Lesson 2.2: Factoring Polynomials

Practice Solutions – III

1. Factor the following polynomial expressions.

a. $x^2 - 10x + 25$

The b value is –10 and c is 25; therefore, $r + s = -10$ and $rs = 25$.

r	s	rs	$r + s$	Works?
1	25	$1(25) = 25$	$1 + 25 = 26$	×
–1	–25	$-1(-25) = 25$	$-1 - 25 = -26$	×
5	5	$5(5) = 25$	$5 + 5 = 10$	×
–5	–5	$-5(-5) = 25$	$-5 - 5 = -10$	✓

The factored form is $(x - 5)(x - 5) = (x - 5)^2$.

b. $3x^2 - 2x - 8$

Find a pair of numbers with a sum of b ($b = -2$) and a product of ac ($3(-8) = -24$).

First number	Second number	Product	Sum	Works?
1	–24	$1(-24) = -24$	$1 - 24 = -23$	×
–1	24	$-1(24) = -24$	$-1 + 24 = 23$	×
2	–12	$2(-12) = -24$	$2 - 12 = -10$	×
–2	12	$-2(12) = -24$	$-2 + 12 = 10$	×
3	–8	$3(-8) = -24$	$3 - 8 = -5$	×
–3	8	$-3(8) = -24$	$-3 + 8 = 5$	×
4	–6	$4(-6) = -24$	$4 - 6 = -2$	✓
–4	6	$-4(6) = -24$	$-4 + 6 = 2$	×

Use decomposition to express in factored form.

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

2. Factor the polynomial expression $-2(n+3)^2+12(n+3)+14$.

Let $u=n+3$

$-2(n+3)^2+12(n+3)+14=-2u^2+12u+14$

Factor out a GCF of –2.

$-2u^2+12u+14=-2(u^2-6u-7)$

Find a pair of numbers with a sum of b ($b=-6$) and a product of ac $(1(-7)=-7)$.

First number	Second number	Product	Sum	Works?
1	–7	$1(-7)=-7$	$1-7=-6$	✓
–1	7	$-1(7)=-7$	$-1+7=6$	×

Factor the trinomial expression within the brackets.

$-2(u^2-6u-7)=-2(u-7)(u+1)$

Then, substitute $u=n+3$.

$$-2(u-7)(u+1)=-2[(n+3)-7][(n+3)+1]$$
$$=-2(n-4)(n+4)$$

$-2(n+3)^2+12(n+3)+14=-2(n-4)(n+4)$

3. Factor the following differences of squares.

a. x^4-121y^2

$x^4-121y^2=(x^2+11y)(x^2-11y)$

b. $7a^2-175b^4$

$$7a^2-175b^4=7(a^2-25b^4)$$
$$=7(a-5b^2)(a+5b^2)$$

4. Factor $25(n-5)^2-(m+4)^2$ as a difference of squares.

$$25(n-5)^2-(m+4)^2=[5(n-5)+(m+4)][5(n-5)-(m+4)]$$
$$=(5n-25+m+4)(5n-25-m-4)$$
$$=(5n-21+m)(5n-29-m)$$

Please complete *Lesson 2.2 Explore Your Understanding Assignment* located in *Workbook 2A* before proceeding to *Lesson 2.3*.