



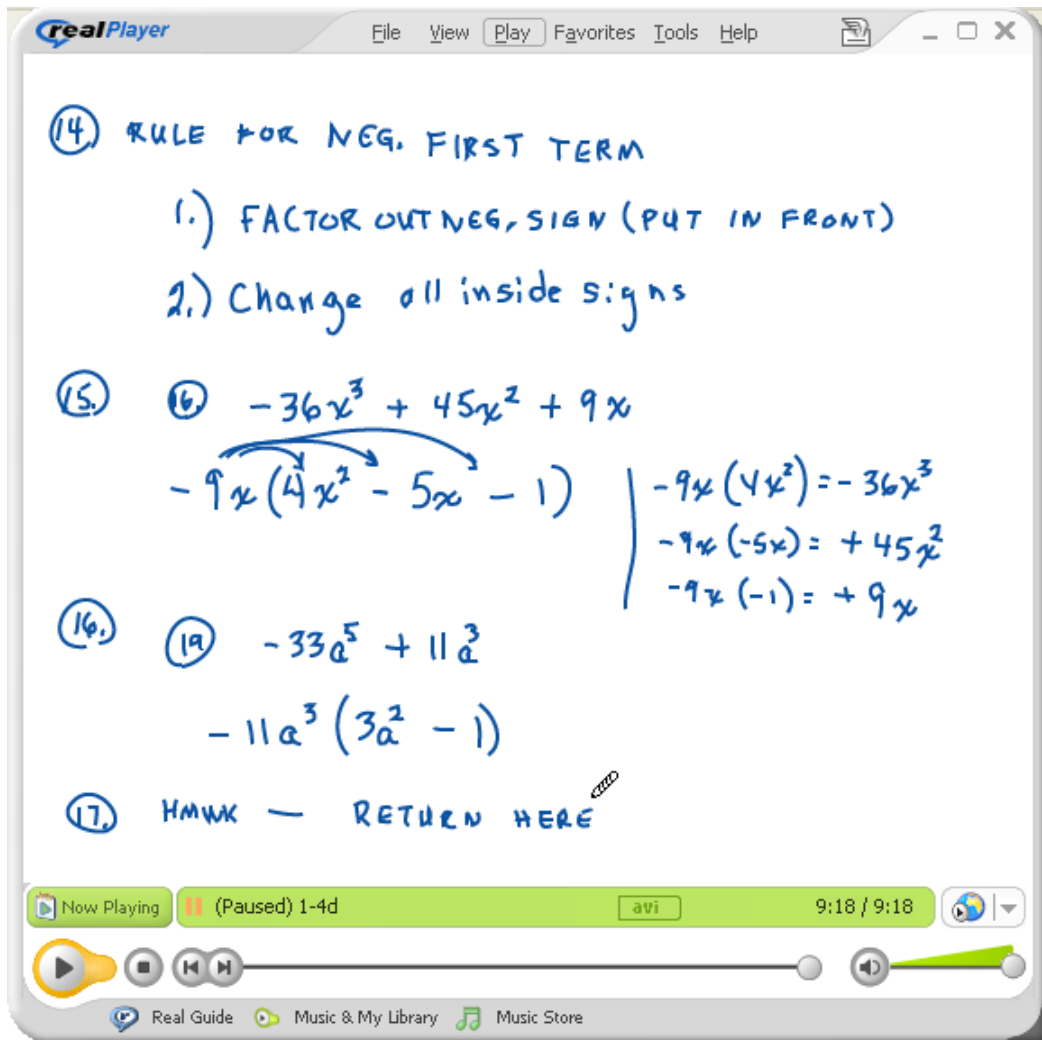
MATH 008

Factoring for Algebra Students

Includes Streaming Video Access
by
Beverly Mick

FREE ONLINE VIDEOS!

Sometimes hearing it once isn't enough. Our site doesn't replace your teacher, but with the help of your teacher and www.math4me.me you are bound to succeed! Here is a sample of a video in progress that was created by the author, Beverly Mick:



The screenshot shows a RealPlayer window with a menu bar (File, View, Play, Favorites, Tools, Help) and standard window controls. The video content is handwritten text on a white background:

(14) RULE FOR NEG. FIRST TERM

1.) FACTOR OUT NEG. SIGN (PUT IN FRONT)

2.) Change all inside signs

(15) (16) $-36x^3 + 45x^2 + 9x$

$-9x(4x^2 - 5x - 1)$

$-9x(4x^2) = -36x^3$

$-9x(-5x) = +45x^2$

$-9x(-1) = +9x$

(16) (19) $-33a^5 + 11a^3$

$-11a^3(3a^2 - 1)$

(17) HWK — RETURN HERE

The video player interface includes a status bar with "Now Playing", "(Paused) 1-4d", "avi", and "9:18 / 9:18". Below the status bar are playback controls: play/pause, stop, previous, next, a progress slider, and volume control. At the bottom, there are links for "Real Guide", "Music & My Library", and "Music Store".

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About the cover and inside cover:

These images were created by Vicky Brago-Mitchell using a very math intensive process called fractals. Her work can be found at <http://www.abm-enterprises.net/wallpaper.html>

Fractal art is created by calculating fractal objects and representing the calculation results as still images, animations, music, or other media. Fractal art is usually created indirectly with the assistance of fractal-generating software, iterating through three phases: setting parameters of appropriate fractal software, executing the possibly lengthy calculation and evaluating the product. In some cases, other graphics programs, such as Photoshop, are used to further modify the images produced. This is called post-processing. waaup hoes

Fractals of all four kinds have been used as the basis for digital art and animation. Starting with 2-dimensional details of fractals, such as the Mandelbrot Set, fractals have found artistic application in fields as varied as texture generation, plant growth simulation and landscape generation.

