

LESSON PLAN

Course: Grade 12 U Advanced Functions

Lesson : 1 - 2

Unit/Chapter: Polynomial Skills

Topic: Factoring Review

▣ *homework check:* Foundations of Math 12 p. 13-15

exercise 1.1 # 5 & 9 (odd letters)

exercise 1.2 # 2 – 4 (odd letters)

▣ *note:* Factoring Review

1. common factoring
2. factoring by grouping
3. factoring by decomposition

1. common factoring hints – more than one variable

example)
$$\begin{aligned} -35a^3b^2 - 15a^3b^3 + 20a^2b^2 &= \\ &= -5a^2b^2(7a + 3ab - 4) \end{aligned}$$

2. factoring by grouping – two or more groups of variables

examples)

$$\begin{aligned} 4a(x+2) - 3b(x+2) &= \\ &= (x+2)(4a-3b) \end{aligned}$$

$$\begin{aligned} 4mx - 2m + 6xy - 3y &= \\ &= 2m(2x-1) + 3y(2x-1) \\ &= (2x-1)(2m+3y) \end{aligned}$$

3. factoring by decomposition

examples)

$$\begin{aligned} x^2 + 3x - 10 &= \\ &= x^2 + 5x - 2x - 10 \\ &= x(x+5) - 2(x+5) \\ &= (x+5)(x-2) \end{aligned}$$

$$\begin{aligned}6x^2 + 13x + 5 &= \\&= 6x^2 + 10x + 3x + 5 \\&= 2x(3x + 5) + 1(3x + 5) \\&= (3x + 5)(2x + 1)\end{aligned}$$

$$3w^2 - 10w + 8 = \text{(show use of factors and "guess and check" as optional method)}$$

- ▣ **homework assignment:** FM12 p. 16-19
exercise 1.3 # 3,
exercise 1.4 # 2 & 3
exercise 1.5 #1, 3, 4, (left hand column)

EXERCISE 1.3

3. Factor.

- (a) $7abc - 14ab + 21a$
- (b) $2x^6 - 4x^4 - 2x^2$
- (c) $39rst - 13rs$
- (d) $25a^2b - 35a^2b^2 - 40a^3b^3$
- (e) $27abc - abcd$
- (f) $4x^7 + 8x^6 - 12x^8$
- (g) $24xy^2 - xy - 8x^2y$
- (h) $12x^2y^3 - 18x^3y^2 - 24x^2y^2$

EXERCISE 1.4

2. Factor.

- (a) $ax + by + bx + ay$
- (b) $mx + 2y + my + 2x$
- (c) $y^2 + 1 - y^3 - y$
- (d) $mx - ny + my - nx$
- (e) $ax - 3a + 3b - bx$
- (f) $cx^2 + d - dx^2 - cx$

3. Factor.

- (a) $2 + x^3 - 2x^2 - x$
- (b) $4mx + 2ny - 8my - nx$
- (c) $10x^2 + 3y - 5xy - 6x$
- (d) $15s^2 - 12s - 5st + 4t$
- (e) $a^2 + 6bc - 3ac - 2ab$
- (f) $3ab - 20cd - 15ac + 4bd$
- (g) $4y^2 + 6x + 3y + 8xy$
- (h) $x^2y - y^2 - x^3 + xy$

EXERCISE 1.5

B 1. Factor.

- | | |
|----------------------|----------------------|
| (a) $x^2 + 7x + 12$ | (b) $x^2 + 7x + 10$ |
| (c) $w^2 - 8w + 15$ | (d) $x^2 - 2x - 8$ |
| (e) $x^2 + 3x - 10$ | (f) $m^2 - 6m - 7$ |
| (g) $t^2 - 9t + 20$ | (h) $x^2 - 2x - 24$ |
| (i) $x^2 + 2x - 15$ | (j) $t^2 - t - 12$ |
| (k) $w^2 - 4w - 45$ | (l) $r^2 + 12r + 35$ |
| (m) $x^2 + 11x + 28$ | (n) $w^2 - 14w + 40$ |
| (o) $t^2 - t - 20$ | (p) $x^2 + 3x - 88$ |
| (q) $r^2 + 2r - 24$ | (r) $y^2 - 7y + 10$ |
| (s) $x^2 + 7x - 30$ | (t) $s^2 - 4s - 21$ |
| (u) $x^2 + 6x - 27$ | (v) $t^2 - 3t + 2$ |
| (w) $x^2 - 3x - 40$ | (x) $w^2 + 3w - 70$ |
| (y) $m^2 + 16m + 63$ | (z) $n^2 - 10n + 16$ |

