

## LESSON PLAN

Course: Grade 12 U Advanced Functions

Lesson: 1 - 12

Unit/Chapter: Polynomial Skills

Topic: Unit Review

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- ▣ *review assignment:* **FM12** p. 50 exercise 1.18 omit #13, and 18 – 25  
p. 52 exercise 1.19 omit #6, 9 and 10

## 1.18 REVIEW EXERCISE

1. Expand and simplify.

- (a)  $(2x + 3y)(x - y)$
- (b)  $(4t - s)(4t + s)$
- (c)  $(3m + 2n)^2$
- (d)  $(5c - 4d)^2$
- (e)  $(7x + 3y)(x + 5y)$
- (f)  $(5p - 2q)(2p - 5q)$

2. Expand and simplify.

- (a)  $(2x - 1)(x + 4) + 2(x - 3)(x + 3)$
- (b)  $6(m - 2)(m + 7) - (m - 6)$
- (c)  $3(2y - 3) - 4(y - 5)(3y + 1)$
- (d)  $2(3x - y)(x - y) - 2(x + y)(5x + y)$
- (e)  $5(2t - 3s) - (t - s)(t + s)$
- (f)  $4(2x - 3y)(2x + 3y) - (5x - y)$

3. Expand and simplify.

- (a)  $(x + 1)(x^2 + 2x + 3)$
- (b)  $(m - 1)(2m^2 - 3m + 4)$
- (c)  $(2t - 3)(3t^2 + 4t + 5)$
- (d)  $(x^2 - 2x - 1)(x^2 + x + 3)$
- (e)  $(3r^2 + 3r + 2)(2r^2 - r - 5)$

4. Factor.

- (a)  $3abc - 6ab + 9bc$
- (b)  $5x^3 - 15x^2 + 25x$
- (c)  $16x^2y^2 - 24x^2y + 8xy^2$
- (d)  $3y(a + b) + 2(a + b)$
- (e)  $(m - 2)(m + 1) - (m + 3)(m - 2)$

5. Factor by grouping.

- (a)  $px + qy + qx + py$
- (b)  $ax - 3y + ay - 3x$
- (c)  $2mx - my - 2nx + ny$
- (d)  $x^3 - 3x^2 + x - 3$

6. Factor.

- (a)  $x^2 + 8x + 15$
- (b)  $m^2 - 11m + 28$
- (c)  $t^2 - 4t - 32$
- (d)  $n^2 + 2n - 63$
- (e)  $m^2 + 12m + 36$
- (f)  $s^2 - 14s + 49$
- (g)  $x^2 + 19x + 90$
- (h)  $y^2 - 2y - 48$
- (i)  $x^2 + x - 110$

7. Factor.

- (a)  $2x^2 + 9x + 4$
- (b)  $6y^2 - 11y + 4$
- (c)  $15m^2 - 7m - 2$
- (d)  $6t^2 - 25t + 14$
- (e)  $8s^2 + 6s - 27$
- (f)  $14x^2 - 29x - 15$
- (g)  $18t^2 - 39t + 20$
- (h)  $5m^2 + 34m + 24$

8. Factor.

- (a)  $x^2 + 14x + 49$
- (b)  $m^2 - 10m + 25$
- (c)  $4x^2 - 49$
- (d)  $16x^2 + 24xy + 9y^2$
- (e)  $25m^2 - 20mn + 4n^2$
- (f)  $64x^2y^2 - 81m^2$
- (g)  $x^2 + 6xy + 9y^2 - 49$
- (h)  $p^2 - 2pq + q^2 - 4$

9. Divide and state any restrictions on the variables.

- (a)  $(x^3 + 2x^2 - 10x + 5) \div (x - 2)$
- (b)  $(6t^3 + 7t^2 - 2t - 2) \div (2t + 1)$
- (c)  $(6 + 6w^3 - 5w^2) \div (3w + 2)$
- (d)  $(3x^3 - 10x^2 + 6 - x + 2x^4) \div (x + 3)$