Fractals are sometimes combined with human-assisted evolutionary algorithms, either by iteratively choosing good-looking specimens in a set of random variations of a fractal artwork and producing new variations, to avoid dealing with cumbersome or unpredictable parameters, or collectively, like in the Electric Sheep project, where people use fractal flames rendered with distributed computing as their screensaver and "rate" the flame they are viewing, influencing the server, which reduces the traits of the undesirables, and increases those of the desirables to produce a computer-generated, community-created piece of art.

Chapter 1
Greatest Common Factor

Section 1.1 - Practice for skill. Factors of 2 or 3.

Factor out 2 only.

Factor out 3 only.

Factor out 2 or 3.

1. $4x + 6$

16. $6x + 15$

31. $9x + 15$

2. $8x - 10$

17. $9x - 24$

32. $10x + 22$

3. $12x - 14$

18. $12x + 21$

33. $12x - 14$

4. $10x - 16$

19. $30x - 27$

34. $30x + 4$

5. $22x + 28$

20. $18x + 33$

35. $30x + 9$

6. $6x + 10y - 4$

21. $9x + 15y + 12$

36. $18x - 24y - 3$

7. $2x - 16y + 6$

22. $3x + 21y - 6$

37. $16x - 14y - 2$

8. $8x - 20y - 14$

23. $60x - 18y - 39$

38. $6x + 2y - 6$

9. $16x + 2y + 10$

24. $24x + 3y + 27$

39. $3x + 3y - 3$

10. $20x - 12y + 30$

25. $36x - 15y + 9$

40. $4x - 6y + 10$

11. $6x + 2$

26. $6x + 3$

12. $18x - 2$

27. $15x - 3$

13. $14x + 8y + 2$

28. $21x - 12y + 3$

14. $24x - 10y - 2$

29. $33x + 18y - 3$

15. $2x + 6y + 2$

30. $3x + 24y + 3$

Section 1.2

G.C.F. of 4, 5, or 6 only.

Factor completely.

1. $15a + 35$

2. $8a - 12$

3. $45a - 10$

4. $18a + 30$

5. $60a - 42$

6. $16a + 24b + 28$

7. $36a - 12b + 30$

8. $25a + 40b - 15$

9. $28a - 8b - 20$

10. $10a + 45b - 30$

11. $5a - 15b - 5$

12. $18a - 12b + 6$

13. $32a + 40b - 4$

14. $6a - 6b + 18$

15. $4a + 4b + 4$

16. $50a + 40b + 55$

17. $35a - 75b + 40$

18. $66a + 54b - 60$

19. $42a - 12b - 48$

20. $30a + 6b + 36$

21. $12a - 44b - 48$

22. $64a + 32b + 36$

23. $4a - 20b - 40$

24. $10a - 50b - 45$

25. $5a + 25b + 20$

G.C.F of 7, 8, or 9 only.

26. $27a + 18$

27. $63a - 72$

28. $14a - 35$

29. $40a + 48$

30. $16a - 56$

31. $49a + 21b + 28$

32. $42a - 56b - 63$

33. $72a - 54b + 45$

34. $36a + 90b + 81$

35. $64a - 24b - 32$

36. $8a - 72b + 80$

37. $21a + 35b + 7$

38. $70a + 14b - 49$

39. $48a - 8b - 8$

40. $63a - 63b + 45$

41. $40a + 56b + 16$

42. $32a + 24b - 80$

43. $18a - 81b + 54$

44. $90a - 99b + 36$

45. $45a + 27b + 9$

46. $28a - 14b + 77$

47. $56a - 7b + 49$

48. $8a + 64b + 32$

49. $70a + 35b - 21$

50. $63a - 45b - 72$

Section 1.3

Factors of 10, 11, 12, 13 only.
Factor completely.

1. $55x + 22y + 99$

2. $13x + 26y + 52$

3. $90x + 70y - 20$

4. $24x + 48y - 36$

5. $39x + 13y - 65$

6. $44x - 88y - 33$

7. $72x - 12y - 24$

8. $30x - 10y + 100$

9. $144x + 60y - 12$

10. $66x - 44y - 121$

G. C. F. of 15, 20, or 25 only.

11. $40x - 100y + 20$

12. $75x + 25y + 100$

13. $140x - 80y + 40$

14. $30x + 45y - 150$

15. $50x - 125y - 175$

16. $45x + 60y + 15$

17. $120x - 20y + 60$

18. $100x + 150y + 75$

19. $75x - 30y - 45$

20. $80x - 100y - 20$

Be sure to factor completely
Look for a common factor.

21. $15x^2 + 20x + 35$

22. $42x^2 + 49x - 14$

23. $80x^2 + 90x - 20$

24. $45x^2 - 27x - 63$

25. $20x^2 - 24x + 12$

26. $66x^2 - 11x - 77$

27. $32x^2 + 48x + 40$

28. $30x^2 - 18x - 6$

29. $50x^2 - 75x + 100$

30. $12x^2 + 30x + 21$

31. $18y + 45$

32. $90y + 48$

33. $10x - 18y + 6z + 4$

34. $6x - 24y + 12z - 6$

35. $45a + 25b + 10c + 25d$

36. $48a - 56b$

37. $33a + 15b$

38. $28a - 7b$

39. $16a + 24b - 12c - 8d$

40. $48a - 36b - 24c + 12d$

Section 1.4

Factor GCF with variables.

1. $9x^2y + 12xy + 6y$

2. $20a^2b^2 + 25ab^2 + 15b^2$

3. $8a^2b^3 + 6a^2b^2$

4. $7ab^3 + 21ab$

5. $63a^2b^2 + 18ab^2$

6. $12x^3 + 8x^2$

7. $36y^3 + 24y^2 - 42y$

8. $20y^5 + 50y^4 - 30y^3$

9. $13a^3b^3 + 12a^2b^2 + 5ab$

10. $19x^5y^2 + 20x^3y^4$

Factor out Negative Leading Coefficient.

