

$$\begin{aligned} \text{note: } (Ax+B)(Cx+D) &= ACx^2 + ADx + BCx + BD \\ &= ACx^2 + (AD+BC)x + BD \\ &= ax^2 + bx + c \end{aligned}$$

$$a = AC \quad b = (AD+BC) \quad c = BD$$

only use this technique when the leading term (i.e. ax^2) is positive.

we will be separating the patterns for sign of last terms of factors and numerical calculations.

Case 1: last term is negative (i.e. $c = BD$), then the factors will have different signs.

$$ax^2 + bx - c$$

$$\begin{aligned} &= (\quad)x + (\quad) (\quad)x - (\quad) \\ &+ (\quad)(\quad) - (\quad)(\quad) \end{aligned}$$

example:

$$(116) \quad 6p^2 + p - 22$$

$$\begin{aligned} &\begin{matrix} 6 \\ (1)(6) \\ (2)(3) \end{matrix} = \begin{matrix} (1)p + (2) \\ (6)p - (11) \end{matrix} \begin{matrix} 22 \\ (1)(22) \\ (2)(11) \end{matrix} \\ &+ (6)(2) - (1)(11) \\ &+ 12 - 11 \\ &+ 1 \leftarrow \text{middle term} \\ &= \text{coefficient} \end{aligned}$$

Case 2: last term positive with middle term positive,
both factors will have positive sign.

$$ax^2 + bx + c$$

$$= (\quad)x + (\quad)(\quad)x + (\quad)$$

example:

$$1(2) \quad 8w^2 + 25w + 3$$

$$\begin{matrix} 8 \\ (1)(8) \\ (2)(4) \end{matrix} = (\quad)w + (\quad)(\quad)w + (\quad) \quad \begin{matrix} 3 \\ (1)(3) \end{matrix}$$

$$+ (\quad)(\quad) + (\quad)(\quad)$$

$$+ 1 + 24$$

+25 ← middle term coefficient

Case 3: last term positive with middle term negative,
both factors will have negative signs.

$$ax^2 - bx + c$$

$$= (\quad)x - (\quad)(\quad)x - (\quad)$$

example:

$$1(4) \quad 5s^2 - 9s + 4$$

$$\begin{matrix} 5 \\ (1)(5) \end{matrix} = (\quad)s - (\quad)(\quad)s - (\quad) \quad \begin{matrix} 4 \\ (1)(4) \\ (2)(2) \end{matrix}$$

$$- (\quad)(\quad) - (\quad)(\quad)$$

$$- 5 - 4$$

-9 ← middle term coefficient

$$62) w^2 + 10w + 21$$

$$\begin{array}{l} (w + \underline{3})(w + \underline{7}) \quad \begin{array}{l} 21 \\ (1)(21) \\ (3)(7) \end{array} \\ \quad \uparrow \quad \quad \uparrow \\ + \quad \underline{3} + \quad \underline{7} \\ \quad + 3 + 7 \\ \quad \underline{+ 10} \end{array}$$

$$\begin{array}{l} w^2 + 10w + 21 \\ = \underline{\underline{(w+3)(w+7)}} \end{array}$$

$$64) b^2 + 14b + 48$$

$$\begin{array}{l} (b + \underline{6})(b + \underline{8}) \quad \begin{array}{l} 48 \\ (1)(48) \\ (2)(24) \\ (3)(16) \\ (4)(12) \\ (6)(8) \end{array} \\ \quad \uparrow \quad \quad \uparrow \\ + \quad \underline{6} + \quad \underline{8} \\ \quad + 6 + 8 \\ \quad \underline{+ 14} \end{array}$$

$$\begin{array}{l} b^2 + 14b + 48 \\ = \underline{\underline{(b+6)(b+8)}} \end{array}$$

