

Period

Name

Date

7.8 Factoring by grouping.

Find the GCF of the first two terms and the GCF of the last two terms for each polynomial

1) $12x^3 + 3x^2 + 20x + 5$
 $3 \cdot 4xxx + 3xx \quad 4 \cdot 5x + 5 \cdot 1$
 $\underline{3x^2} \quad \underline{5}$

2) $6v^3 + 42v^2 + 5v + 35$
 $\underline{6} \cdot \underline{v} \underline{v} \underline{v} + \underline{6} \cdot \underline{7} \underline{v} \underline{v} \quad \underline{5} \cdot \underline{v} \cdot \underline{1} + \underline{5} \cdot \underline{7}$
 $\underline{6v^2} \quad \underline{5}$

3) $8t^3 + 36t^2 + 2t + 9$
 $\underline{4} \cdot \underline{2} \underline{t} \underline{t} \underline{t} + \underline{4} \cdot \underline{9} \underline{t} \underline{t} \quad \underline{2} \cdot \underline{1} \underline{t} + \underline{9} \cdot \underline{1}$
 $\underline{4t^2}, \quad \underline{1}$

4) $10x^3 + 35x^2 + 6x + 21$
 $\underline{5} \cdot \underline{2} \underline{x} \underline{x} \underline{x} + \underline{5} \cdot \underline{7} \underline{x} \underline{x} \quad \underline{2} \cdot \underline{3} \underline{x} + \underline{3} \cdot \underline{7}$
 $\underline{5x^2} \quad \underline{3}$

$$5) 9m^3 - 6m^2 + 12m - 8$$

$$(3) 3m(m^2) - 2(3m^2) 4 \cdot 3m - 4 \cdot 2$$

$$(3m^2) \quad (4)$$

$$6) 8w^3 + 6w^2 - 28w - 21$$

$$4 \cdot 2w^2 + 2 \cdot 3w^2 - 7 \cdot 4w - 7 \cdot 3$$

$$(2w^2) \quad (-7)$$

$$7) 7x^3 + 16x^2 - 9x - 72$$

$$7x(x^2) + 16(x^2) - 9 \cdot 1 - 9 \cdot 8$$

$$(x^2) \quad (-9)$$

$$8) 21x^3 - 28x^2 - 6x + 8$$

$$(7) 3x(x^2) - 4(7x^2) - 2 \cdot 3x + 2 \cdot 4$$

$$(7x^2) \quad (-2)$$

$$13) \quad 21x^3 + 6x^2 - 28x - 8$$

$$\quad \quad \quad - 4 \cdot 7x - 4 \cdot 2$$

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

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

$$14) \quad 8w^3 + 12w^2 + 10w + 15$$

$$\quad \quad \quad 5 \cdot 2w + 3 \cdot 5$$

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

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

$$15) \quad 18x^3 - 12x^2 + 21x - 14$$

$$\quad \quad \quad + 3 \cdot 7x - 2 \cdot 7$$

$$6x^2(3x-2) + 7(3x-2)$$

$$(6x^2 + 7)(3x - 2)$$

$$16) \quad 36n^3 - 27n^2 - 8n + 6$$

$$\quad \quad \quad - 2 \cdot 4n + 2 \cdot 3$$

$$9n^2(4n-3) - 2(4n-3)$$

$$(9n^2 - 2)(4n - 3)$$

Factor each expression

$$9) \quad 8j^3 + 4j^2 + 10j + 5$$

$6 \cdot 2j \quad 5 \cdot 1$

$$4j^2(2j+1) + 5(2j+1)$$

$$(4j^2 + 5)(2j + 1)$$

$$10) \quad 10x^3 + 25x^2 + 8x + 20$$

$4 \cdot 2x \quad 4 \cdot 5$

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

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

$$11) \quad 2m^3 + 8m^2 + 9m + 36$$

$9 \cdot 1m \quad 9 \cdot 4$

$$2m^2(m+4) + 9(m+4)$$

$$(2m^2 + 9)(m + 4)$$

$$12) \quad 6x^3 + 9x^2 + 2x + 3$$

$2x \cdot 1 + 3 \cdot 1$

$$3x^2(2x+3) + 1(2x+3)$$

$$(3x^2 + 1)(2x + 3)$$

$$17) \quad 110b^3 + 77b^2 - 60b - 42$$

$$-6 \cdot 10b - 6 \cdot 7$$

$$11b^2(10b+7) - 6(10b+7)$$

$$(11b^2 - 6)(10b + 7)$$

$$18) \quad 64d^3 - 40d^2 - 24d + 15$$

$$-3 \cdot 8d + 3 \cdot 5$$

$$8d^2(8d-5) - 3(8d-5)$$

$$(8d^2 - 3)(8d - 5)$$

Factor completely

$$19) \quad 32x^3 + 8x^2 + 48x + 12$$

$$4(8x^3 + 2x^2 + 12x + 3)$$

$$+4 \cdot 3x + 3 \cdot 1$$

$$\downarrow \quad 2x^2(4x+1) + 3(4x+1)$$

$$4(2x^2 + 3)(4x + 1)$$

$$\begin{aligned}
 20) \quad & 45w^4 - 36w^3 + 15w^2 - 12w \\
 & 3w(15w^3 - 12w^2 + 5w - 4) \\
 & 3w^2(5w-4) + 1(5w-4) \\
 & 3w(3w^2+1)(5w-4)
 \end{aligned}$$

$$\begin{aligned}
 21) \quad & 32x^4 - 16x^3 + 12x^2 - 6x \\
 & 2x(16x^3 - 8x^2 + 6x - 3) \\
 & 8x^2(2x-1) + 3(2x-1) \\
 & 2x(8x^2+3)(2x-1)
 \end{aligned}$$

$$\begin{aligned}
 22) \quad & 6x^3 + 18x^2 + 60x + 180 \\
 & 6(x^3 + 3x^2 + 10x + 30) \\
 & x^2(x+3) + 10(x+3) \\
 & 6(x^2+10)(x+3)
 \end{aligned}$$