11. $-15x^3 + 24x^2$

12. $-20x^5 - 18x^3$

13. $-45x + 10y + 30z$

14. $-4a^3 - 44a^2 - 32a$

15. $-14b^4 - 42b^3 + 35b^2$

16. $-36x^3 + 45x^2 + 9x$

17. $-100a - 25b + 75$

18. $-56x^2 + 49$

19. $-33a^5 + 11a^3$

20. $-60x^4 - 50x$

Section 1.5
Factoring Completely.

First remove 2, then go back and remove another factor.

1. $70x + 28$
2. $110y + 132$
3. $84x - 92$
4. $126a - 90$
5. $90x + 66$

First remove 3, then remove another factor.

6. $63x + 105$
7. $99x + 165$
8. $75x + 45$
9. $300x + 132$
10. $30x - 18$

First remove 5, then remove another factor.

11. $105x - 75$
12. $140x + 35$
13. $110x + 165$
14. $245x - 210y$
15. $60x - 165y$

First remove 7, then remove another factor.

16. $28x + 42$
17. $63x + 147$
18. $70x + 14$
19. $49x + 98$
20. $56x - 70$

Factor completely.

21. $24x^2 - 60x$
22. $48y^2 - 52y$
23. $96x^2 + 72x$
24. $104x^2 + 112x$
25. $54y^2 - 90y$

Chapter 2
Factoring by Grouping

Section 2.1

Distribute.

1. $5(4a + 7)$
2. $3(8a - 5)$
3. $6(2a + 11)$
4. $-2(5a - 9)$
5. $-4(3a + 1)$
6. $7(3x^2 + 4x + 2)$
7. $3(8x^2 - 5x - 12)$
8. $-10(9x^2 + 4x - 7)$
9. $-5(6x^2 - x + 3)$
10. $-8(2x^2 - 9x - 1)$
14. $(8x + 3)(5x + 1)$
15. $(7x + 10)(4x - 3)$
16. $(5x + 2)(x - 3)$
17. $(4x + 1)(3x - 2)$
18. $(x + 6)(2x - 5)$
19. $(3x - 7)(2x + 3)$
20. $(6x - 5)(4x - 3)$

Evaluate Squares.

Multiply Binomials.
(FOIL)

11. $(4x + 7)(2x + 3)$
12. $(9x + 2)(3x + 6)$
13. $(3x + 5)(5x + 1)$

21. $7^2 =$
22. $3^2 =$
23. $5^2 =$
24. $11^2 =$
25. $12^2 =$
26. $8^2 =$
27. $13^2 =$

28. $10^2 =$

29. $2^2 =$

30. $1^2 =$

Find the square roots.

31. $\sqrt{81} =$

32. $\sqrt{25} =$

33. $\sqrt{144} =$

34. $\sqrt{9} =$

35. $\sqrt{1} =$

36. $\sqrt{169} =$

37. $\sqrt{49} =$

38. $\sqrt{16} =$

39. $\sqrt{64} =$

40. $\sqrt{100} =$

Section 2.2

Factor Completely.

1. $15xy + 20y$

2. $49x^2y + 42xy$

3. $56a^2b^3 - 80a^2b^2$

4. $-9z^3 + 18z^2$

5. $-30x^2 - 48xy$

6. $21y^3 + 35y$

7. $12x^2 - 15xy$

8. $-36a^2 + 12a$

9. $-16a^3 - 40a$

10. $-25x^5 + 50x^2$

Readiness - Patterns

Separate 4 terms into parts just before the middle sign (+). Factor the pairs separately.

Notice: Middle sign is +

11. $4a + 6b + 15y + 25x$

12. $49x^2 - 28x + 27a + 36$

13. $15xy - 12x^2 + 28a - 40$

14. $6x^2 + 15xy + 38x - 30$

15. $63a^2 - 27a + 8b - 32$

16. $16x^2 - 64x + 99y^2 + 63y$

17. $8y^2 + 12xy + 15a^2 - 21a$

18. $60ab - 66a + 7xy - 63y$

19. $5a^2b - 15ab + 4x - 4$

20. $81x^3 + 18x^2 + 25y^3 - 35y^2$

Section 2.3

Readiness - Patterns: pairs with middle sign minus (-).

Separate into pairs right before middle minus sign. Leading coefficient of last pair is negative. Must change last sign.

Factor the pairs separately.

1. $63a^2 + 72a - 35x^2 - 14x$

2. $4b^2 - 20ab - 21x^2 - 15x$

3. $10x^3 + 30x^2 - 27y^2 + 18y$

4. $75y^3 - 50y - 33x^4 + 77x$

5. $24ab + 12b - 13xy - 26x$

6. $18x^5 + 6x^2 - 45y^4 - 81y^3$

7. $5x^3 + 3x^2 - 4y^2 + 6y^3$

8. $6ab - 9b - 10xy + 14y$

9. $5x^2y + 5x^2 - 6y^4 + 6y^3$

10. $12ab - 6a - 35xy + 7x$

Factor out the Q or the P or the long empty box symbol [_____].

11. $4xQ - 3Q$

12. $9a^2Q + 5Q$

13. $3y^2Q - 7Q$

14. $7xQ - 8Q$

15. $5x^2Q + 9Q$

16. $10Q - 3xQ$

17. $5x^2P + 8P$

18. $2xP + P$

19. $8y^2P + P$

20. $6xP - P$

21. $3x[\text{_____}] + 2[\text{_____}]$

22. $5y[\text{_____}] - 7[\text{_____}]$

23. $9y^2[\text{_____}] + 10[\text{_____}]$

24. $7a[\text{_____}] - 3b[\text{_____}]$

25. $6x[\text{_____}] + [\text{_____}]$

Section 2.4

Grouping

Notice the quantities in the parentheses are the same.
Factor these quantities out.