10. Divide.

- (a)  $(5x^2 + x^3 - 4x - 20) \div (5 + x)$
- (b)  $(x^4 + 4x^3 + 2x^2 - 3x + 2) \div (x + 2)$
- (c)  $(2w - 4w^2 + 2w^4 - 5w^3 + 3) \div (w - 3)$
- (d)  $(4x^3 + 5x + 21) \div (2x + 3)$
- (e)  $(2w - 1 + 9w^3) \div (3w - 2)$
- (f)  $(10 + 9x + x^3) \div (2 + x)$
- (g)  $(x^4 + x^3 - 13x^2 - 25x - 12) \div (x^2 + 2x + 1)$
- (h)  $(2w^3 - 4 - 8w - 3w^2 + w^4) \div (w^2 - w - 2)$
- (i)  $(t^4 - 17t^2 - 36t - 20) \div (t^2 - 3t - 10)$

11. Use the Remainder Theorem to find the remainders.

- (a)  $(x^2 - 3x + 5) \div (x - 2)$
- (b)  $(w^3 - 3w^2 + 2w - 4) \div (w - 1)$
- (c)  $(3x^3 - 2x^2 + x - 5) \div (x + 2)$
- (d)  $(2t^3 - t^2 - 3t + 1) \div (t - 3)$

12. Factor.

- (a)  $w^3 - 3w^2 - 4w + 12$
- (b)  $x^3 + 2x^2 - 11x - 12$
- (c)  $2x^3 + x^2 - 13x + 6$
- (d)  $2x^3 - 3x^2 - 18x + 27$

13. Express in nested form and evaluate for  $x = 3$ .

- (a)  $x^2 - 3x - 7$
- (b)  $3x^2 - 2x + 5$
- (c)  $3x^3 + 4x^2 - x - 2$
- (d)  $2x^4 + 3x^3 - 2x^2 + 5x - 1$
- (e)  $4x^4 - 5x^3 + 6x^2 - 2x + 3$

14. Solve by factoring.

- (a)  $x^2 + x - 12 = 0$
- (b)  $2x^2 = 5x + 3$
- (c)  $9m^2 + 6m + 1 = 0$
- (d)  $6t^2 - t - 12 = 0$
- (e)  $2x^2 - 5x = 12$
- (f)  $5y^2 + 8y + 3 = 0$
- (g)  $4m^2 - 17m + 4 = 0$

15. Solve.

- (a)  $x^2 - 3x + 1 = 0$
- (b)  $t^2 + 2t - 4 = 0$
- (c)  $2x^2 - x - 5 = 0$
- (d)  $3m^2 - m - 1 = 0$
- (e)  $4r^2 + 2r - 11 = 0$

16. Solve.

- (a)  $x^3 + 8x^2 + 19x + 12 = 0$
- (b)  $t^3 - 9t^2 + 26t - 24 = 0$
- (c)  $w^3 + 2w^2 - 9w - 18 = 0$
- (d)  $4x^3 - 8x^2 + x + 3 = 0$
- (e)  $x^3 - 6x + 4 = 0$
- (f)  $t^3 - 10t - 3 = 0$
- (g)  $x^3 + 3x^2 - 3x + 4 = 0$
- (h)  $6t^3 + t^2 - 31t + 10 = 0$
- (i)  $x^4 + 3x^3 - x^2 - 6x = 0$
- (j)  $x^3 + 27 = 0$

17. Solve.

- (a)  $x^2 - 8x + 16 = 0$
- (b)  $t^2 + 10t + 25 = 0$
- (c)  $3x^2 - 14x + 8 = 0$
- (d)  ~~$9m^2 + 16 = 24m$~~
- (e)  $4t^2 - 17t + 4 = 0$
- (f)  $4x^2 + 2x - 6 = 0$

18. Find three consecutive integers so that the sum of the first and second is 3 less than twice the third integer.

19. A passenger plane and a cargo plane left Montreal Airport at the same time and flew in the same direction. The passenger plane flew at 1000 km/h. After 6 h, the planes were 2100 km apart. What was the speed of the cargo plane?

20. A rectangular field is enclosed by 200 m of fencing. The area of the field is 2000 m<sup>2</sup>. Find the dimensions of the field.

21. Find two consecutive even integers whose product is 5328.

22. The sum of the squares of two consecutive odd integers is 1154. Find the integers.

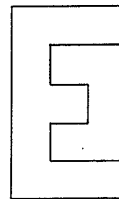
23. Find two numbers whose sum is 8 and whose product is 15.

24. Find two numbers whose difference is 4 and whose product is 480.

25. Three times the square of a number equals twenty-one times the number. What is the number?

## MIND BENDER

Make four cuts in the letter E and arrange the five pieces to form a square.



