LESSON PLAN

Course: Grade 12 U Advanced Functions **Lesson : 1 - 3**

Unit/Chapter: Polynomial Skills **Topic: Sums and Differences of Squares**

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

- ***note:*** **Sums and Differences of Squares**

Difference of Squares

$$\begin{aligned} x^2-9 &= x^2+0x-9 \\ &= x^2+3x-3x-9 \\ &= x(x+3)-3(x+3) \\ &= (x+3)(x-3) \end{aligned}$$

$$\begin{aligned} 64x^2-81y^2 &= 64x^2+0xy-81y^2 \\ &= 64x^2+72xy-72xy-81y^2 \\ &= 8x(8x+9y)-9y(8x+9y) \\ &= (8x+9y)(8x-9y) \end{aligned}$$

When the numbers get very large, we use the square root of AC to find the factors. Once the pattern has been established, we should continue to use this pattern to factor any difference of squares.

examples)

$$\begin{aligned} 49x^2-81 &= \\ &= (7x)^2-9^2 \\ &= (7x-9)(7x+9) \end{aligned}$$

$$\begin{aligned} 121a^4b^6-144x^2y^8 &= \\ &= (11a^2b^3)^2-(12xy^4)^2 \\ &= (11a^2b^3-12xy^4)(11a^2b^3+12xy^4) \end{aligned}$$

Sums of Squares

Recall $$\begin{aligned} (a+b)^2 &= (a+b)(a+b) \\ &= a^2+2ab+b^2 \end{aligned}$$

The pattern in a sum of squares should be recognized in a similar way to the pattern in a difference of squares, with the important element being the 2ab portion.

In the trinomials

$9a^2 + 30ab + 25b^2 =$

We should recognize that

$(3a)^2 + 2(3a)(5b) + (5b)^2$ and so

$9a^2 + 30ab + 25b^2 = (3a + 5b)(3a + 5b)$

and

$49a^2 - 70ab + 25b^2 =$

We should recognize that

$(7a)^2 - 2(7a)(5b) + (5b)^2$ and so

$49a^2 - 70ab + 25b^2 = (7a - 5b)(7a - 5b)$

- ***homework assignment:*** **FM12** p. 21 exercise 1.6 # 2 – 6 odds
  FM11 exercise 2.8 # 3 & 5 LHC

Exercise 1.6

2. Factor.

(a) $4x^2 - 9$
(b) $36y^2 - 49$
(c) $100x^2 - 81$
(d) $1 - 16y^2$
(e) $121y^2 - 4$
(f) $9m^2 - 1$

B 3. Factor.

(a) $16x^2 - 49y^2$
(b) $4m^2 + 12mn + 9n^2$
(c) $36s^2 - 60st + 25t^2$
(d) $81p^2 + 144pq + 64q^2$
(e) $9d^2 - 25y^2$
(f) $16x^2 - 88xy + 121y^2$
(g) $25a^2 + 30ab + 9b^2$
(h) $49s^2 - 56st + 16t^2$
(i) $100m^2 - 121n^2$

4. Factor.

(a) $49x^4y^2 - 4z^2$
(b) $25m^2n^2 + 40mnt + 16t^2$
(c) $36x^6 - 25y^4$
(d) $4x^6y^4 - 28x^3y^2 + 49$
(e) $16m^6 - 40m^3n + 25n^2$
(f) $36s^4 + 60s^2t + 25t^2$
(g) $0.25x^2 - 0.64y^2$
(h) $1.44s^2 + 6st^2 + 6.25t^4$

5. Factor.

(a) $(x - y)^2 - 16$
(b) $(s + 3t)^2 - 9$
(c) $(a + 2b)^2 - 144$
(d) $(3x - 2y)^2 - 25$

6. Factor.

(a) $49 - (2y - w)^2$
(b) $1 - (x - y)^2$
(c) $(x + y)^2 - (a + b)^2$
(d) $(3m + n)^2 - (2s - 5t)^2$

Exercise 2.8

B 3. Factor over the integers, where possible.

