$	15xy
4y	4xy	$20y^2$

= $3x^2 + 19xy + 20y^2$

The final factoring of $3x^2y + 19xy^2 + 20y^3$ is

$y(x + 5y)(3x + 4y)$.