Example: $5x [a+b] + 4[a+b] = [a+b](5x+4)$

1. $9y (a + b) + 5 (a + b)$

2. $4a (a + b) + 2 (a + b)$

3. $15x (a + b) + 2 (a + b)$

4. $8w (a + b) + 1 (a + b)$

5. $2a (x + y) + 9 (x + y)$

6. $7z^2 (x + y) + 2 (x + y)$

7. $a^2 (x + y) + 4b (x + y)$

8. $2ab (3x + 4) + 5 (3x + 4)$

9. $12y (2x - 5) + 7 (2x - 5)$

10. $5y (4x + 9) - 6 (4x + 9)$

11. $3x (2x + 5) + 1 (2x + 5)$

12. $7a (5x - 6) + 1 (5x - 6)$

13. $6y (2y + 5) + (2y + 5)$

14. $4w (3y - 2) - (3y - 2)$

15. $10x^2 (3y + 7) + (3y + 7)$

Group by pairs and factor each pair.

If the quantities in the parentheses are exactly the same, factor them out.

(Notice the middle sign is plus in every problem.)

16. $7a^2 + 14ab + 3a + 6b$

17. $9ax + 9bx + 5a + 5b$

18. $12ax + 6ay + 10x + 5y$

19. $9xy + 12y + 6x + 8$

20. $14xy - 35y + 8x - 20$

21. $12xy - 20y + 9x - 15$

22. $6a^2 - 14a + 3ab - 7b$

23. $5x^3 - x^2 + 15xy^3 - 3y^3$

24. $2xy + 4x + 3y + 6$

25. $12z^2 - 2z + 6wz - w$

Section 2.5

Grouping (Middle sign is minus.)

Group by pairs. Since the middle sign is minus, the last pair has a negative leading coefficient. Must change the following sign when factoring out a negative.

Example. Notice the middle and the last sign.

$$7xa + 7xb - 3a - 3b$$

$$7x(a + b) - 3(a + b)$$

$$(a + b)(7x - 3) \text{ Completely factored.}$$

Notice:

The middle sign doesn't change.

The last sign changes.

Factor by Grouping

1. $8ax + 8ay - 5x - 5y$

2. $4xa - 4xb - 3a + 3b$

3. $4ab + 6b - 10a - 15$

4. $14ab - 21a - 8b + 12$

5. $x^2 + xy - 2x - 2y$

6. $15a^2 + 5ab - 18a - 6b$

7. $18a^4 - 45a^3 - 8a + 20$

8. $5a^2 + 5ab - a - b$

9. $6x^3 + 15x^2 - 2x - 5$

10. $15x^2y^2 + 35x^2 - 6y^2 - 14$

Group by pairs.

Watch the middle sign.

If it is plus, do not change last sign.

If the middle sign is minus, change last sign.

11. $2xy + 8x + 9y + 36$

12. $7ab^2 - 35ab + 2b - 10$

13. $4a^2 + 8ab - 9a - 18b$

14. $6y^5 + 6y^3 - 5y^2 - 5$

15. $a^2 - ab + 8a - 8b$

Chapter 3
Factoring Binomials
Difference of Two Squares

Section 3.1

Distribute.

1. $7x(2x + 3)$

2. $5x^2(4x - 9)$

3. $10a(2a + 5)$

4. $2a^3(3a - 7)$

5. $4a^2b^3(6a^2b^2 - ab)$

6. $-5a(7a + 2)$

7. $-12x(2x - 3)$

8. $-8a^2(a^2 + 1)$

9. $-9y(6y - 1)$

10. $-6y^2(4y + 7)$

Combine like terms. (Readiness)

11. $3x^2 + 9x + 2x + 6$

12. $7x^2 + 8x + 6x + 3$

13. $14y^2 + 10y - 3y + 5$

14. $2y^2 + 8y - 4y + 9$

15. $4a^2 - 9a + 2a - 10$

16. $15a^2 - 6a + 4a + 8$

17. $10x^2 - 5x - 7x - 3$

18. $3x^2 - 8x - 2x + 8$

19. $4x^2 - 6x + 6x - 9$

20. $16x^2 + 4x - 4x - 1$

21. $4x^2 + 6x + 6x + 11$

22. $x^2 - 7x + 7x - 49$

23. $5x^2 + x + x + 20$

24. $9x^2 + 3x + 3x + 1$

25. $8x^2 - 4x + x + 15$

26. $x^2 - 5x + 5x - 25$

27. $3x^2 - 8x + x - 10$

28. $7x^2 + 20x - 19x + 50$

29. $x^2 - x + x - 1$

30. $35x^2 + 24x - 24x + 18$

Multiply Binomials (F.O.I.L.)

31. $(6x + 7)(2x + 5)$

32. $(10x + 3)(8x + 3)$

33. $(4x + 5)(4x + 5)$

34. $(3x - 7)(3x - 7)$

35. $(x - 3)(x - 3)$

36. $(2x + 3)(2x - 3)$

37. $(7x + 2)(7x - 2)$

38. $(3x - 5)(3x + 5)$

39. $(8x - 9)(8x + 9)$

40. $(6x + 1)(6x + 1)$

Section 3.2

Squares and square roots.
Evaluate squares.

1. $4^2 =$

2. $8^2 =$

3. $10^2 =$

4. $12^2 =$

5. $11^2 =$

6. $13^2 =$

7. $14^2 =$

8. $15^2 =$

9. $(7x)^2 =$

10. $(2x)^2 =$

Find square roots.

11. $\sqrt{100} =$

12. $\sqrt{49} =$

13. $\sqrt{225} =$

14. $\sqrt{81} =$

15. $\sqrt{1} =$

16. $\sqrt{25} =$

17. $\sqrt{196} =$

18. $\sqrt{36x^2} =$

19. $\sqrt{64y^2} =$

20. $\sqrt{121x^2} =$

Multiply (FOIL).

