

**LESSON**  
**8-2**

## Review for Mastery

### Factoring by GCF

The Distributive Property states:  $a(b + c) = ab + ac$

Factoring by GCF reverses the Distributive Property:

$$ab + ac = a(b + c)$$

**Factor  $12x^3 + 21x^2 + 15x$ . Check your answer.**

**Step 1:** Find the GCF of all the terms in the polynomial.

The factors of  $12x^3$  are: 1, 2, **3**, 4, 6, 12, **x**, **x**, **x**

The factors of  $21x^2$  are: 1, **3**, 7, 21, **x**, **x**

The factors of  $15x$  are: 1, **3**, 5, 15, **x**

} The GCF is  **$3x$** .

**Step 2:** Write terms as products using the GCF.

$$12x^3 + 21x^2 + 15x$$

$$(3x)4x^2 + (3x)7x + (3x)5$$

**Step 3:** Use the Distributive Property to factor out the GCF.

$$3x(4x^2 + 7x + 5)$$

**Check:**

$$3x(4x^2 + 7x + 5) = 12x^3 + 21x^2 + 15x \checkmark$$

**Factor  $5(x - 3) + 4x(x - 3)$ .**

**Step 1:** Find the GCF of all the terms in the polynomial.

The factors of  $5(x - 3)$  are: 5,  **$(x - 3)$**

The factors of  $4x(x - 3)$  are: 4,  **$x$** ,  **$(x - 3)$**

} The GCF is  **$(x - 3)$** .

The terms are already written as products with the GCF.

**Step 2:** Use the Distributive Property to factor out the GCF.

$$(x - 3)(5 + 4x)$$

**Factor each polynomial.**

1.  $20x^2 - 15x$

2.  $44a^2 + 11a$

3.  $24y - 36x$

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**Factor each expression.**

4.  $5x(x + 7) + 2(x + 7)$

5.  $3a(a + 4) - 2(a + 4)$

6.  $4y(4y + 1) + (4y + 1)$

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**LESSON**  
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## Review for Mastery

### Factoring by GCF *continued*

When a polynomial has four terms, make two groups and factor out the GCF from each group.

**Factor**  $8x^3 + 6x^2 + 20x + 15$ .

**Step 1:** Group terms that have common factors.

$$(8x^3 + 6x^2) + (20x + 15)$$

**Step 2:** Identify and factor the GCF out of each group.

$$(8x^3 + 6x^2) + (20x + 15)$$

GCF is  $2x^2$ .
GCF is  $5$ .

$$2x^2(4x + 3) + 5(4x + 3)$$

**Step 3:** Factor out the common binomial factor.

$$2x^2(4x + 3) + 5(4x + 3)$$

GCF is  $(4x + 3)$ .

$$(4x + 3)(2x^2 + 5)$$

**Check:**

$$(4x + 3)(2x^2 + 5)$$

$$4x(2x^2) + 4x(5) + 3(2x^2) + 3(5) \quad \text{Use FOIL.}$$

$$8x^3 + 20x + 6x^2 + 15$$

$$8x^3 + 6x^2 + 20x + 15 \quad \text{Rearrange terms.}$$

**Factor each polynomial filling in the blanks.**

7.  $(18x^3 + 15x^2) + (24x + 20)$

GCF is       GCF is

$(6x + 5) +$    $(6x + 5)$

$(6x + 5)$

8.  $(10a^3 - 15a^2) + (12a - 18)$

GCF is       GCF is

$(2a - 3) +$    $(2a - 3)$

$(2a - 3)$

**Factor each polynomial by grouping.**

9.  $21x^3 + 12x^2 + 14x + 8$

10.  $40x^3 - 50x^2 + 12x - 15$

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# Practice A

## Factoring by GCF

Factor each polynomial. Check your answer. The first one is done for you.

1.  $x^2 + 5x$

$x(x + 5)$

2.  $5m^3 + 45$

\_\_\_\_\_ (\_\_\_\_\_ + 9)

3.  $15y^3 + 20y^5 - 10$

\_\_\_\_\_ ( $3y^3 + 4$  \_\_\_\_\_ - \_\_\_\_\_)

4.  $10y^2 + 12y^3$

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5.  $-12t^5 + 6t$

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6.  $6x^4 + 15x^3 + 3x^2$

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7. The expression  $-5t^2 + 40t$  gives the approximate height of a golf ball after  $t$  seconds at a speed of 40 m/s. Factor this expression.

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Factor out the common binomial factor in each expression.

8.  $4d(d + 2) + 9(d + 2)$

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9.  $12(x - 5) + 7x(x - 5)$

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Factor each polynomial by grouping.

10.  $n^3 + 3n^2 + 4n + 12$

$(n^3 + \underline{\hspace{1cm}}) + (4n + \underline{\hspace{1cm}})$

$n^2(n + \underline{\hspace{1cm}}) + 4(n + \underline{\hspace{1cm}})$

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11.  $2x^3 + 5x^2 + 2x + 5$

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Factor each polynomial by grouping and using opposites.

12.  $2y^3 - 4y^2 + 6 - 3y$

$(\underline{\hspace{1cm}} - 4y^2) + (\underline{\hspace{1cm}} - 3y)$

$2y^2(\underline{\hspace{1cm}} - 2) + 3(\underline{\hspace{1cm}} - y)$

$2y^2(\underline{\hspace{1cm}} - 2) + 3(-1)(\underline{\hspace{1cm}} - 2)$

$2y^2(\underline{\hspace{1cm}} - 2) - 3(y - \underline{\hspace{1cm}})$

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13.  $4m^3 - 12m^2 + 15 - 5m$

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