

Section 5.2b – Practice Problems

EMERGING LEVEL QUESTIONS

Give four examples for b so that the following trinomials can be factored

1. $x^2 + bx + 6$

$\begin{matrix} \wedge \\ - + - = b \end{matrix}$

$b = -7, 5, 7, -5$

Factors of +6
 $\begin{matrix} 1 & 6 \\ -1 & -6 \\ 2 & 3 \\ -2 & -3 \end{matrix}$ } what do these add to.

2. $x^2 + bx + 4$

$\begin{matrix} 4 & & 4 \\ \wedge & & \wedge \\ 2 & 2 & 1 & 4 \end{matrix}$

$b = 5, -5, 4, -4$

3. $x^2 + bx - 8$

$b = 7, -7, 2, -2$

4. $x^2 + bx - 6$

$b = -5, 5, -1, 1$

PROFICIENT LEVEL QUESTIONS

Give positive and negative examples for c so that the following trinomials can be factored

5. $x^2 + 6x + c$

$c = 5, 8, -7, -16$

Infinite potential answers.

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

$c = 4, 3, -5, -12$

7. $x^2 + x + c$

$c = -2, -6, -12, -20$

8. $x^2 - 5x + c$

$c = -6, -4, 4, 6$

22. $-5x^2 + 25x - 20$

$$-5(x^2 - 5x + 4)$$

$\quad \quad \quad \wedge$
 $\quad \quad \quad -4 \quad -1$

$$\boxed{-5(x-4)(x-1)}$$

23. $-2y^2 + 58y - 200$

$$-2(y^2 - 29y + 100)$$

$\quad \quad \quad \wedge$
 $\quad \quad \quad -25 \quad -4$

$$\boxed{-2(y-25)(y-4)}$$

24. $-x^2 - 6x + 27$

$$-1(x^2 + 6x - 27)$$

$\quad \quad \quad \wedge$
 $\quad \quad \quad 9 \quad -3$

$$\boxed{-(x+9)(x-3)}$$

25. $-x^2 + 7x + 44$

$$-1(x^2 - 7x - 44)$$

$\quad \quad \quad \wedge$
 $\quad \quad \quad 4 \quad -11$

$$\boxed{-(x+4)(x-11)}$$

26. $x^3 + 8x^2 - 20x$

$$x(x^2 + 8x - 20)$$

$\quad \quad \quad \wedge$
 $\quad \quad \quad -2 \quad 10$

$$\boxed{x(x-2)(x+10)}$$

27. $-2x^4 - 4x^3 + 30x^2$

$$-2x^2(x^2 + 2x - 15)$$

$\quad \quad \quad \wedge$
 $\quad \quad \quad 5 \quad -3$

$$\boxed{-2x^2(x+5)(x-3)}$$

28. $-x^3y - x^2y^2 + 6xy^3$

$$-xy(x^2 + xy - 6y^2)$$

$\quad \quad \quad \wedge$
 $\quad \quad \quad -2y \quad 3y$

$$\boxed{-xy(x-2y)(x+3y)}$$

29. $2x^4 - 16x^3y + 32x^2y^2$

$$2x^2(x^2 - 8xy + 16y^2)$$

$\quad \quad \quad \wedge$
 $\quad \quad \quad -4y \quad -4y$

$$\boxed{2x^2(x-4y)(x-4y)}$$

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

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

$$\boxed{-xy^2(x+4y)(x-y)}$$

31. $x^6 - 11x^5y + 28x^4y^2$

$$x^4(x^2 - 11xy + 28y^2)$$

$$\boxed{x^4(x-7y)(x-4y)}$$

EXTENDING LEVEL QUESTIONS

Factor Completely

32. $(2a + 5)y^2 + 9(2a + 5)y - 10(2a + 5)$

$$(2a+5)(y^2 + 9y - 10)$$

$$\boxed{(2a+5)(y-1)(y+10)}$$

33. $x^3(a + b) - 6x^2(a + b) + 8x(a + b)$

$$(a+b)(x^3 - 6x^2 + 8x)$$

$$(a+b)(x)(x^2 - 6x + 8)$$

$$\boxed{x(a+b)(x-4)(x-2)}$$

34. $(2a + b)x^2 - 12(2a + b)x + 27(2a + b)$

$$(2a+b)(x^2 - 12x + 27)$$

$$\boxed{(2a+b)(x-9)(x-3)}$$

35. $(3a - b)y^2 - 13(3a - b)y + 40(3a - b)$

$$(3a-b)(y^2 - 13y + 40)$$

$$\boxed{(3a-b)(y-5)(y-8)}$$

36. $x^4 + x^2 + 1$ (Very Challenging)