(a) $6x^2 - 7x - 20$
(b) $12x^2 + 23x + 5$
(c) $22t^2 + 13t + 1$
(d) $6r^2 + 11r + 6$
(e) $6m^2 - 7m - 3$
(f) $2y^2 - y - 28$
(g) $12q^2 + 29q + 15$
(h) $20x^2 - 3x - 9$
(i) $12x^2 - 40x - 7$
(j) $3m^2 - 19m - 20$
(k) $10t^2 - 31t + 15$
(l) $10x^2 - 16x + 3$
(m) $6q^2 - 23q + 7$
(n) $4m^2 + 23m - 35$
(o) $3y^2 + 22y - 16$
(p) $3x^2 + 25x + 42$
(q) $4s^2 + 31s - 45$
(r) $20x^2 + 11x - 4$
(s) $20x^2 - 64x + 35$
(t) $36m^2 - 7m - 15$
(u) $16t^2 - 18t - 9$
(v) $15x^2 + 27x + 8$
(w) $4s^2 + 21s + 27$
(x) $8x^2 - 2x - 3$

5. Factor over the integers.

(a) $8x^2 + 38x + 45$ (b) $20y^2 + 44y - 15$
(c) $40t^2 - 47t + 12$ (d) $48x^2 + 74x + 21$
(e) $42m^2 - 51m + 15$ (f) $40x^2 + 38x + 7$
(g) $8m^2 + 46m + 63$ (h) $48y^2 - 26y + 3$
(i) $20s^2 - 29s - 33$ (j) $15 - 53x + 42x^2$
(k) $42 + t - 56t^2$
(l) $28m^2 + 107m + 99$

Answers:

EXERCISE 1.6

1. (a) $(x - 4)^2$ (b) $(y + 5)^2$ (c) $(x - 4)(x + 4)$
   (d) $(m + 6)^2$ (e) $(t - 7)(t + 7)$ (f) $(w - 7)^2$
   (g) $(x - 10)^2$ (h) $(s - 1)(s + 1)$ (i) $(y + 1)^2$
2. (a) $(2x - 3)(2x + 3)$ (b) $(6y - 7)(6y + 7)$ (c) $(10x - 9)(10x + 9)$
   (d) $(1 - 4y)(1 + 4y)$ (e) $(11y - 2)(11y + 2)$ (f) $(3m - 1)(3m + 1)$
3. (a) $(4x - 7y)(4x + 7y)$ (b) $(2m + 3n)^2$ (c) $(6s - 5t)^2$
   (d) $(9p + 8q)^2$ (e) $(3d - 5y)(3d + 5y)$ (f) $(4x - 11y)^2$
   (g) $(5a + 3b)^2$ (h) $(7s - 4t)^2$ (i) $(10m - 11n)(10m + 11n)$
4. (a) $(7x^2y - 2z)(7x^2y + 2z)$ (b) $(5mn + 4t)^2$ (c) $(6x^3 - 5y^2)(6x^3 + 5y^2)$
   (d) $(2x^3y^2 - 7)^2$ (e) $(4m^3 - 5n)^2$ (f) $(6s^2 + 5t)^2$
   (g) $(0.5x - 0.8y)(0.5x + 0.8y)$ (h) $(1.2s + 2.5t^2)^2$
5. (a) $(x - y - 4)(x - y + 4)$ (b) $(s + 3t - 3)(s + 3t + 3)$
   (c) $(a + 2b - 12)(a + 2b + 12)$ (d) $(3x - 2y - 5)(3x - 2y + 5)$
6. (a) $(7 - 2y + w)(7 + 2y - w)$ (b) $(1 - x + y)(1 + x - y)$
   (c) $(x + y + a + b)(x + y - a - b)$ (d) $(3m + n - 2s + 5t)(3m + n + 2s - 5t)$
7. (a) $(x + 3y - 6)(x + 3y + 6)$ (b) $(s - 4 - \sqrt{t})(s - 4 + \sqrt{t})$
   (c) $(p + q - 5)(p + q + 5)$ (d) $(x - y - 7)(x + y + 7)$
   (e) $(a + b - c + 3)(a + b + c - 3)$ (f) $(m + n - s - t)(m + n + s + t)$
   (g) $(5y - 3 - 2c - d)(5y - 3 + 2c + d)$
8. (a) $-(3y - 2)^2$ (b) $2ab(a - 1)^2$ (c) $3(3 - x)(x + 3)$
   (d) $-x(2y + 1)^2$ (e) $2x(x - 5y)(x + 5y)$ (f) $4st(3s + 5t)^2$
   (g) $-p(p - 3q)^2$ (h) $(4\sqrt{2} - 3a)(3a + 4\sqrt{2})$
9. (a) 161 (b) 267 (c) 1760 (d) 8760
10. (a) $(x^{2n} - y^{3n})(x^{2n} + y^{3n})$ (b) $(3x^{3n} - 2y^{2n})$ (c) $(4x^{2n+1} + 3y^{4n})^2$