(sum) x (difference)

21. $(x + 3)(x - 3)$

22. $(x + 5)(x - 5)$

23. $(x + 7)(x - 7)$

24. $(2x + 3)(2x - 3)$

25. $(4x - 9)(4x + 9)$

26. $(8x + 1)(8x - 1)$

27. $(3x + 8)(3x - 8)$

28. $(2x - 11)(2x + 11)$

29. $(5x - 12)(5x + 12)$

30. $(7x - 6)(7x + 6)$

Difference of 2 squares.

Factor.

31. $x^2 - 36$

32. $x^2 - 9$

33. $x^2 - 100$

34. $25x^2 - 64$

35. $49x^2 - 144$

36. $9x^2 - 1$

37. $16x^2 - 81$

38. $225x^2 - 4$

39. $36x^2 - 121$

40. $64x^2 - 49$

Section 3.3

GCF and Difference of 2 Squares.

First, remove the GCF of 2 or $2x$, then factor the Difference of 2 Squares.

1. $2x^2 - 18$

2. $8x^2 - 50$

3. $18x^3 - 8x$

4. $98x^3 - 2x$

5. $72x^2 - 50$

6. $2x^3 - 8x$

7. $200x^2 - 162$

8. $288x^3 - 98x$

9. $8x^2 - 162$

10. $2x^3 - 72x$

There is a common factor in one or both of each pair of parentheses. Remove that common factor so the expression will be completely factored.

(Do not multiply!)

11. $(4x + 6)(9x - 7)$

12. $(5x - 3)(6x + 9)$

13. $(x + 4)(5x + 15)$

14. $(6x - 12)(4x + 6)$

15. $(7x - 3)(4x - 10)$

16. $(3x - 10)(9x - 12)$

17. $(4x + 12)(5x + 5)$

18. $(9x + 3)(10x - 6)$

19. $(12x + 2)(x - 3)$

20. $(15x - 25)(5x - 5)$

First, remove the GCF, then factor the Difference of 2 Squares. (Sometimes, but not always, you can factor the Difference of 2 Squares first and remove the GCF last.) It is best to remove GCF FIRST.

21. $5a^2 - 5b^2$

22. $12a^2 - 3b^2$

23. $36a^2 - 9b^2$

24. $100a^2 - 36b^2$

25. $9a^2 - 81b^2$

26. $20a^2 - 45$

27. $16x^2 - 64y^2$

28. $75x^2 - 3y^2$

29. $8x^2y - 50y$

30. $320 - 20x^2$

Section 3.4

2 - Terms = Binomials

Factor and also name the type of factoring indicated. Write "GCF" for Greatest Common Factor and "D2S" for Difference of 2 Squares. Some expressions involve both types. Always look for the GCF first.

Factor and Name.

1. $18x^2 + 9$

2. $28x^2 - 20$

3. $18x^2 + 8$

4. $25x^2 - 81$

5. $x^2 - 100$

6. $20x^2 - 5$

7. $8x^2 - 40$

8. $4x^2 - 144$

9. $54x^2 - 24$

10. $100x^2 - 16$

4 - Terms or Polynomial

Factor and also name the type of factoring. Write "GCF" for Greatest Common Factor and write "4GP" for factoring 4 terms by Grouping. Some expressions involve both types.

Factor and Name.

11. $6a^2 + 8a + 9ab + 12b$

12. $5a^2 + 25b + 35x - 10$

13. $20x^2 - 8xy + 15x - 6y$

14. $6a - 10b + 2c - 14$

15. $4a^2 - 8ab + 10a - 20b$

16. $6x^3 + 4x^2 - 30x^2y - 20xy$

17. $8x^2 + 4xy + 18x + 9y$

18. $3xy + 3x + 6y + 6$

19. $2x^2 - 4xy - 3x + 6y$

20. $3x^3 + 6x - 12x^2y - 24y$

Section 3.5

Cubes and cube roots.

Evaluate cubes. Simplify expressions.

1. $2^3 =$

2. $3^3 =$

3. $4^3 =$

4. $(5x)^3 =$

5. $(10x)^3 =$

6. $1^3 =$

7. $2^3x^3 + 5^3 =$

8. $4^3x^3 - 3^3 =$

9. $5^3x^3 + 1^3 =$

10. $3^3x^3 + 2^3y^3 =$

Find the cube roots.

11. $\sqrt[3]{27}$

12. $\sqrt[3]{125}$

13. $\sqrt[3]{8x^3}$

14. $\sqrt[3]{1000}$

15. $\sqrt[3]{x^3}$

16. $\sqrt[3]{1}$

17. $\sqrt[3]{64x^3}$

18. $\sqrt[3]{125x^3}$

19. $\sqrt[3]{8y^3}$

20. $\sqrt[3]{27y^3}$

Multiply and combine like terms.

The multiplication has been done for you in the first 3 problems.

Combine like terms.

21. $(x + 2)(x^2 - 2x + 4) = x^3 - 2x^2 + 4x + 2x^2 - 4x + 8 =$

22. $(2x + 3)(4x^2 - 6x + 9) = 8x^3 - 12x^2 + 18x + 12x^2 - 18x + 27 =$

23. $(3x + 4)(9x^2 - 12x + 16) = 27x^3 - 36x^2 + 48x + 36x^2 - 48x + 64 =$

24. $(x + 3)(x^2 - 3x + 9) =$

25. $(5x - 2)(25x^2 + 10x + 4) =$

Chapter 4
Factoring the Sum or Difference of Two Cubes

Section 4.1

Evaluate squares and cubes.

1. $4^2 =$

2. $4^3 =$

3. $9^2 =$

4. $7^2 =$

5. $5^3 =$

6. $(2x)^3 =$

7. $(6x)^2 =$

8. $3^2 =$

9. $3^3 =$

10. $8^2 =$

Find square roots and cube roots.

11. $\sqrt{144}$

12. $\sqrt{81}$

13. $\sqrt[3]{8}$

14. $\sqrt[3]{125}$

15. $\sqrt{16}$

16. $\sqrt{49x^2}$

17. $\sqrt{100y^2}$

18. $\sqrt[3]{27}$

19. $\sqrt[3]{64}$

20. $\sqrt[3]{1}$

Multiply binomials (F.O.I.L.)

