ABBUBACA.COM QR

Objective: Factoring Quadratics where a ≠ 1 (Borrow and Pay Back!)

Homework FE-6 – NYA p.537 #17 – 25

Do Now: Factor 1. $10x^3 + 14x$ 2. $6x^3 - 18x^2 - 42x$

Exam Prep: Factor the equation: $6y^2 - y - 2$

A) $(6y + 1)(y - 2)$ B) $(3y + 1)(2y - 2)$ C) $(6y - 2)(x + 1)$ D) $(3y - 2)(2y + 1)$

This method will help you get through the problems with ease, but it will be tough to follow at first. Practice it to learn it fully.

Borrow and Payback Factoring (Quadratics: $ax^2 + bx + c$)

$2x^2 + 11x + 12$ *Scrap "a•c"*

$2 \bullet 12 = 24$

$x^2 + 11x + 24$

$(x + 8)(x + 3)$

$\left(x + \frac{8}{2}\right)\left(?x + \frac{3}{2}\right)$ *Pay It Back!*

$(x + 4)(2x + 3)$ *Factored!*

Steps

1. Borrow the "a" and multiply it to "c".
2. Factor the new polynomial normally.
3. Payback the "a" by dividing it into each number.
4. Reduce each number and anything with a left over denominator "slides" over to be the coefficient of the variable of that binomial.
5. FOIL to check (if you want)

Practice

1. $2y^2 + 5y + 2$	2. $5d^2 - 14d - 3$	3. $2x^2 - 5x + 2$
4. $8x^2 - 2x - 3$	5. $9x^2 + 21x + 10$	6. $7x^2 - 4x - 3$
7. $6n^2 - 23n + 7$	8. $2n^2 + n - 3$	9. $20p^2 - 31p - 9$

Factoring by Grouping (EXTRA)

Prior Knowledge Necessary for Factoring by Grouping
– FOIL Method of distribution. Ex: $(x – 2)(x – 3) = x^2 – 3x – 2x + 6 = x^2 – 5x – 6$
– Factoring a trinomial where a = 1. Ex: $x^2 – 11x + 28 = (x – 7)(x – 4)$
– Finding the GCF of an expression. Ex: $(8x^2 – 20x) = 4x(2x – 5)$

Factoring by Grouping	
$4x^2 + 33x – 70$	Original Problem
$(4)(–70) = –280$	Find the product "ac".
$(–10) + (28) = 18$ ✗ $(–5) + (56) = 49$ ✗ $(–7) + (40) = 33$ ✓	Find two factors of "ac" that add to "b". Use mental math, be careful with the signs! (In the past when a = 1, we found factors of "c" with a sum of "b").
$4x^2 – 7x + 40x – 70$	Rewrite the trinomial using your two factors. The order of the factors does not matter.
$x(4x – 7) + 10(4x – 7)$	Factor by Grouping – Find the GCF of the first two terms and the second two terms. You will find the same leftover factor for both sets.
$(4x – 7)(x + 10)$	Use the distributive property to factor again, setting up your final set of binomials. FOIL to check!!

Revisiting the Problem Above – Factors in Reverse Order	
$4x^2 + 33x – 70$	Original Problem
$(4)(–70) = –280$	Find the product of ac.
$(–7) + (40) = 33$	Find two factors of "ac" that have a sum of "b.
$4x^2 + 40x – 7x – 70$	Rewrite the trinomial. Same factors as above, but now in reverse order.
$4x(x + 10) – 7(x + 10)$	Factor by Grouping – Find the GCF of both groups. Same factors as above, but the GCF outcome is reversed.
$(4x – 7)(x + 10)$	The resulting binomial factors are identical to the above!

Practice AGAIN Using Grouping

1. $2y^2 + 5y + 2$	2. $5d^2 - 14d - 3$	3. $2x^2 - 5x + 2$
4. $8x^2 - 2x - 3$	5. $9x^2 + 21x + 10$	6. $7x^2 - 4x - 3$
7. $6n^2 - 23n + 7$	8. $2n^2 + n - 3$	9. $20p^2 - 31p - 9$