$z^2 + z + 1$ now make a PST let $x^2 = z$
 \wedge
 $z^2 + 2z - z + 1$
 $z^2 + 2z + 1 - z$ rearrange
 $(z^2 + 2z + 1) - z$
 \downarrow
 $(z+1)^2 - z$ sub back for z
 $\rightarrow (x^2+1)^2 - x^2$ DOS
 $(x^2+1+x)(x^2+1-x)$

37. $(2x + 3)^2 + (2xz + 3z) - 20z^2$

let $(2x+3) = x$

$(2x+3)^2 + z(2x+3) - 20z^2$

$x^2 + xz - 20z^2$

$(x + 5z)(x - 4z)$

sub back in

$(2x+3+5z)(2x+3-4z)$

38. $(x - 2y)^2 - 8a(x - 2y) + 15a^2$

$x^2 - 8ax + 15a^2$

let $(x-2y) = x$

$(x - 3a)(x - 5a)$

sub back in

$(x - 2y - 3a)(x - 2y - 5a)$

39. $(5x - y)^2 + (10xz - 2yz) - 24z^2$

let $(5x-y) = x$

$x^2 + 2z(x) - 24z^2$

$(x + 6z)(x - 4z)$

$(5x - y + 6z)(5x - y - 4z)$

40. The volume of a rectangular solid is $(x^3 + 7x^2 + 12x)cm^3$. Determine its dimensions in terms of x .

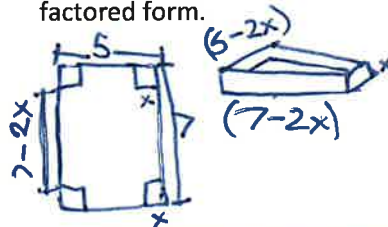
$x^3 + 7x^2 + 12x$

$x(x^2 + 7x + 12)$

\wedge
34

$x(x+3)(x+4)$

41. A sheet of cardboard measuring 5in by 7in has squares x inches wide cut from each corner. Then the sides are folded up to form an open top box. Express the volume of the box in factored form.



$x(5-2x)(7-2x)$

PROFICIENT LEVEL QUESTIONS

Factor each binomial completely

42. $x^2 - 1$

$$(x+1)(x-1)$$

43. $4x^2 - 1$

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

44. $y^2 - 25$

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

45. $25y^2 - 9$

$$(5y-3)(5y+3)$$

46. $4 - 9z^2$

$$(2-3z)(2+3z)$$

47. $16 - 25y^2$

$$(4-5y)(4+5y)$$

48. $16x^2 - 9y^2$

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

49. $25x^4 - 81y^6$

$$(5x^2-9y^3)(5x^2+9y^3)$$

50. $16x^2y^8 - 4$

$$4(4x^2y^8 - 1)$$

$$4(2xy^4-1)(2xy^4+1)$$

51. $20x^2 - 5y^2$

$$5(4x^2 - y^2)$$

$$5(2x-y)(2x+y)$$

52. $(x+1)^2 - y^2$

$$\text{let } (x+1) = q$$

$$\text{so, } (x+1)^2 - y^2 \Rightarrow q^2 - y^2$$

$$(q-y)(q+y) \text{ sub in for } q$$

$$(x+1-y)(x+1+y)$$

53. $4 - (x+2)^2$

$$\text{let } (x+2) = q$$

$$\text{so, } 4 - (x+2)^2 \Rightarrow 4 - q^2$$

$$(2-q)(2+q) \text{ sub in for } q$$

$$(2-x-2)(2+x+2)$$

$$(-x)(4+x)$$

Factor each perfect square trinomial completely

54. $x^2 + 10x + 25$

$$\begin{array}{c} \wedge \\ 5 \ 5 \\ (x+5)(x+5) \end{array}$$

$$\boxed{(x+5)^2}$$

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

$$\begin{array}{c} \wedge \\ 4 \ 4 \\ (x+4)(x+4) \end{array}$$

$$\boxed{(x+4)^2}$$

56. $y^2 - 12y + 36$

$$\begin{array}{c} \wedge \\ -6 \ -6 \\ (y-6)(y-6) \end{array}$$

$$\boxed{(y-6)^2}$$

57. $y^2 - 6y^2 + 9$

$$\begin{array}{c} \wedge \\ -3 \ -3 \end{array}$$

$$(y^2-3)(y^2-3)$$

$$(y^2-3)^2$$

58. $2z^2 - 28z + 98$

$$2(z^2 - 14z + 49)$$

$$\begin{array}{c} \wedge \\ 7 \ 7 \end{array}$$

$$2(z-7)(z-7)$$

$$\boxed{2(z-7)^2}$$

59. $-9x^2 - 24xy - 16y^2$

$$-1(9x^2 - 24xy - 16y^2)$$

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

$$\boxed{-(3x+4y)^2}$$