Algebra 1 8.5

Use the distributive property to factor polynomials

Solve quadratic equations by factoring

quadratic x^2

factor mult.

distributive property

greatest common factor (GCF) 24, 36

zero product property

whiteboards

$2(x+5)$

$2x + 10$

$12 \cdot 2$ $12 \cdot 3$

24		36	
1	24	1	36
2	12	2	18
3	8	3	12
4	6	4	9

$9 \cdot 2$ $9 \cdot 3$ $9 \cdot 6$

18		27		54	
1	18	1	27	1	54
2	9	3	9	2	27
6	3			3	18
				6	9

$3x + 18$

Factor:

GCF = 3

Guided Practice

1A. $\boxed{\frac{15w}{3} - \frac{3v}{3}}$

$3(5w - v)$

What is GCF?
What is leftover?
Backwards distributive property

15w
1 15
3 5
w

3v
1 3
v

b. $-4a^2b - 8ab^2 + 2ab$

Factor:
What is the GCF?

$2ab \quad 2ab \quad 2ab$

$-1 \quad -1$

$1 \; 4 \qquad 1 \; 8 \qquad 1 \; 2$

$2 \cdot 2 \qquad 2 \; 4 \qquad a$

$a \; a \qquad a \qquad b$

$b \qquad b \; b$

$2ab(-2a - 4b + 1)$

$-2ab(2a + 4b - 1)$

1B. $\frac{7u^2t^2}{ut} + \frac{21ut^2}{ut} - \frac{ut}{ut}$ = $ut(7ut + 21t - 1)$ Factor

1 7
u u
t t

1 21
3 7
u
t t

1
u
t

$\frac{21utt}{ut}$

Example 2 Factor by Grouping

Factor $(4qr + 8r) + (3q + 6)$.

1 4   1 8   1 3   1 6

2 2   2 4   2 3

q   q

r   r

$$\left(\frac{4qr}{4r} + \frac{8r}{4r}\right) \quad \left(\frac{3q}{3} + \frac{6}{3}\right)$$

$$4r(q+2) \quad 3(q+2)$$

$$(q+2)(4r+3)$$

$$\begin{array}{r} 4r + 3 \\ q + 2 \\ \hline 8r + 6 \\ 4rq \; 3q \\ \hline 4qr + 3q + 8r + 6 \end{array}$$

Factor each polynomial.

2A. $(rn + 5n) + (-r - 5)$

n	1	5
r		
n	n	

-1	-1	5
r		

$n(r+5) \quad -1(r+5)$

Might need to factor out (-)

$(r+5)(n-1)$

2B. $\left(\frac{3np}{3p} + \frac{15p}{3p}\right) + \left(\frac{-4n}{-4} + \frac{-20}{-4}\right)$

$3p(n+5) \; -4(n+5)$

$(n+5)(3p-4)$

$\frac{24x^2y}{6x} + \frac{18xy^2}{6x} - \frac{60x}{6x}$

$6x(4xy + 3y^2 - 10)$

Close but not quite...can you factor out (-) to make it work?

Example 3 Factor by Grouping with Additive Inverses

Factor $\underset{2m}{2mk} + \underset{2m}{^{-}12m} + \underset{-7}{42} - \underset{-7}{7k}$.

$2m(k + -6) - 7(+k + ^{-}6)$

$(2m-7)(k-6)$

$(k-6)(2m-7)$

p 498

15-20 all

21-37 odd

Close but not... can you factor out (-) to make it work?

Factor each polynomial.

3A. $c - 2cd + 8d - 4$

3B. $3p - 2p^2 - 18p + 27$

KeyConcept Zero Product Property

Words	If the product of two factors is 0, then at least one of the factors must be 0.
Symbols	For any real numbers a and b, if $ab = 0$, then $a = 0$, $b = 0$, or both a and b equal zero.

$$(\quad)(\quad) = 0$$

Example 4 Solve Equations

Solve each equation. Check your solutions.

a. $(2d + 6)(3d - 15) = 0$

Guided Practice

4A. $3n(n + 2) = 0$

4B. $8b^2 - 40b = 0$

Is it a product?

must be in factored form...
= 0

b. $c^2 = 3c$

4C. $x^2 = -10x$