## 1.19 CHAPTER 1 TEST

1. Expand and simplify.

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

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

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

2. Factor by grouping.  $2ax - bx + 2ay - by$

3. Factor.

(a)  $x^2 + 3x - 18$

(b)  $2x^2 + 3x - 5$

(c)  $x^2 - 6x + 9$

4. Divide.  $(x^3 - x^2 - 7x - 2) \div (x + 2)$

5. Factor.  $x^3 + 4x^2 + x - 6$

6. Express in nested form and evaluate for  $x = 2$ .

$$x^4 + 3x^3 - 2x^2 - 5x - 7$$

7. Solve.

(a)  $2x^2 - 9x + 4 = 0$

(b)  $3x^2 - x - 5 = 0$

8. Solve.  $x^3 + 4x^2 + x - 6 = 0$

9. Two runners start at the opposite sides of a 60 m field. One runs at 4 m/s. The other runs at 5 m/s. If they run back and forth for 12 min, how many times will they pass each other?

10. The sum of the squares of two consecutive even integers is 580. Find the integers.

## EXERCISE 1.17

1. 1.67 h      2. 31      3. 0      4. 28      5.  $\frac{n(n+1)}{2}$
6. 1      7. 15 cm, 18 cm, 24 cm      8. 157      9. (a) A = 4, B = 2, C = 8, D = 5, E = 7      (b) 0.142857      (c)  $\frac{2ABCDE}{3}$   
 $\overline{ABCDE2}$
10. 42 sheep, 24 chickens      11. 25 cm × 39 cm      12. 100 km/h      13. \$14 000      14. 6 ways      15. 6 ways
16. Edmonton vs. Toronto, Winnipeg vs. Calgary, Vancouver vs. Quebec, Halifax vs. Montreal
17. 12      18. 9 m × 9 m      19. two parallel sides of 9 m, third side 18 m      20. \$1243.20      21. 335 mm × 515 mm      22. 2327 m      23. 36 cm      24. 21.78 m
25. 48.7 cm      26. 8.4 cm      27. 10 m      28. 55 and 57 or -57 and -55
29. 1.2 m      30. 800 km/h      31. 60 km/h      32. 45 or -44      33. 9.7 m × 9.7 m
34. 5 m, 12 m      35. 5 cm × 14 cm      36. 16.9 cm × 16.9 cm      37.  $\frac{1+\sqrt{5}}{2}$
38. 32 cm      39. 17 and 24 or -24 and -17      40. 8.5 cm × 8.5 cm      41.  $\frac{x^2}{18}$
42. 64      43.  $\frac{1}{2}$       44. 24 s      45. 40, 60, 96      46. 3 m<sup>2</sup>      47. 2.4 h

