

Polynomial Identities & Factoring

Name _____ Date _____ Period _____

Expand the product using polynomial identities. Show work!

1. $(x-2)(x+5)$

2. $(3x-5)(x+2)$

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

4. $(3-5x)^2$

5. $(3x+4y)^2$

6. $(2u-v)^3$

7. $(u+3v)^3$

8. $(2x^3-3y)(2x^3+3y)$

9. $(\sqrt{u}+\sqrt{v})(\sqrt{u}-\sqrt{v})$

10. $(x^2-\sqrt{3})(x^2+\sqrt{3})$

11. $(x-2)(x^2+2x+4)$

12. $(x+1)(x^2-x+1)$

Factor each expression using the polynomial identities. Show work!

13. $64 - 25y^2$

14. $9y^2 - 16$

15. $y^2 + 8y + 16$

16. $9z^2 - 24z + 16$

17. $27y^3 - 8$

18. $64z^3 + 27$

19. $x^2 + 9x + 14$

20. $2x^3 - 3x^2 + 2x - 3$

Use the quadratic formula to solve each equation. Show work!

21. $x^2 - 5x - 7 = 0$

22. $3x^2 - 4x + 3 = 0$

Expand each expression using polynomial identities and complex numbers. Show work!

23. $(x + 5i)^2$

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

Factor each expression over the complex numbers. Use identities if needed. Show work!

25. $4x^2 + 49$

26. $x^2 - 10x + 26$

Factor each polynomial completely.

27. $3k^2 - 24k - 60$

28. $x^3 + 13x^2 + 42x$

29. $36xy + 48x - 6ky - 8k$

30. $6az^2 - 2ac + 9bz^2 - 3bc$

31. $6n^3 - 3n^2$

32. $3k^2 - 19k + 20$

33. $20b^2 + 156b + 216$

34. $25a^2 + 30a - 135$

35. $7n^2 + 61n - 18$

36. $20x^2 - 70xy$

37. $6u^4 - 6u^2 - 540$

38. $6x^4 - 108x^2 + 480$

39. $r^2 - 100$

40. $m^2 - 24m + 144$

41. $121n^2 - 4$

42. $64k^2 - 1$

43. $32a^2 - 18b^2$

44. $a^2 - 4b^2$

45. $245y^2 + 350yx + 125x^2$

46. $9m^2 + 6mn + n^2$

47. $1 + x^3$

48. $3x^3 + 24$

49. $1 - 125x^3$

50. $3x^3 + 375$

51. $1 + 64x^6$

52. $250u^6 + 432$

Polynomial Identities & Factoring (KEY)

Name _____ Date _____ Period _____

Expand the product using polynomial identities. Show work!

$$1. (x-2)(x+5)$$
$$x^2 + 3x - 10$$

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

$$3. (3x-y)(3x+y)$$
$$9x^2 - y^2$$

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

$$5. (3x+4y)^2$$
$$9x^2 + 24xy + 16y^2$$

$$6. (2u-v)^3$$
$$8u^3 - 12u^2v + 6uv^2 - v^3$$

$$7. (u+3v)^3$$
$$u^3 + 9u^2v + 27uv^2 + 27v^3$$

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

$$9. (\sqrt{u} + \sqrt{v})(\sqrt{u} - \sqrt{v})$$
$$u - v, u \geq 0 \text{ and } v \geq 0$$

$$10. (x^2 - \sqrt{3})(x^2 + \sqrt{3})$$
$$x^4 - 3$$

$$11. (x-2)(x^2+2x+4)$$
$$x^3 - 8$$

$$12. (x+1)(x^2-x+1)$$
$$x^3 + 1$$

Factor each expression using the polynomial identities. Show work!

13. $64 - 25y^2$

$(8+5y)(8-5y)$

14. $9y^2 - 16$

$(3y+4)(3y-4)$

15. $y^2 + 8y + 16$

$(y+4)^2$

16. $9z^2 - 24z + 16$

$(3z-4)^2$

17. $27y^3 - 8$

$(3y-2)(9y^2+6y+4)$

18. $64z^3 + 27$

$(4z+3)(16z^2-12z+9)$

19. $x^2 + 9x + 14$

$(x+7)(x+2)$

20. $2x^3 - 3x^2 + 2x - 3$

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

Use the quadratic formula to solve each equation. Show work!

21. $x^2 - 5x - 7 = 0$

$x = \frac{5 \pm \sqrt{53}}{2}$

22. $3x^2 - 4x + 3 = 0$

$x = \frac{2 \pm \sqrt{5}i}{3}$

Expand each expression using polynomial identities and complex numbers. Show work!

23. $(x+5i)^2$

$x^2 + 10ix - 25$

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

$x^2 + 9$

Factor each expression over the complex numbers. Use identities if needed. Show work!

25. $4x^2 + 49$

$(2x-7i)(2x+7i)$

26. $x^2 - 10x + 26$

$(x-5-i)(x-5+i)$

Factor each polynomial completely.

27. $3k^2 - 24k - 60$

$3(k-10)(k+2)$

28. $x^3 + 13x^2 + 42x$

$x(x+7)(x+6)$

29. $36xy + 48x - 6ky - 8k$

$2(6x-k)(3y+4)$

30. $6az^2 - 2ac + 9bz^2 - 3bc$

$(2a+3b)(3z^2-c)$

31. $6n^3 - 3n^2$

$3n^2(2n-1)$

32. $3k^2 - 19k + 20$

$(3k-4)(k-5)$

33. $20b^2 + 156b + 216$

$4(5b+9)(b+6)$

34. $25a^2 + 30a - 135$

$5(5a-9)(a+3)$

35. $7n^2 + 61n - 18$

$(7n-2)(n+9)$

36. $20x^2 - 70xy$

$10x(2x-7y)$

37. $6u^4 - 6u^2 - 540$

$6(u^2+9)(u^2-10)$

38. $6x^4 - 108x^2 + 480$

$6(x^2-8)(x^2-10)$

39. $r^2 - 100$

$(r+10)(r-10)$

40. $m^2 - 24m + 144$

$(m-12)^2$

41. $121n^2 - 4$

$(11n+2)(11n-2)$

42. $64k^2 - 1$

$(8k+1)(8k-1)$

43. $32a^2 - 18b^2$

$2(4a+3b)(4a-3b)$

44. $a^2 - 4b^2$

$(a+2b)(a-2b)$

$$45. 245y^2 + 350yx + 125x^2$$

$$5(7y + 5x)^2$$

$$46. 9m^2 + 6mn + n^2$$

$$(3m + n)^2$$

$$47. 1 + x^3$$

$$(1 + x)(1 - x + x^2)$$

$$48. 3x^3 + 24$$

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

$$49. 1 - 125x^3$$

$$(1 - 5x)(1 + 5x + 25x^2)$$

$$50. 3x^3 + 375$$

$$3(x + 5)(x^2 - 5x + 25)$$

$$51. 1 + 64x^6$$

$$(1 + 4x^2)(1 - 4x + 16x^4)$$

$$52. 250u^6 + 432$$

$$2(5u^2 + 6)(25u^4 - 30u + 36)$$