21. $(2x + 7)(2x - 7)$

22. $(y + 5)(y - 5)$

23. $(4x - 3)(4x + 3)$

24. $(6y + 1)(6y - 1)$

25. $(2y - 9)(2y + 9)$

Factor Binomials.
(Pattern: Difference of 2 Squares)

26. $4x^2 - 25$

27. $36x^2 - y^2$

28. $a^2 - b^2$

29. $81x^2 - 16y^2$

30. $x^2 - 64$

Section 4.2

Factor Sum or Difference of 2 Cubes.

1. $27x^3 - 125$

2. $a^3 - 8$

3. $y^3 - 64$

4. $8x^3 - y^3$

5. $a^3 - b^3$

6. $125a^3 + 8$

7. $x^3 + 27$

8. $64x^3 + 1$

9. $a^3 + b^3$

10. $8a^3 + 27b^3$

Factor binomials and name the type of factoring.

GCF for Greatest Common Factor

D2S for Difference of 2 Squares

2Cu for Sum or Difference of 2 Cubes

Factor and Name.

11. $20x^2 + 35$

12. $26x^3 - 18x$

13. $8x^3 + 125$

14. $45x^2 - 20$

15. $x^3 - 27$

16. $81y^2 - 49$

17. $54x^3 + 2$

18. $24x - 6y$

19. $200x^3 - 18x$

20. $250x^3 - 16$

Section 4.3

Factor the following numbers into 2 factors, in all possible ways. (Factor Pairs).

Example: $10 = 1 \times 10$

$$10 = 2 \times 5$$

(Do not need to list 5×2 and 10×1 .)

1. 12

2. 8

3. 15

4. 13

5. 24

6. 40

7. 52

8. 28

9. 60

10. 44

Combine like terms.

11. $6x^2 + 8x + 21x + 28$

12. $14x^2 - 21x - 6x + 9$

13. $4a^2 - 5a + 12a - 15$

14. $30a^2 - 18a + 5a - 3$

15. $x^2 - 3x + 8x - 24$

Multiply binomials (F.O.I.L.)

16. $(6x + 1)(5x - 3)$

17. $(2x + 7)(x + 4)$

18. $(4a - 5)(a + 3)$

19. $(7x - 3)(2x - 3)$

20. $(x + 8)(x - 3)$

Section 4.4

Factor 4 terms. (Review)

Separate into pairs. Factor each pair.

Look for the common factor.

1. $4ab - 5a + 12b - 15$

2. $xy - 3x + 8y - 24$

3. $6xy + 8x + 21y + 28$

4. $30ab - 18a + 5b - 3$

5. $14xy - 21y - 6x + 9$

Greatest Common Factor. (Review)

Factor.

6. $27x^2 + 33x$

7. $12x^5 + 18x^4 - 6x^2$

8. $49a^3b^2 - 56ab^3$

9. $250a^6b^3 + 150a^4b^3$

10. $40xy - 48y^2 + 16y^3$

Factor the Difference of Squares. (Review)

11. $49x^2 - 4y^2$

12. $144x^2 - 25y^2$

13. $4a^2 - 9$

14. $36a^2 - 1$

15. $81x^2 - 64$

Section 4.5

Factor Sum or Difference of Cubes. (Review)

1. $a^3 + 125$

2. $64y^3 + 27$

3. $8x^3 - 1$

4. $125x^3 - 8$

5. $27a^3 + b^3$

Give all possible factor pairs for the following numbers.
(Example: $14 = 1 \times 14$ and 2×7)

6. 25

7. 45

8. 18

9. 56

10. 66

Select the correct factorization.

1. $x^2 + 8x + 15$ $(x + 3)(x + 5)$
 $(x + 4)(x + 4)$

2. $x^2 + 10x + 21$ $(x + 2)(x + 8)$
 $(x + 7)(x + 3)$

3. $x^2 + 3x - 10$ $(x + 7)(x - 4)$
 $(x + 5)(x - 2)$

4. $x^2 - 13x + 42$ $(x - 7)(x - 6)$
 $(x + 7)(x - 20)$

5. $x^2 - 8x - 20$ $(x - 10)(x + 2)$
 $(x - 5)(x - 4)$

Chapter 5
Factoring Trinomials
Leading Coefficient is One

Section 5.1

Combine like terms

1. $x^2 - 6x + 4x - 24$

2. $x^2 + 5x - 9x - 45$

3. $x^2 - 6x - 8x + 48$

4. $x^2 - 10x + 3x - 30$

5. $x^2 - 9x - 8x + 72$

Name the pair of numbers with the following Sums and Products. (Look at the products first.)

11. Sum = 11 Product = 28

12. Sum = 9 Product = 18

13. Sum = 7 Product = -30

14. Sum = -5 Product = -36

Find the Sum and the Product of the same 2 numbers.

15. Sum = -15 Product = 56

1. -3 and -5, Sum = ____ Product = ____

16. Sum = -1 Product = -56

2. 4 and -7, Sum = ____ Product = ____

17. Sum = -11 Product = 18

3. -10 and 4, Sum = ____ Product = ____

4. -5 and -5, Sum = ____ Product = ____

18. Sum = 7 Product = -18

5. 8 and 6, Sum = ____ Product = ____

19. Sum = 10 Product = -24

6. -2 and 3, Sum = ____ Product = ____

7. -2 and -3, Sum = ____ Product = ____

20. Sum = 10 Product = 24

8. 6 and 5, Sum = ____ Product = ____

9. -6 and -5, Sum = ____ Product = ____

10. -6 and 5, Sum = ____ Product = ____

Section 5.2

Write the product of the Inside terms only.