$$66) u^2 + 101u + 100$$

$$\begin{array}{l} (u + \underline{1})(u + \underline{100}) \quad \begin{array}{l} 100 \\ (1)(100) \\ (2)(50) \\ (4)(25) \\ (5)(20) \\ (10)(10) \end{array} \\ \quad \uparrow \quad \quad \uparrow \\ + \quad \underline{1} + \quad \underline{100} \\ \quad + 1 + 100 \\ \quad \underline{+ 101} \end{array}$$

$$\begin{array}{l} u^2 + 101u + 100 \\ = \underline{\underline{(u+1)(u+100)}} \end{array}$$

$$68) \quad q^2 - 13q + 36$$

$$(q - (4))(q - (9))$$

$$- (4) - (9)$$

$$-4 - 9$$

$$\underline{-13}$$

$$36$$

$$(1)(36)$$

$$(2)(18)$$

$$(3)(12)$$

$$(4)(9)$$

$$(6)(6)$$

$$q^2 - 13q + 36$$

$$= (q - 4)(q - 9)$$

$$70) \quad m^2 - 13m + 30$$

$$(m - (3))(m - (10))$$

$$- (3) - (10)$$

$$-3 - 10$$

$$\underline{-13}$$

$$30$$

$$(1)(30)$$

$$(2)(15)$$

$$(3)(10)$$

$$(5)(6)$$

$$m^2 - 13m + 30$$

$$= (m - 3)(m - 10)$$

$$72) \quad y^2 - 5y + 6$$

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

$$- (2) - (3)$$

$$-2 - 3$$

$$\underline{-5}$$

$$6$$

$$(1)(6)$$

$$(2)(3)$$

$$y^2 - 5y + 6$$

$$= (y - 2)(y - 3)$$

$$74) \quad 6n - 7 + n^2$$

$$= n^2 + 6n - 7$$

$$\begin{matrix} 7 \\ (1)(7) \end{matrix}$$

$$(n + \textcolor{blue}{(7)})(n - \textcolor{blue}{(1)})$$

$$\begin{matrix} \uparrow & \uparrow \\ + \textcolor{blue}{(7)} - \textcolor{blue}{(1)} \end{matrix}$$

$$+ 7 - 1$$

$$+ \underline{6}$$

$$6n - 7 + n^2$$

$$= n^2 + 6n - 7$$

$$= \underline{\underline{(n + 7)(n - 1)}}$$

$$76) \quad 7x + x^2 + 6$$

$$= x^2 + 7x + 6$$

$$\begin{matrix} 6 \\ (1)(6) \\ (2)(3) \end{matrix}$$

$$(x + \textcolor{blue}{(1)})(x + \textcolor{blue}{(6)})$$

$$\begin{matrix} \uparrow & \uparrow \\ + \textcolor{blue}{(1)} + \textcolor{blue}{(6)} \end{matrix}$$

$$+ 1 + 6$$

$$+ \underline{7}$$

$$7x + x^2 + 6$$

$$= x^2 + 7x + 6$$

$$= \underline{\underline{(x + 1)(x + 6)}}$$

$$78) \quad -11 - 10x + x^2$$

$$= x^2 - 10x - 11$$

$$\begin{matrix} 11 \\ (1)(11) \end{matrix}$$

$$(x + \textcolor{blue}{(1)})(x - \textcolor{blue}{(11)})$$

$$\begin{matrix} \uparrow & \uparrow \\ + \textcolor{blue}{(1)} - \textcolor{blue}{(11)} \end{matrix}$$

$$+ 1 - 11$$

$$- \underline{10}$$

$$-11 - 10x + x^2$$

$$= x^2 - 10x - 11$$

$$= \underline{\underline{(x + 1)(x - 11)}}$$

$$82) p^2 - 2pq - 35q^2$$

$$\begin{array}{r}
 (p + \underset{\uparrow}{(5)}q)(p - \underset{\uparrow}{(7)}q) \quad \begin{array}{l} 35 \\ (1)(35) \\ (5)(7) \end{array} \\
 + \quad (5) - (7) \\
 +5-7 \\
 \underline{-2}
 \end{array}$$