## 1.18 REVIEW EXERCISE

1. (a)  $2x^2 + xy - 3y^2$       (b)  $16t^2 - s^2$       (c)  $9m^2 + 12mn + 4n^2$   
 (d)  $25c^2 - 40cd + 16d^2$       (e)  $7x^2 + 38xy + 15y^2$       (f)  $10p^2 - 29pq + 10q^2$
2. (a)  $4x^2 + 7x - 22$       (b)  $6m^2 + 29m - 78$       (c)  $-12y^2 + 62y + 11$   
 (d)  $-4x^2 - 20xy$       (e)  $s^2 - t^2 - 15s + 10t$       (f)  $16x^2 - 36y^2 - 5x + y$
3. (a)  $x^3 + 3x^2 + 5x + 3$       (b)  $2m^3 - 5m^2 + 7m - 4$       (c)  $6t^3 - t^2 - 2t - 15$   
 (d)  $x^4 - x^3 - 7x - 3$       (e)  $6r^4 + 3r^3 - 14r^2 - 17r - 10$
4. (a)  $3b(ac - 2a + 3c)$       (b)  $5x(x^2 - 3x + 5)$       (c)  $8xy(2xy - 3x + y)$   
 (d)  $(a + b)(3y + 2)$       (e)  $-2(m - 2)$
5. (a)  $(p + q)(x + y)$       (b)  $(a - 3)(x + y)$       (c)  $(m - n)(2x - y)$       (d)  $(x^2 + 1)(x - 3)$
6. (a)  $(x + 3)(x + 5)$       (b)  $(m - 4)(m - 7)$       (c)  $(t + 4)(t - 8)$       (d)  $(n - 7)(n + 9)$   
 (e)  $(m + 6)^2$       (f)  $(s - 7)^2$       (g)  $(x + 9)(x + 10)$       (h)  $(y - 8)(y + 6)$
7. (a)  $(2x + 1)(x + 4)$       (b)  $(3y - 4)(2y - 1)$       (c)  $(5m + 1)(3m - 2)$       (d)  $(2t - 7)(3t - 2)$   
 (e)  $(4s + 9)(2s - 3)$       (f)  $(2x - 5)(7x + 3)$       (g)  $(6t - 5)(3t - 4)$       (h)  $(5m + 4)(m + 6)$
8. (a)  $(x + 7)^2$       (b)  $(m - 5)^2$       (c)  $(2x - 7)(2x + 7)$       (d)  $(4x + 3y)^2$   
 (e)  $(5m - 2n)^2$       (f)  $(8xy + 9m)(8xy - 9m)$   
 (g)  $(x + 3y + 7)(x + 3y - 7)$       (h)  $(p - q - 2)(p - q + 2)$
9. (a)  $x^2 + 4x - 2, R 1, x \neq 2$       (c)  $2w^2 - 3w + 2, R 2, w \neq -\frac{2}{3}$   
 (b)  $3t^2 + 2t - 2, t \neq -\frac{1}{2}$       (d)  $2x^3 - 3x^2 - x + 2, x \neq -3$
10. (a)  $x^2 - 4, x \neq -5$       (b)  $x^3 + 2x^2 - 2x + 1, x \neq -2$   
 (c)  $2w^3 + w^2 - w - 1, w \neq 3$       (d)  $2x^2 - 3x + 7, x \neq -\frac{3}{2}$   
 (e)  $3w^2 + 2w + 2, R 3, w \neq \frac{2}{3}$       (f)  $x^2 - 2x + 13 + \left(\frac{-16}{x+2}\right)$   
 (g)  $x^2 - x - 12$       (h)  $w^2 \pm 3w + 2$   
 (i)  $t^2 + 3t + 2$
11. (a) 3      (b) -4      (c) -39      (d) 37
12. (a)  $(w - 3)(w - 2)(w + 2)$       (b)  $(x - 3)(x + 1)(x + 4)$   
 (c)  $(x - 2)(2x - 1)(x + 3)$       (d)  $(x - 3)(2x - 3)(x + 3)$
13. (a)  $x - 3 | x - 7; -7$       (b)  $3x | -2 | x + 5; 26$   
 (c)  $3x | +4 | x - 1 | x - 2; 112$       (d)  $2x | +3 | x - 2 | x + 5 | x - 1; 239$   
 (e)  $4x | -5 | x + 6 | x - 2 | x + 3; 240$
14. (a)  $(x - 3)(x + 4) = 0; x = -4$  or  $x = 3$       (b)  $(2x + 1)(x - 3) = 0; x = -\frac{1}{2}$  or  $x = 3$   
 (c)  $(3m + 1)^2 = 0; x = -\frac{1}{3}$       (d)  $(2t - 3)(3t + 4) = 0; t = -\frac{4}{3}$  or  $t = \frac{3}{2}$   
 (e)  $(2x + 3)(x - 4) = 0; x = -\frac{3}{2}$  or  $x = 4$       (f)  $(5y + 3)(y + 1) = 0; y = -\frac{3}{5}$  or  $y = -1$