1. $(x + 7)(x - 4)$ _____
2. $(x - 8)(2x + 6)$ _____
3. $(x + 9)(2x - 3)$ _____
4. $(2x + 5)(3x - 8)$ _____
5. $(4x - 11)(3x + 1)$ _____
6. $(7x + 9)(4x - 7)$ _____
7. $(3x - 8)(3x - 8)$ _____
8. $(12x - 5)(12x - 5)$ _____
9. $(x - 8)(5x + 3)$ _____
10. $(9x - 10)(3x - 2)$ _____

Write the product of the Outside terms only.

11. $(x - 5)(x + 7)$ _____
12. $(9x + 4)(x - 6)$ _____
13. $(x - 8)(3x - 5)$ _____
14. $(5x - 7)(3x + 10)$ _____
15. $(3x - 8)(3x - 8)$ _____
16. $(2x - 3)(3x - 8)$ _____
17. $(x + 4)(x + 4)$ _____
18. $(5x + 2)(3x - 7)$ _____
19. $(10x + 1)(x - 6)$ _____
20. $(2x - 3)(9x - 11)$ _____

Find the Sums of the products of the inside and outside terms.

21. $(x + 7)(x - 4)$ _____ + _____ = _____
22. $(3x + 2)(4x - 1)$ _____ + _____ = _____
23. $(8x + 5)(2x + 3)$ _____ + _____ = _____
24. $(6x + 7)(3x - 2)$ _____ + _____ = _____
25. $(9x + 4)(x - 2)$ _____ + _____ = _____

Section 5.3

Choose the correct factorization. (Inside + Outside = Middle term)

1. $x^2 + 14x + 40$ $(x + 5)(x + 8)$
 $(x + 4)(x + 10)$

2. $x^2 + 2x - 48$ $(x + 12)(x - 4)$
 $(x - 6)(x + 8)$

3. $x^2 - 12x + 36$ $(x - 6)(x - 6)$
 $(x - 4)(x - 9)$

4. $x^2 - 13x - 30$ $(x - 10)(x + 3)$
 $(x - 15)(x + 2)$

5. $x^2 - 11x + 24$ $(x - 3)(x - 8)$
 $(x - 2)(x - 12)$

6. $x^2 + 20x - 44$ $(x + 4)(x - 11)$
 $(x - 2)(x + 22)$

7. $x^2 - 16x + 60$ $(x - 10)(x - 6)$
 $(x - 12)(x - 5)$

8. $x^2 - 3x - 18$ $(x - 9)(x + 2)$
 $(x + 3)(x - 6)$

9. $x^2 - 5x - 6$ $(x + 2)(x - 3)$
 $(x + 1)(x - 6)$

10. $x^2 - 4x + 4$ $(x - 2)(x - 2)$
 $(x - 4)(x - 1)$

Name the last term and list the possible factor pairs, then select the correct pair.

Example: $x^2 - 9x - 10$, Last term is -10, possible factor pairs are -1 and 10, 1 and -10, -2 and 5, and 2 and -5. Correct pair is 1 and -10.

11. $x^2 - 4x - 77$, Last term is ____, possible factor pairs are

12. $x^2 - 2x - 35$, Last term is ____, possible factor pairs are

13. $x^2 + 5x + 6$, Last term is ____, possible factor pairs are

14. $x^2 + 12x + 20$, Last term is ____, possible factor pairs are

15. $x^2 + 2x - 15$, Last term is ____, possible factor pairs are

Section 5.4

Factor the following trinomials.
Check with FOIL.

1. $x^2 + 14x + 45$

2. $x^2 + 2x - 63$

3. $x^2 + 8x + 16$

4. $x^2 + 6x - 40$

5. $x^2 - 12x + 32$

6. $x^2 - 9x - 36$

7. $x^2 + x - 56$

8. $x^2 + 16x + 55$

9. $x^2 + 18x + 81$

10. $x^2 + 15x - 100$

Find the square roots and cube roots.

11. $\sqrt{49}$

12. $\sqrt[3]{27}$

13. $\sqrt{144}$

14. $\sqrt[3]{125}$

15. $\sqrt{64}$

16. $\sqrt[3]{8x^3}$

17. $\sqrt{121x^2}$

18. $\sqrt{16x^2}$

19. $\sqrt[3]{64x^3}$

20. $\sqrt{9x^2}$

Factor trinomials and name the
type of factoring. GCF or FOIL.

21. $3x^2 + 27x + 12$

22. $x^2 + 14x + 48$

23. $2x^2 + 4x - 16$

24. $x^2 + 15x + 26$

25. $5x^2 + 20x + 15$

Section 5.5

Binomials.

Factor 2 terms.

There are 4 possibilities: GCF or
Difference of 2 Squares or
Sum or Difference of Cubes.

1. $9x^2 - 121$

2. $25y^2 - 81$

3. $100y^2 - 49$

4. $50x^2 - 18$

5. $36x^2 - 144$

6. $64x^2 - y^2$

7. $125x^3 + 27y^3$

8. $a^3 + 8$

9. $64x^3 + 1$

10. $40x^3 - 5$

Trinomials.

Factor 3 terms.

Check with FOIL.

11. $x^2 + 8x - 9$

12. $x^2 - 4x - 5$

13. $x^2 - x - 6$

14. $x^2 - 11x + 28$

15. $x^2 + x - 12$

Factor 4 terms by Grouping

16. $6xy + 3x + 14y + 7$

17. $8a^2 + 12ab - 6a - 9b$

18. $xy + 2x + 3y + 6$

19. $2ab + 4a + 9b + 18$

20. $5xy + 35x - 2y - 14$

Completely factor.

(Factor out the GCF inside some of
these parentheses).

21. $(6x + 10)(3x + 4)$

22. $(7x - 3)(9x - 12)$

23. $(8x - 5)(10x - 15)$

24. $(14x - 7)(8x + 20)$

25. $(12x - 18)(2x + 10)$

Chapter 6

Factoring Trinomials

Section 6.1

List all the factor pairs of the following numbers.