$$\begin{aligned}
 & p^2 - 2pq - 35q^2 \\
 &= \underline{\underline{(p+5q)(p-7q)}}
 \end{aligned}$$

$$80) p^2 - 8pq - 65q^2$$

$$\begin{array}{r}
 (p + \underset{\uparrow}{(5)}q)(p - \underset{\uparrow}{(13)}q) \quad \begin{array}{l} 65 \\ (1)(65) \\ (5)(13) \end{array} \\
 + \quad (5) - (13) \\
 +5-13 \\
 \underline{-8}
 \end{array}$$

$$\begin{aligned}
 & p^2 - 8pq - 65q^2 \\
 &= \underline{\underline{(p+5q)(p-13q)}}
 \end{aligned}$$

$$84) r^2 + 3rs - 28s^2$$

$$\begin{array}{r}
 (r + \underset{\uparrow}{(7)}s)(r - \underset{\uparrow}{(4)}s) \quad \begin{array}{l} 28 \\ (1)(28) \\ (2)(14) \\ (4)(7) \end{array} \\
 + \quad (7) - (4) \\
 +7-4 \\
 \underline{+3}
 \end{array}$$

$$\begin{aligned}
 & r^2 + 3rs - 28s^2 \\
 &= \underline{\underline{(r+7s)(r-4s)}}
 \end{aligned}$$

86) $u^2 - 8uv - 24v^2$

$$(u + ()v)(u - ()v)$$

$$+ () - ()$$

$$\begin{array}{c} 24 \\ (1)(24) \end{array}$$

$$(2)(12)$$

$$(3)(8)$$

$$(4)(6)$$

not factorable

"Prime"

88) $c^2 - 7cd + 18d^2$

$$(c - ()d)(c - ()d)$$

$$- () - ()$$

$$18$$

$$(1)(18)$$

$$(2)(9)$$

$$(3)(6)$$

not factorable

"Prime"

90) $q^3 - 5q^2 - 24q$

$$= q(q^2 - 5q - 24)$$

$$(q + (3))(q - (8))$$

$$+ (3) - (8)$$

$$+3-8$$

$$\underline{-5}$$

$$\begin{array}{c} 24 \\ (1)(24) \end{array}$$

$$(2)(12)$$

$$(3)(8)$$

$$(4)(6)$$

$$q^3 - 5q^2 - 24q$$

$$= q(q^2 - 5q - 24)$$

$$= \underline{\underline{q(q+3)(q-8)}}$$

$$92) 11n^3 - 55n^2 + 44n$$

$$= 11n(n^2 - 5n + 4)$$

$$(n - \underset{\substack{\uparrow \\ (1)}}{(1)})(n - \underset{\substack{\uparrow \\ (4)}}{(4)})$$

$$- (1) - (4)$$

$$-1-4$$

$$\underline{-5}$$

$$11n^3 - 55n^2 + 44n$$

$$= 11n(n^2 - 5n + 4)$$

$$= \underline{\underline{11n(n-1)(n-4)}}$$

$$94) 6y^4 + 12y^3 - 48y^2$$

$$= 6y^2(y^2 + 2y - 8)$$

$$(y + \underset{\substack{\uparrow \\ (4)}}{(4)})(y - \underset{\substack{\uparrow \\ (2)}}{(2)})$$

$$+ (4) - (2)$$

$$+4-2$$

$$\underline{+2}$$

$$6y^4 + 12y^3 - 48y^2$$

$$= 6y^2(y^2 + 2y - 8)$$

$$= \underline{\underline{6y^2(y+4)(y-2)}}$$

$$96) 5y^2 + 16y + 11$$

$$\overset{5}{(1)(5)} \quad ((1)y + (1))((5)y + (11)) \quad \overset{11}{(1)(11)}$$