3. Factor over the integers, if possible.

- | | |
|-----------------------|-----------------------|
| (a) $2x^2 + 7x + 3$ | (b) $2x^2 - 7x + 5$ |
| (c) $3w^2 - 11w - 20$ | (d) $6y^2 + y - 1$ |
| (e) $6w^2 - 7w - 3$ | (f) $10w^2 - w - 2$ |
| (g) $3x^2 - 3x - 4$ | (h) $2x^2 - 3x + 1$ |
| (i) $2w^2 + 9w + 10$ | (j) $2t^2 + 7t + 6$ |
| (k) $6m^2 + 13m + 9$ | (l) $3w^2 + 7t - 20$ |
| (m) $4m^2 + 9m + 3$ | (n) $10x^2 + x - 2$ |
| (o) $8x^2 + 6x - 9$ | (p) $4t^2 - 13t + 10$ |

4. Factor over the integers, if possible. First remove any common factors.

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|-----------------------|------------------------|
| (a) $4x^2 - 10x + 6$ | (b) $9m^2 + 33m + 30$ |
| (c) $8t^2 + 4t + 4$ | (d) $16y^2 - 10y - 21$ |
| (e) $12y^2 - 17y + 6$ | (f) $20x^2 + 46x + 24$ |
| (g) $5m^2 + 30m + 30$ | (h) $6x^2 - 6x - 21$ |
| (i) $12x^2 - 2x - 30$ | (j) $6t^2 + 13t - 28$ |

Answers:

EXERCISE 1.3

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|---------------------------------|----------------------------|-------------------------|--------------------------|
| 1. (a) $3(x + 3)$ | (b) $7(x - 2)$ | (c) $s(13t + 8)$ | (d) $x(2y + 5)$ |
| (e) $t(3t - 4)$ | (f) $mn(2 - 3t)$ | (g) $6(s - 1)$ | (h) $3x(t - 2y + 1)$ |
| 2. (a) $3x(x + 1)(x - 3)$ | (b) $4t^3(9t - 4)$ | (c) $xy(18x - 9y + xy)$ | (f) $2t^4(3 - 2t)$ |
| (d) $x^4(x^3 - x^2 + x - 1)$ | (e) $2m(nt - 3n + 4)$ | (c) $13rs(3t - 1)$ | (f) $4x^6(x + 2 - 3x^2)$ |
| (g) $x^7y^6(x^2y^2 - 1 + xy^3)$ | (h) $5mn(2m - 3n - mn)$ | (c) $13rs(3t - 1)$ | (f) $4x^6(x + 2 - 3x^2)$ |
| 3. (a) $7a(bc - 2b + 3)$ | (b) $2x^2(x^4 - 2x^2 - 1)$ | (c) $13rs(3t - 1)$ | (f) $4x^6(x + 2 - 3x^2)$ |
| (d) $5a^2b(5 - 7b - 8ab^2)$ | (e) $abc(27 - d)$ | (c) $13rs(3t - 1)$ | (f) $4x^6(x + 2 - 3x^2)$ |
| (g) $xy(24y - 1 - 8x)$ | (h) $6x^2y^2(2y - 3x - 4)$ | (c) $13rs(3t - 1)$ | (f) $4x^6(x + 2 - 3x^2)$ |
| 4. (a) $(a + b)(2x + 3)$ | (b) $(m + n)(4t + 5s)$ | (c) $(x - 3)(5w + 1)$ | (d) $(x + 2)(x + 1)$ |

