Chapter 3 Final Review

1. Factor each polynomial.

a) $2a^3b - 8a^2b$

$= 2a^2b(a-4)$

b) $9x^3y^4 + 27xy^2$

$= 9xy^2(x^2y^2+3)$

c) $-3xy^6 - 15x^2y^2 + 3xy$

$= -3xy(y^5 + 5xy - 1)$

d) $2y^2x^5 + 2y^6 + 4y$

$= 2y(yx^5 + y^5 + 2)$

e) $72x^2y^3 - 48x^3y + 80x^2y$

$= 8x^2y(9y^2 - 6x + 10)$

f) $18u^7v^5 - 54u^3v^3 - 27uv^2$

$= 9uv^2(2u^6v^3 - 6u^2v - 3)$

g) $-9a^4b^5 - 12a^2b^3 + 6a^3$

$= -3a^2(3a^2b^5 + 4b^3 - 2a)$

h) $24y^6 + 20y^3 - 8y^2x$

$= 4y^2(6y^4 + 5y - 2x)$

i) $-12f^8g^6 + 6f^6g^7 + 12f^7g^5 + 54f^6g^3$

$-6f^6g^3(2f^2g^3 - g^4 - 2fg^2 - 9)$

nine, not "g"

j) $-21ab^3 - 21a^2b^2 - 35ab^2 - 14a^2b$

$= -7ab(3b^2 + 3ab + 5b - 2a)$

2. Factor each trinomial.

a) $x^2 - 9x + 18$

$\underline{-6} \times \underline{-3} = 18$

$\underline{-6} + \underline{-3} = -9$

$= (x-6)(x-3)$

b) $x^2 - 15x + 54$

$\underline{-9} \times \underline{-6} = 54$

$\underline{-9} + \underline{-6} = -15$

$= (x-9)(x-6)$

c) $p^2 - 14p + 40$

$\underline{-4} \times \underline{-10} = 40$

$\underline{-4} + \underline{-10} = -14$

$= (p-4)(p-10)$

d) $x^2 + x - 42$

$\underline{7} \times \underline{-6} = -42$

$\underline{7} + \underline{-6} = 1$

$= (x+7)(x-6)$

e) $n^2-12n+35$

$\underline{-7} \times \underline{-5} = 35$

$\underline{-7} + \underline{-5} = -12$

$= (n-7)(n-5)$

f) $n^2+9n+14$

$\underline{7} \times \underline{2} = 14$

$\underline{7} + \underline{2} = 9$

$= (n+7)(n+2)$

g) $r^2+3r-28$

$\underline{7} \times \underline{-4} = -28$

$\underline{7} + \underline{-4} = 3$

$= (r+7)(r-4)$

h) x^2+7x+6

$\underline{1} \times \underline{6} = 6$

$\underline{1} + \underline{6} = 7$

$= (x+1)(x+6)$

i) r^2-r-12

$\underline{-4} \times \underline{3} = -12$

$\underline{-4} + \underline{3} = -1$

$= (r-4)(x+3)$

j) $m^2+5m-50$

$\underline{10} \times \underline{-5} = -50$

$\underline{10} + \underline{-5} = 5$

$= (m+10)(m-5)$

3. Factor each trinomial.

a) $5r^2+r-4$

$(5)(-4) = -20$

$\underline{5} \times \underline{-4} = -20$

$\underline{5} + \underline{-4} = 1$

$5r^2 + 5r - 4r - 4$

$5r(r+1) - 4(r+1)$

$= (r+1)(5r-4)$

b) $3k^2-7k-10$

$(3)(-10) = -30$

$\underline{-10} \times \underline{3} = -30$

$\underline{-10} + \underline{3} = -7$

$3k^2 + 3k - 10k - 10$

$3k(k+1) - 10(k+1)$

$= (k+1)(3k-10)$

c) $7x^2+20x+12$

$(7)(12) = 84$

$\underline{6} \times \underline{14} = 84$

$\underline{6} + \underline{14} = 20$

$7x^2 + 14x + 6x + 12$

$7x(x+2) + 6(x+2)$

$= (x+2)(7x+6)$

d) $3x^2-2x-16$

$(3)(-16) = -48$

$\underline{-8} \times \underline{6} = -48$

$\underline{-8} + \underline{6} = -2$

$3x^2 + 6x - 8x - 16$

$3x(x+2) - 8(x+2)$

$= (x+2)(3x-8)$

e) $7p^2-5p-2$

$(7)(-2) = -14$

$\underline{-7} \times \underline{2} = -14$

$\underline{-7} + \underline{2} = -5$

$7p^2 - 7p + 2p - 2$

$7p(p-1) + 2(p-1)$

$= (p-1)(7p+2)$

f) $9x^2-12x-32$

$(9)(-32) = -288$

$\underline{-24} \times \underline{12} = -288$

$\underline{-24} + \underline{12} = -12$

$9x^2 - 24x + 12x - 32$

$3x(3x-8) + 4(3x-8)$

$= (3x-8)(3x+4)$

g) $4r^2+15r-25$

$(4)(-25)=-100$

$20 \times -5 = -100$

$20 + -5 = 15$

$4r^2+20r-5r-25$

$4r(r+5)-5(r+5)$

$=(r+5)(4r-5)$

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

