Review Exercise Set 4

Exercise 1: Completely factor the following trinomial.

$2a^2 + 5a - 12$

Exercise 2: Completely factor the following trinomial.

$3x^2 - 5x - 42$

Exercise 3: Completely factor the following trinomial.

$12n^2 + 4n - 5$

Exercise 4: Completely factor the following trinomial.

$6x^2 - 17x + 12$

Exercise 5: Completely factor the following trinomial.

$18n^2 + 25n - 3$

Review Exercise Set 4 Answer Key

Exercise 1: Completely factor the following trinomial.

$2a^2 + 5a - 12$

Find the product of the leading coefficient and the constant

$(2)(-12) = -24$

Find the factors of -24 that will produce the coefficient of the middle term.

Product of Factors of -24	Sum of Factors
$1(-24) = -24$	$1 + (-24) = -23$
$2(-12) = -24$	$2 + (-12) = -10$
$3(-8) = -24$	$3 + (-8) = -5$
$4(-6) = -24$	$4 + (-6) = -2$
$6(-4) = -24$	$6 + (-4) = 2$
$8(-3) = -24$	$8 + (-3) = 5$
$12(-2) = -24$	$12 + (-2) = 10$
$24(-1) = -24$	$24 + (-1) = 23$

The factors of 8 and -3 will provide the coefficient of the middle term of the trinomial, so the middle term will be rewritten as the difference of 8a and -3a.

$2a^2 + 5a - 12 = 2a^2 + 8a - 3a - 12$

Now factor by using the grouping method.

$$\begin{aligned} 2a^2 + 5a - 12 &= (2a^2 + 8a) + (-3a - 12) \\ &= 2a(a + 4) - 3(a + 4) \\ &= \mathbf{(a + 4)(2a - 3)} \end{aligned}$$

Exercise 2: Completely factor the following trinomial.

$3x^2 - 5x - 42$

In addition to the grouping method, we can also factor trinomials by starting with the terms that only have one possible product. For example, the coefficient of the leading term will only factor as 3(1) so we can start by factoring this term.

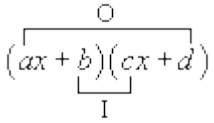
$3x^2 - 5x - 42 = (3x \quad)(x \quad)$

Exercise 2 (Continued):

Now find the factors of -42 that when multiplied with the factors of 3 and 1 will produce the coefficient of the middle term.

Product of Factors of -42	Sum of Factors
1(-42) = -42	3(1) + 1(-42) = -39
1(-42) = -42	3(-42) + 1(1) = -125
2(-21) = -42	3(2) + 1(-21) = -15
2(-21) = -42	3(-21) + 1(2) = -61
3(-14) = -42	3(3) + 1(-14) = -5
3(-14) = -42	3(-14) + 1(3) = -39

The factors of 3 and -14 will provide the coefficient of the middle term when multiplied by the factors of the leading coefficient. Since the 3 must be multiplied to the 3 and the 1 must be multiplied to the -14, the -14 will be placed in the first set of parenthesis and the 3 will go in the second set. When placing the factors recall how the FOIL method works to produce the middle term.



$3x^2 - 5x - 42 = (3x\ \ )(x\ \ )$

$= (3x - 14)(x + 3)$

The method that you use will depend on which one you are most comfortable using because you will get the same answer.

Exercise 3: Completely factor the following trinomial.

$12n^2 + 4n - 5$

Find the product of the leading coefficient and the constant

(12)(-5) = -60

Exercise 3 (Continued):

Find the factors of -60 that will produce the coefficient of the middle term.

Product of Factors of -60	Sum of Factors
1(-60) = -60	1 + (-60) = -59
2(-30) = -60	2 + (-30) = -28
3(-20) = -60	3 + (-20) = -17
4(-15) = -60	4 + (-15) = -11
6(-10) = -60	6 + (-10) = -4
10(-6) = -60	10 + (-6) = 4

The factors of 10 and -6 will provide the coefficient of the middle term of the trinomial, so the middle term will be rewritten as the difference of 10n and -6n.

$$12n^2 + 4n - 5 = 12n^2 + 10n - 6n - 5$$

Switch the middle terms so that the first two and last two terms will have a common factor.

$$\begin{aligned} 12n^2 + 4n - 5 &= 12n^2 - 6n + 10n - 5 \\ &= (12n^2 - 6n) + (10n - 5) \\ &= 6n(2n - 1) + 5(2n - 1) \\ &= \mathbf{(2n - 1)(6n + 5)} \end{aligned}$$

Exercise 4: Completely factor the following trinomial.

$$6x^2 - 17x + 12$$

Find the product of the leading coefficient and the constant

$$(6)(12) = 72$$

Exercise 4 (Continued):

Find the factors of 72 that will produce the coefficient of the middle term. We can shorten the process by looking at the signs of the trinomial. Since the last term is positive this indicates that the signs of the factors must be the same sign and since the coefficient of the middle term is negative the factors must be negative.

Product of Factors of 72	Sum of Factors
-1(-72) = 72	(-1) + (-72) = -73
-2(-36) = 72	(-2) + (-36) = -38
-3(-24) = 72	(-3) + (-24) = -27
-4(-18) = 72	(-4) + (-15) = -19
-6(-12) = 72	(-6) + (-12) = -18
-8(-9) = 72	(-8) + (-9) = -17

The factors of -8 and -9 will provide the coefficient of the middle term of the trinomial, so the middle term will be rewritten as the sum of -8x and -9x.

$$6x^2 - 17x + 12 = 6x^2 - 8x - 9x + 12$$

Now factor by using the grouping method.

$$\begin{aligned} 6x^2 - 17x + 12 &= (6x^2 - 8x) + (-9x + 12) \\ &= 2x(3x - 4) - 3(3x - 4) \\ &= \mathbf{(3x - 4)(2x - 3)} \end{aligned}$$

Exercise 5: Completely factor the following trinomial.

$$18n^2 + 25n - 3$$

Find the product of the leading coefficient and the constant

$$(18)(-3) = -54$$

Exercise 5 (Continued):

Find the factors of -54 that will produce the coefficient of the middle term. Again we can shorten the process of finding the factors by looking at the signs of the trinomial. Since the last term is negative this indicates that the signs of the factors must be opposite signs and since the coefficient of the middle term is positive the larger factor must be positive.

Product of Factors of -54	Sum of Factors
-1(54) = -54	(-1) + 54 = 53
-2(27) = -54	(-2) + 27 = 25
-3(18) = -54	(-3) + 18 = 15
-6(9) = -54	(-6) + 9 = 3

The factors of -2 and 27 will provide the coefficient of the middle term of the trinomial, so the middle term will be rewritten as the sum of -2n and 27n.

$18n^2 + 25n - 3 = 18n^2 - 2n + 27n - 3$

Now factor by using the grouping method.

$$\begin{aligned} 18n^2 + 25n - 3 &= (18n^2 - 2n) + (27n - 3) \\ &= 2n(9n - 1) + 3(9n - 1) \\ &= \mathbf{(9n - 1)(2n + 3)} \end{aligned}$$