$$+ (5)(1) + (1)(11)$$

$$+5+11$$

$$\underline{+16}$$

$$5y^2 + 16y + 11$$

$$= \underline{\underline{(y+1)(5y+11)}}$$

98) $7b^2 + 50b + 7$

$\begin{matrix} 7 \\ (1)(7) \end{matrix}$

$(\overset{7}{(7)}b + \overset{1}{(1)}) (\overset{1}{(1)}b + \overset{7}{(7)})$

$+ (\overset{1}{(1)})(\overset{1}{(1)}) + (\overset{7}{(7)})(\overset{7}{(7)})$

$+ 1 + 49$

$+ 50$

$\begin{matrix} 7 \\ (1)(7) \end{matrix}$

$7b^2 + 50b + 7$
 $= \underline{\underline{(7b+1)(b+7)}}$

100) $5x^2 - 17x + 6$

$\begin{matrix} 5 \\ (1)(5) \end{matrix}$

$(\overset{5}{(5)}x - \overset{2}{(2)}) (\overset{1}{(1)}x - \overset{3}{(3)})$

$- (\overset{1}{(1)})(\overset{2}{(2)}) - (\overset{5}{(5)})(\overset{3}{(3)})$

$- 2 - 15$

$- 17$

$\begin{matrix} 6 \\ (1)(6) \\ (2)(3) \end{matrix}$

$5x^2 - 17x + 6$
 $= \underline{\underline{(5x-2)(x-3)}}$

102) $10y^2 - 53y - 11$

$\begin{matrix} 10 \\ (1)(10) \\ (2)(5) \end{matrix}$

$(\overset{5}{(5)}y + \overset{1}{(1)}) (\overset{2}{(2)}y - \overset{11}{(11)})$

$+ (\overset{2}{(2)})(\overset{1}{(1)}) - (\overset{5}{(5)})(\overset{11}{(11)})$

$+ 2 - 55$

$- 53$

$\begin{matrix} 11 \\ (1)(11) \end{matrix}$

$10y^2 - 53y - 11$
 $= \underline{\underline{(5y+1)(2y-11)}}$

$$104) \quad 21m^2 - 29mn + 10n^2$$

$$\begin{array}{l} 21 \\ (1)(21) \\ (3)(7) \end{array}$$

$$\begin{array}{c} (3)m - (2)n \quad (7)m - (5)n \\ \quad \quad \quad \uparrow \quad \quad \quad \uparrow \\ - (7)(2) - (3)(5) \end{array}$$

$$\begin{array}{l} 10 \\ (1)(10) \\ (2)(5) \end{array}$$

$$\begin{aligned} 21m^2 - 29mn + 10n^2 \\ = \underline{\underline{(3m-2n)(7m-5n)}} \end{aligned}$$

$$\begin{array}{r} -14-15 \\ \hline -29 \end{array}$$

$$106) \quad 6u^2 + 5uv - 14v^2$$

$$\begin{array}{l} 6 \\ (1)(6) \\ (2)(3) \end{array}$$

$$\begin{array}{c} (1)u + (2)v \quad (6)u - (7)v \\ \quad \quad \quad \uparrow \quad \quad \quad \uparrow \\ + (6)(2) - (1)(7) \end{array}$$

$$\begin{array}{l} 14 \\ (1)(14) \\ (2)(7) \end{array}$$

$$\begin{aligned} 6u^2 + 5uv - 14v^2 \\ = \underline{\underline{(u+2v)(6u-7v)}} \end{aligned}$$

$$\begin{array}{r} +12-7 \\ \hline +5 \end{array}$$

$$\begin{aligned} 108) \quad -81a^2 + 153a + 18 \\ = -9(9a^2 - 17a - 2) \end{aligned}$$

$$\begin{array}{l} 9 \\ (1)(9) \\ (3)(3) \end{array}$$

$$\begin{array}{c} (9)a + (1) \quad (1)a - (2) \\ \quad \quad \quad \uparrow \quad \quad \quad \uparrow \\ + (1)(1) - (9)(2) \end{array}$$