EXERCISE 1.4

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|-----------------------------------|-------------------------------|----------------------------|
| 1. (a) $(a + b)(3t + 7)$ | (b) $(x - 1)(5 + 2x)$ | (c) $(x - 5)(3x - 7)$ |
| (d) $(x + y)(4m + 1)$ | (e) $(m - n)(2a - 1)$ | (f) $(2x - y)(4x - 3)$ |
| (g) $(x + 3)(x + 1)$ | (h) $(x^2 - x - 1)(m + 3)$ | (i) $(x - y)(7q - 1)$ |
| 2. (a) $(a + b)(x + y)$ | (b) $(x + y)(m + 2)$ | (c) $(1 - y)(1 + y^2)$ |
| (d) $(x + y)(m - n)$ | (e) $(a - b)(x - 3)$ | (f) $(x - 1)(cx - dx - d)$ |
| 3. (a) $(x + 1)(x - 1)(x - 2)$ | (b) $(4m - n)(x - 2y)$ | (c) $(y - 2x)(3 - 5x)$ |
| (d) $(5s - 4)(3s - t)$ | (e) $(a - 2b)(a - 3c)$ | (f) $(3a + 4d)(b - 5c)$ |
| (g) $(4y + 3)(y + 2x)$ | (h) $(y - x)(x^2 - y)$ | (f) $(3a + 4d)(b - 5c)$ |
| 4. (a) $(a^2 - 4)(b^2 - 7b + 13)$ | (b) $(r^2 - 9)(x^2 - 3x + 2)$ | (c) $(a - b)(x^2 + x + 1)$ |

EXERCISE 1.5

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|--------------------------|-------------------------|------------------------|------------------------|
| 1. (a) $(x + 3)(x + 4)$ | (b) $(x + 2)(x + 5)$ | (c) $(w - 3)(w - 5)$ | (d) $(x + 2)(x - 4)$ |
| (e) $(x + 5)(x - 2)$ | (f) $(m + 1)(m - 7)$ | (g) $(t - 4)(t - 5)$ | (h) $(x + 4)(x - 6)$ |
| (i) $(x + 5)(x - 3)$ | (j) $(l + 3)(t - 4)$ | (k) $(w + 5)(w - 9)$ | (l) $(r + 5)(r + 7)$ |
| (m) $(x + 4)(x + 7)$ | (n) $(w - 4)(w - 10)$ | (o) $(t + 4)(t - 5)$ | (p) $(x + 11)(x - 8)$ |
| (q) $(r + 6)(r - 4)$ | (r) $(y - 2)(y - 5)$ | (s) $(x + 10)(x - 3)$ | (t) $(s + 3)(s - 7)$ |
| (u) $(x + 9)(x - 3)$ | (v) $(t - 1)(t - 2)$ | (w) $(x + 5)(x - 8)$ | (x) $(w + 10)(w - 7)$ |
| (y) $(m + 7)(m + 9)$ | (z) $(n - 2)(n - 8)$ | | |
| 2. (a) $-4, 3$ | (b) $2, 5$ | (c) not possible | (d) $-5, 10$ |
| (e) $-9, 4$ | (f) not possible | (g) $4, 11$ | (h) $-10, -2$ |
| (i) $-1, -1$ | (j) $-3, 6$ | (k) $-6, 6$ | (l) $-4, -4$ |
| 3. (a) $(x + 3)(2x + 1)$ | (b) $(2x - 5)(x - 1)$ | (c) $(3w + 4)(w - 5)$ | (d) $(3y - 1)(2y + 1)$ |
| (e) $(2w - 3)(3w + 1)$ | (f) $(5w + 2)(2w - 1)$ | (g) not possible | (h) $(x - 1)(2x - 1)$ |
| (i) $(2w + 5)(w + 2)$ | (j) $(2t + 3)(t + 2)$ | (k) not possible | (l) $(3w - 5)(w + 4)$ |
| (m) not possible | (n) $(5x - 2)(2x + 1)$ | (o) $(4x - 3)(2x + 3)$ | (p) $(4t - 5)(t - 2)$ |
| (a) $2(x - 1)(2x - 3)$ | (b) $3(3m + 5)(m + 2)$ | (c) not possible | (d) $(8y + 7)(2y - 3)$ |
| (e) $(3y - 2)(4y - 3)$ | (f) $2(2x + 3)(5x + 4)$ | (g) not possible | (h) not possible |
| (i) $2(2x + 3)(3x - 5)$ | (j) $(2t + 7)(3t - 4)$ | | |