- (g)  $(4m - 1)(m - 4) = 0$ ;  $m = \frac{1}{4}$  or  $m = 4$
15. (a)  $x = \frac{3 \pm \sqrt{5}}{2}$  (b)  $t = -1 \pm \sqrt{5}$  (c)  $x = \frac{1 \pm \sqrt{41}}{4}$   
 (d)  $m = \frac{1 \pm \sqrt{13}}{6}$  (e)  $r = \frac{-1 \pm 3\sqrt{5}}{4}$
16. (a)  $x = -4$  or  $-3$  or  $-1$  (b)  $t = 2$  or  $3$  or  $4$   
 (c)  $w = -3$  or  $-2$  or  $3$  (d)  $x = -\frac{1}{2}$  or  $1$  or  $\frac{3}{2}$   
 (e)  $x = 2$  or  $x = -1 \pm \sqrt{3}$  (f)  $t = -3$  or  $t = \frac{3 \pm \sqrt{13}}{2}$   
 (g)  $x = -4$  or  $x = \frac{1 \pm \sqrt{3}i}{2}$  (h)  $t = -\frac{5}{2}$  or  $\frac{1}{3}$  or  $2$   
 (i)  $x = 0$  or  $-2$  or  $x = \frac{-1 \pm \sqrt{13}}{2}$  (j)  $x = 3$  or  $x = \frac{-3 \pm 3\sqrt{3}i}{2}$
17. (a)  $(x - 4)^2 = 0$ ;  $x = 4$  (b)  $(t + 5)^2 = 0$ ;  $t = -5$  (c)  $x = \frac{2}{3}$  or  $x = 4$   
 (d)  $m = -\frac{4}{3}$  (e)  $t = \frac{1}{4}$  or  $t = 4$  (f)  $x = \frac{3}{2}$  or  $x = 1$
18. Any three consecutive integers satisfy this condition.  
 20.  $50 + 10\sqrt{5}$  m  $\times$   $50 - 10\sqrt{5}$  m exactly (or approx.  $72.4$  m  $\times$   $27.6$  m)  
 21. 72, 74 22. 23, 25 or  $-23, -25$  23. 3, 5  
 24.  $(-24, -20)$  or  $(24, 20)$  25.  $(0$  or  $7)$
19. 650 km/h

### 1.19 CHAPTER 1 TEST

1. (a)  $3x^2 - 7xy - 20y^2$  (b)  $2x^3 + 5x^2 - 11x + 4$  (c)  $2x^4 - 7x^3 + 7x^2 - 26x + 7$   
 2.  $(2a - b)(x + y)$  3. (a)  $(x - 3)(x + 6)$  (b)  $(2x + 5)(x - 1)$  (c)  $(x - 3)^2$   
 4.  $x^2 - 3x - 1$  ( $x \neq -2$ ) 5.  $(x - 1)(x + 2)(x + 3)$   
 6.  $x] + 3]x - 2]x - 5]x - 7; 15$   
 7. (a)  $x = \frac{1}{2}$  or  $x = 4$  (b)  $x = \frac{1 \pm \sqrt{61}}{6}$   
 8.  $x = 1$  or  $-2$  or  $-3$  9. 54 times 10. 16, 18 or  $-18, -16$

### REVIEW AND PREVIEW TO CHAPTER 2

#### EXPONENTS

1. (a)  $x^{11}$  (b)  $t^2$  (c)  $m^{15}$  (d)  $x^{12}y^4$  (e)  $t^{15}$  (f)  $\frac{y^9}{x^6}$   
 (g)  $y^6$  (h)  $x^{28}$  (i)  $m^{15}n^{20}$  (j)  $-x^9y^{12}$
2. (a)  $12x^7$  (b)  $8y^{12}$  (c)  $\frac{x^{20}}{y^{15}}$  (d)  $16y^{12}$  (e)  $-15x^3y^5$  (f)  $5x^3y^2$   
 (g)  $3m^5n^3$  (h)  $\frac{16x^9}{81y^4}$  (i)  $22x^3y^2z$  (j)  $6x^9$
3. (a)  $6x^5$  (b)  $15a^3b^4$  (c)  $-42x^5y$  (d)  $24m^9n^3$  (e)  $18a^5b^4c^4$  (f)  $-21x^6y^4$   
 (g)  $-78x^3y^9$  (h)  $11p^3q^3r^3$  (i)  $-27rs^5t^6$  (j)  $-26a^6b^7c^4$
4. (a)  $12a^4b^8$  (b)  $-7a^3b$  (c)  $54x^7$  (d)  $-5rs^3$  (e)  $\frac{-27a^9}{8x^3}$  (f)  $-36a^4bc$
5. (a)  $x^{2n+2}$  (b)  $x^{2n+1}$  (c)  $x^{2n+4}$  (d)  $a^n b^n$  (e)  $x^{4n+2}$  (f)  $x^{n+9}$   
 (g)  $\frac{x^{n^2+n}}{y^{n^2-n}}$  (h)  $x^{n^2-3n-4}y^{n^2+4n+3}$

#### EQUATIONS AND INEQUALITIES

1. (a) 2 (b) 3 (c) 2 (d)  $-\frac{1}{11}$  (e) 6 (f)  $\frac{1}{12}$   
 (g) 1
2. (a)  $x < 4$  (b)  $x < 2$  (c)  $x \leq 7$  (d)  $x > -\frac{1}{3}$  (e)  $x \leq 4$  (f)  $x < 9$   
 (a)  $x \leq 6$