1. 12

2. 15

3. 39

4. 49

5. 60

6. 4

7. 6

8. 10

9. 3

10. 28

Find the product of the inside terms only.

11. $(2x + 7)(3x - 5)$ _____

12. $(6y - 11)(2y + 7)$ _____

13. $(3x - 8)(3x - 2)$ _____

14. $(x + 10)(6x - 1)$ _____

15. $(y + 2)(9y - 13)$ _____

Find the product of the outside terms only.

16. $(11y + 7)(3y - 4)$ _____

17. $(y - 2)(5y - 4)$ _____

18. $(9y + 13)(2y - 7)$ _____

19. $(x + 4)(x - 4)$ _____

20. $(6y + 7)(2y - 5)$ _____

Find the sums of the products of the inside and outside terms.

21. $(2x - 9)(5x - 3)$ _____ + _____ = _____

22. $(x - 11)(x - 11)$ _____ + _____ = _____

23. $(7x + 2)(7x - 2)$ _____ + _____ = _____

24. $(9x + 4)(2x - 1)$ _____ + _____ = _____

25. $(4x + 11)(7x + 5)$ _____ + _____ = _____

Section 6.2

Select the correct factorization.

Inside + Outside = Middle term

1. $6x^2 + 35x + 50$ $(x + 10)(6x + 5)$
 $(3x + 10)(2x + 5)$

2. $6x^2 + 43x - 40$ $(3x + 8)(2x - 5)$
 $(6x - 5)(x + 8)$

3. $4x^2 - 27x + 35$ $(4x - 7)(x - 5)$
 $(2x - 5)(2x - 7)$

4. $9x^2 + 30x + 25$ $(x + 5)(9x + 5)$
 $(3x + 5)(3x + 5)$

5. $15x^2 - x - 6$ $(5x + 3)(3x - 2)$
 $(5x - 3)(3x - 2)$

6. $8x^2 + 14x - 9$ $(4x - 3)(2x + 3)$
 $(4x + 9)(2x - 1)$

7. $6x^2 + 5x - 4$ $(2x - 1)(3x + 4)$
 $(6x + 1)(x - 4)$

8. $14x^2 - 15x - 9$ $(2x + 3)(7x - 3)$
 $(7x + 3)(2x - 3)$

9. $20x^2 + 13x - 21$ $(5x + 3)(4x - 7)$
 $(5x + 7)(4x - 3)$

10. $16x^2 - 42x + 27$ $(4x - 3)(4x - 9)$
 $(8x - 9)(2x - 3)$

Name all the Factor Pairs for the leading coefficients only. (Do not factor.)

11. $21x^2 - 61x - 30$

12. $25x^2 - 20x + 4$

13. $56x^2 - 19x - 10$

14. $12x^2 - 16x - 3$

15. $9x^2 - 3x - 20$

Section 6.3

Name all the Factor Pairs for the last terms only.

1. $21x^2 - 61x - 30$

2. $25x^2 - 20x + 4$

3. $56x^2 - 19x - 10$

4. $12x^2 - 16x - 3$

5. $9x^2 - 3x - 20$

Factor the trinomials by trying combinations of factor pairs. Trial & Error.

Check by F.O.I.L.

6. $21x^2 - 61x - 30$

7. $25x^2 - 20x + 4$

8. $56x^2 - 19x - 10$

9. $12x^2 - 16x - 3$

10. $9x^2 - 3x - 20$

Practice finding the sum of the products of the Inside and Outside terms. Do not multiply. If possible, work mentally, and write only the sum.

11. $(4x - 3)(7x - 2)$ _____

12. $(5x - 7)(2x - 3)$ _____

13. $(x + 9)(2x - 5)$ _____

14. $(3x + 11)(x - 5)$ _____

15. $(6x - 7)(4x - 1)$ _____

Section 6.4

Find all the factor pairs for the first term and for the last term.

1. $4x^2 - 19x + 22$

2. $12x^2 + 5x - 3$

3. $4x^2 + 4x - 63$

4. $10x^2 - 13x + 4$

5. $35x^2 - 23x - 72$

Factor completely. Arrange and rearrange the factor pairs until you find the correct factorization. Check with FOIL.

6. $4x^2 - 19x + 22$

7. $12x^2 + 5x - 3$

8. $4x^2 + 4x - 63$

9. $10x^2 - 13x + 4$

10. $35x^2 - 23x - 72$

Some of the following trinomials have a GCF. Remove the GCF first, then factor the trinomials.

11. $2x^2 - 6x - 56$

12. $4x^2 + 30x + 50$

13. $6x^2 + 27x - 15$

14. $4x^2 + 4x - 15$

15. $75x^2 - 5x - 10$

16. $36x^2 - 15x - 9$

17. $60x^2 + 112x - 128$

18. $10x^2 + 80x - 90$

19. $56x^2 - 12x - 144$

20. $9x^2 + 33x - 26$

Section 6.5

Look for a GCF first. Count the terms. Then completely factor using the appropriate method. Write the number of terms in the box.

[] 1. $24x^2 + 18x + 3$

[] 2. $x^2 - 49$

[] 3. $8x^2 + 50$

[] 4. $24x^3 - 81$

[] 5. $6x^2 - 6x - 36$

[] 6. $6xy - 18x - 5y + 15$

[] 7. $x^3 - 6x^2 + 2x - 12$

[] 8. $2x^3 + 54$

[] 9. $40x^2 + 24x - 16$

[] 10. $160x^2 + 12x - 18$

Factor completely.

11. $6a^5 - 4a^4 - 80a^3$

12. $36a^3b + 84a^2b + 45ab$

13. $x^4y + 125xy$

14. $32x^4y - 4xy^4$

15. $50x^2 + 72$

16. $20a^2 - 125$

17. $192a^3 - 3a$

18. $10a^2b^3 + 14a^3b^2 + 8a^4b$

19. $4a^2 - 12a + 9a - 27$

20. $a^3 + 2a^2 - 9a - 18$