$$\begin{array}{l} 2 \\ (1)(2) \end{array}$$

$$\begin{aligned} -81a^2 + 153a + 18 \\ = -9(9a^2 - 17a - 2) \\ = \underline{\underline{-9(9a+1)(a-2)}} \end{aligned}$$

$$\begin{array}{r} +1-18 \\ \hline -17 \end{array}$$

$$110) -5y^3 - 30y^2 + 35y$$

$$= -5y(y^2 + 6y - 7)$$

$$\begin{matrix} 7 \\ (1)(7) \end{matrix}$$

$$(y + \overset{\uparrow}{(7)})(y - \overset{\uparrow}{(1)})$$

$$+ \overset{\uparrow}{(7)} - \overset{\uparrow}{(1)}$$

$$+ 7 - 1$$

$$\underline{+6}$$

$$-5y^3 - 30y^2 + 35y$$

$$= -5y(y^2 + 6y - 7)$$

$$= \underline{\underline{-5y(y+7)(y-1)}}$$

for 112, 114, 116 see examples on pages 1 and 2

$$118) 12z^2 - 41z - 11$$

$$\begin{matrix} 11 \\ (1)(11) \end{matrix}$$

$$\begin{matrix} 12 \\ (1)(12) \\ (2)(6) \\ (3)(4) \end{matrix}$$

$$(\overset{\uparrow}{(4)}z + \overset{\uparrow}{(1)})(\overset{\uparrow}{(3)}z - \overset{\uparrow}{(11)})$$

$$+ \overset{\uparrow}{(3)}\overset{\uparrow}{(1)} - \overset{\uparrow}{(4)}\overset{\uparrow}{(11)}$$

$$+ 3 - 44$$

$$\underline{-41}$$

$$12z^2 - 41z - 11$$

$$= \underline{\underline{(4z+1)(3z-11)}}$$

$$120) 6u^2 - 46u - 16$$

$$= 2(3u^2 - 23u - 8)$$

$$\begin{matrix} 8 \\ (1)(8) \\ (2)(4) \end{matrix}$$

$$\begin{matrix} 3 \\ (1)(3) \end{matrix}$$

$$(\overset{\uparrow}{(3)}u + \overset{\uparrow}{(1)})(\overset{\uparrow}{(1)}u - \overset{\uparrow}{(8)})$$

$$+ \overset{\uparrow}{(1)}\overset{\uparrow}{(1)} - \overset{\uparrow}{(3)}\overset{\uparrow}{(8)}$$

$$\begin{matrix} +1 - 24 \\ -23 \end{matrix}$$

$$6u^2 - 46u - 16$$

$$= 2(3u^2 - 23u - 8)$$

$$= \underline{\underline{2(3u+1)(u-8)}}$$

$$122) \quad 90n^3 + 42n^2 - 216n$$

$$= 6n(15n^2 + 7n - 36)$$

$$\begin{array}{l} 15 \\ (1)(15) \\ (3)(5) \end{array}$$

$$\begin{array}{l} \left(\begin{array}{c} (5) \\ \uparrow \end{array} n + \begin{array}{c} (9) \\ \uparrow \end{array} \right) \left(\begin{array}{c} (3) \\ \uparrow \end{array} n - \begin{array}{c} (4) \\ \uparrow \end{array} \right) \\ + \begin{array}{c} (3) \\ \uparrow \end{array} \begin{array}{c} (9) \\ \uparrow \end{array} - \begin{array}{c} (5) \\ \uparrow \end{array} \begin{array}{c} (4) \\ \uparrow \end{array} \\ + 27 - 20 \\ + 7 \end{array}$$

$$\begin{array}{l} 36 \\ (1)(36) \\ (2)(18) \\ (3)(12) \\ (4)(9) \\ (6)(6) \end{array}$$

