Complete 10 problems in each section.

Factoring: Common Monomial

Factor, write prime if prime.

$$\mathbf{12a^3b + 15ab^3 = 3ab(4a^2 + 5b^2)}$$

1. $6x + 3$
2. $24x^2 - 8x$
3. $6x - 12$
4. $2x^2 + 8x$
5. $4x + 10$
6. $10x^2 + 35x$
7. $10x^2y - 15xy^2$
8. $12x^2 - 9x + 15$
9. $3n^3 - 12n^2 - 30n$
10. $9m^2 - 4n + 12$
11. $2x^3 - 3x^2 + 5x$
12. $13m + 26m^2 - 39m^3$
13. $17x^2 + 34x + 51$
14. $18m^2n^4 - 12m^2n^3 + 24m^2n^2$

Factoring: Difference of Squares

$$\mathbf{a^2 - 36 = (a + 6)(a - 6)}$$
$$\mathbf{3x^2 - 48 = 3(x^2 - 16) = 3(x + 4)(x - 4)}$$

Factor, write prime if prime.

1. $x^2 - 1$
2. $x^2 - 9$
3. $x^2 + 4$
4. $x^2 - 25$
5. $9y^2 - 16$
6. $4x^2 - 25$
7. $9x^2 - 1$
8. $a^2 - x^2$
9. $25 - m^2$
10. $x^2 - 16y^2$
11. $25m^2 - n^2$
12. $-x^2 + 16$
13. $36m^2 - 121$
14. $2x^2 - 8$
15. $25 + 4x^2$
16. $4a^2 - 81b^2$
17. $12x^2 - 75$
18. $a^2b - b^3$
19. $-98 + 2x^2$
20. $5x^2 - 45y^2$
21. $9x^4 - 4$
22. $16x^4 - y^2$

Factoring: Simple Trinomials

$$\mathbf{x^2 + 7x + 10 = (x)^2 + (2 + 5)x + (2)(5) = (x + 2)(x + 5)}$$

Factor, write prime if prime.

1. $x^2 + 6x + 8$
2. $c^2 + 5c + 6$
3. $y^2 - 9y + 14$
4. $x^2 - 10x + 16$
5. $a^2 + 12a + 27$
6. $x^2 - 14x + 24$
7. $x^2 - 15x + 36$
8. $y^2 + 21y + 54$
9. $m^2 + 13m - 36$
10. $x^2 - 8x + 15$
11. $y^2 - 4y - 32$
12. $x^2 - x - 6$
13. $y^2 + 3y - 18$
14. $b^2 + 7b - 18$
15. $a^2 + a - 56$
16. $c^2 - 4c - 12$
17. $x^2 - 9x - 36$
18. $y^2 + 4y - 21$
19. $x^2 - 22x - 75$
20. $x^2 - 3x - 40$
21. $45 + 14y + y^2$
22. $x^2 - 13x + 36$

Factoring: Advanced Trinomials

$$\mathbf{2x^2 - 5x - 3 = (2x + 1)(x - 3)}$$

Factor, write prime if prime.

1. $2x^2 - 5x - 3$
2. $3x^2 + 10x - 8$
3. $2y^2 + 15y + 7$
4. $7a^2 - 11a + 4$
5. $5n^2 + 17n + 6$
6. $4y^2 + 8y + 3$
7. $3x^2 + 4x - 7$
8. $2x^2 + 13x + 15$
9. $9y^2 + 6y - 8$
10. $6x^2 - 7x - 20$
11. $2n^2 - 3n - 14$
12. $5n^2 + 2n + 7$
13. $10x^2 + 13x - 30$
14. $12y^2 + 7y + 1$
15. $2n^2 + 9n - 5$
16. $2x^2 + 7x + 6$
17. $5a^2 - 42a - 27$
18. $15x^2 - 28x - 32$
19. $8a^2 - 10a + 3$
20. $2y^2 - 3y - 20$

Factoring: Grouping

$$\begin{aligned} 6ax - 2b - 3a + 4bx &= 6ax - 3a + 4bx - 2b \\ &= 3a(2x - 1) + 2b(2x - 1) \\ &= (2x - 1)(3a + 2b) \end{aligned}$$

1. $x^2 + 2x + xy + 2y$
2. $3a^2 - 2b - 6a + ab$
3. $t^3 - t^2 + t - 1$ Hint: $t - 1 = 1(t - 1)$
4. $10 + 2t - 5s - st$
5. $\frac{2}{3}bc - \frac{14}{3}b + c - 7$
6. $4u^2 + v + 2uv + 2u$
7. $ad + 3a - d^2 - 3d$
8. $n^2 + 2n + 3mn + 6m$
9. $2ax^2 + bx^2 - 2ay^2 - by^2$
10. $yz^2 - y^3 + z^3 - y^2z$
11. $y^3 - y^2 - 4y + 4$
12. $x^2a + x^2b - 16a - 16b$
13. $x^3 + x^2 - x - 1$
14. $a^3 - a^2 - 8a + 8$