EXERCISE 2.8

1. (a) $(x + 2)$ (b) $(m - 6)$ (c) $(n - 2)$ (d) $(x - 3)$ (e) $(x^3 - 18)$ (f) $(x + 4)$
   (g) $(1 + s)$ (h) $(8 - t)$ (i) $(9 - x)$
2. (a) $-3, -5$ (b) $4, 1$ (c) $9, -2$ (d) $-4, 3$ (e) — (f) $7, -4$
   (g) $-9, 2$ (h) $+9, -3$ (i) —
3. (a) $(3x + 4)(2x - 5)$ (b) $(3x + 5)(4x + 1)$ (c) $(2t + 1)(11t + 1)$ (d) —
   (e) $(2m - 3)(3m + 1)$ (f) $(2y + 7)(y - 4)$ (g) $(4q + 3)(3q + 5)$ (h) $(4x - 3)(5x + 3)$
   (i) $(6x + 1)(2x - 7)$ (j) — (k) $(5t - 3)(2t - 5)$ (l) —
   (m) $(3q - 1)(2q - 7)$ (n) $(m + 7)(4m - 5)$ (o) $(y + 8)(3y - 2)$ (p) $(3x + 7)(x + 6)$
   (q) $(s + 9)(4s - 5)$ (r) $(5x + 4)(4x - 1)$ (s) $(2x - 5)(10x - 7)$ (t) $(4m - 3)(9m + 5)$
   (u) $(8t + 3)(2t - 3)$ (v) — (w) $(s + 3)(4s + 9)$ (x) $(4x - 3)(2x + 1)$
4. (a) $2(4x + 1)(3x - 1)$ (b) $(2x + 7)(5x - 3)$ (c) $3(2x + 1)(x - 5)$
   (d) $(3x + y)(2x + 5y)$ (e) $(4x - 5y)(3x + 7y)$ (f) $10(6m + n)(m + 6n)$
   (g) $(8x - 5y)(3x - 4y)$ (h) $(5t + 4s)(3t + 2s)$ (i) $2(1 + 7x)(1 - 6x)$
   (j) $y(x + 4)(5x - 2)$ (k) $(4x^2 + 7)(x^2 + 7)$ (l) $2(x^2 + xy + y^2)$
   (m) — (n) $(3 - 10x)(5 + 2x)$
5. (a) $(2x + 5)(4x + 9)$ (b) $(2y + 5)(10y - 3)$ (c) $(5t - 4)(8t - 3)$
   (d) $(6x + 7)(8x + 3)$ (e) $(7m - 5)(6m - 3)$ (f) $(10x + 7)(4x + 1)$
   (g) $(2m + 7)(4m + 9)$ (h) $(8y - 3)(6y - 1)$ (i) $(5s - 11)(4s + 3)$
   (j) $(3 - 7x)(5 - 6x)$ (k) $(6 + 7t)(7 - 8t)$ (l) $(4m + 9)(7m + 11)$