$(4)(-5)=-20$

$-4 \times 5 = -20$

$-4 + 5 = 1$

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

$4x(x-1)+5(x-1)$

$=(x-1)(4x+5)$

i) $9p^2+52p-12$

$(9)(-12)=-108$

$54 \times -2 = -108$

$54 + -2 = 52$

$9p^2+54p-2p-12$

$9p(p+6)-2(p+6)$

$=(p+6)(9p-2)$

j) $9x^2+7x-2$

$(9)(-2)=-18$

$9 \times -2 = -18$

$9 + -2 = 7$

$9x^2+9x-2x-2$

$9x(x+1)-2(x+1)$

$=(x+1)(9x-2)$

4. Factor each polynomial.

a) $16x^2-9y^2$

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

b) $49x^2-25$

$=(7x-5)(7x+5)$

c) $4a^2-9b^2$

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

d) $225-121x^2$

$=(15-11x)(15+11x)$

e) $4x^2+12x+9$

$=(2x+3)(2x+3)$

$=(2x+3)^2$

f) $16x^2+24x+9$

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

$=(4x+3)^2$

g) $25x^2-20x+4$

$=(5x-2)(5x-2)$

$=(5x-2)^2$

h) $9x^2-30x+25$

$=(3x-5)(3x-5)$

$=(3x-5)^2$

i) $25x^2-10x+1$

$=(5x-1)(5x-1)$

$=(5x-1)^2$

j) $a^2+8a+16$

$=(a+4)(a+4)$

$=(a+4)^2$

5. Expand and simplify each expression.

a) $(x+3)(x+2)$

$= x^2+2x+3x+6$

$= x^2+5x+6$

b) $(x-4)(x+8)$

$= x^2+8x-4x-32$

$= x^2+4x-32$

c) $(3a+2)(a-5)$

$= 3a^2-15a+2a-10$

$= 3a^2-13a-10$

d) $(2x-5)(4x-7)$

$= 8x^2-14x-20x+35$

$= 8x^2-34x+35$

e) $(2p+3)(3p-1)$

$= 6p^2-2p+9p-3$

$= 6p^2+7p-3$

f) $(4x-1)(7x-9)$

$= 28x^2-36x-7x+9$

$= 28x^2-43x+9$

g) $(2b+7)(2b^2-2b-4)$

$= 4b^3-4b^2-8b+14b^2-14b-28$

$= 4b^3+10b^2-22b-28$

h) $(4n+1)(4n^2+3n+8)$

$= 16n^3+12n^2+32n+4n^2+3n+8$

$= 16n^3+16n^2+35n+8$

i) $(3x^2+6x+8)(8x-5)$

$= 24x^3-15x^2+48x^2-30x+64x-40$

$= 24x^3+33x^2+34x-40$

j) $(5x^2-6x+1)(7x-7)$

$= 35x^3-35x^2-42x^2+42x+7x-7$

$= 35x^3-77x^2+49x-7$

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

$= 2x+6+9x-6$

$= 11x$

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

$= (x+2)(x+2)-4(x+1)$

$= x^2+2x+2x+4-4x-4$

$= x^2+4x+4-4x-4 = x^2$

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

$= 2x^2-6x+x-8x-20$

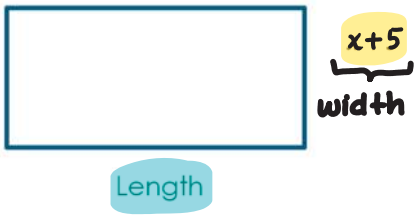
$= 2x^2-13x-20$

n) $2+4(x^2-3x+4)-(x+7)$

$= 2+4x^2-12x+16-x-7$

$= 4x^2-13x+11$

6. Given that the area of the rectangle below is $2x^2+9x-5$, determine the length of the rectangle.



Area = $2x^2+9x-5$

Area = Length × width

$2x^2+9x-5$

$(2)(-5) = -10$

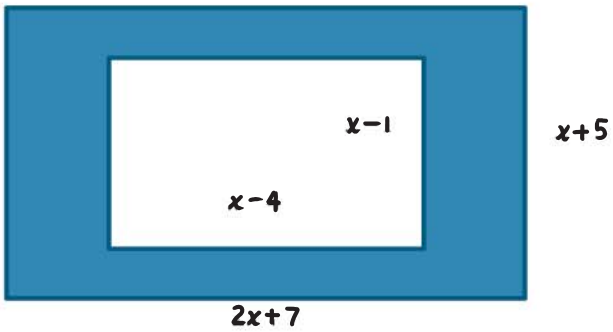
$\frac{10}{10} \times \frac{-1}{+-1} = -10$
$\frac{10}{10} + \frac{-1}{-1} = 9$

$2x^2+10x-1x-5$

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

$(x+5)(2x-1)$ ← length

7. Determine an expression to represent the shaded area below.



Shaded area = large rectangle − small rectangle

$2x^2+17x+35$
$-(x^2-5x+4)$
$x^2+22x+31$

Area of small rectangle: $(x-4)(x-1)$

$= x^2-x-4x+4$

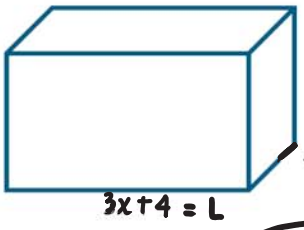
$= x^2-5x+4$

Area of large rectangle: $(2x+7)(x+5)$

$= 2x^2+10x+7x+35$

$= 2x^2+17x+35$

8. Determine a simplified expression for the volume of the prism below. Remember, $V = L \times w \times h$.



$x+3 = h$

$x-4 = w$

$3x+4 = L$

$V = (3x+4)(x-4)(x+3)$

$= (3x^2-12x+4x-16)(x+3)$

$= (3x^2-8x-16)(x+3)$

$V = (3x^2-8x-16)(x+3)$

$= 3x^3+9x^2-8x^2-24x-16x-48$

$= 3x^3+x^2-40x-48$

Additional Practice: p.199 #11bdf, 12abc, 13, 18acef, 19, 24bdf, 25, 27ac, 30, 32, 33ace