$$90n^3 + 42n^2 - 216n$$

$$= 6n(15n^2 + 7n - 36)$$

$$= \underline{\underline{6n(5n+9)(3n-4)}}$$

$$124) \quad 24p^2 + 160p + 96$$

$$= 8(3p^2 + 20p + 12)$$

$$\begin{array}{l} 3 \\ (1)(3) \end{array}$$

$$\begin{array}{l} \left(\begin{array}{c} (3) \\ \uparrow \end{array} p + \begin{array}{c} (2) \\ \uparrow \end{array} \right) \left(\begin{array}{c} (1) \\ \uparrow \end{array} p + \begin{array}{c} (6) \\ \uparrow \end{array} \right) \\ + \begin{array}{c} (1) \\ \uparrow \end{array} \begin{array}{c} (2) \\ \uparrow \end{array} + \begin{array}{c} (3) \\ \uparrow \end{array} \begin{array}{c} (6) \\ \uparrow \end{array} \\ + 2 + 18 \\ + 20 \end{array}$$

$$\begin{array}{l} 12 \\ (1)(12) \\ (2)(6) \\ (3)(4) \end{array}$$

$$24p^2 + 160p + 96$$

$$= 8(3p^2 + 20p + 12)$$

$$= \underline{\underline{8(3p+2)(p+6)}}$$

$$126) \quad 30x^2 + 105x - 60$$

$$= 15(2x^2 + 7x - 4)$$

$$\begin{array}{l} 2 \\ (1)(2) \end{array}$$

$$\begin{array}{l} \left(\begin{array}{c} (1) \\ \uparrow \end{array} x + \begin{array}{c} (4) \\ \uparrow \end{array} \right) \left(\begin{array}{c} (2) \\ \uparrow \end{array} x - \begin{array}{c} (1) \\ \uparrow \end{array} \right) \\ + \begin{array}{c} (2) \\ \uparrow \end{array} \begin{array}{c} (4) \\ \uparrow \end{array} - \begin{array}{c} (1) \\ \uparrow \end{array} \begin{array}{c} (1) \\ \uparrow \end{array} \\ + 8 - 1 \\ + 7 \end{array}$$

$$\begin{array}{l} 4 \\ (1)(4) \\ (2)(2) \end{array}$$

$$30x^2 + 105x - 60$$

$$= 15(2x^2 + 7x - 4)$$

$$= \underline{\underline{15(x+4)(2x-1)}}$$

$$128) \quad x^4 + 2x^2 - 8$$

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

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

$$+ (4) - (2)$$

$$+ 4 - 2$$

$$+ 2$$

$$\begin{array}{l} 8 \\ (1)(8) \\ (2)(4) \end{array}$$

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

$$= \underline{(x^2 + 4)(x^2 - 2)}$$

$$= \underline{(x^2 + 4)(x + \sqrt{2})(x - \sqrt{2})}$$

after section 6.3

$$130) \quad x^4 - 3x^2 - 28$$

$$= (x^2)^2 - 3(x^2) - 28$$

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

$$+ (4) - (7)$$

$$+ 4 - 7$$

$$- 3$$

$$\begin{array}{l} 28 \\ (1)(28) \\ (2)(14) \end{array}$$

$$(4)(7)$$

$$x^4 - 3x^2 - 28$$

$$= \underline{(x^2 + 4)(x^2 - 7)}$$

$$= \underline{(x^2 + 4)(x + \sqrt{7})(x - \sqrt{7})}$$

after section 6.3

$$132) \quad (x-2)^2 - 3(x-2) - 54$$

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

$$+ (6) - (9)$$

$$+ 6 - 9$$

$$- 3$$

$$\begin{array}{l} 54 \\ (1)(54) \\ (2)(27) \\ (3)(18) \\ (6)(9) \end{array}$$

$$(x-2)^2 - 3(x-2) - 54$$

$$= \underline{((x-2) + 6)((x-2) - 9)}$$

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

$$= (x+4)(x-11)$$

$$134) (5y-1)^2 - 3(5y-1) - 18$$

$$\begin{array}{l}
 (5y-1) + \underset{\uparrow}{(3)} \quad (5y-1) - \underset{\uparrow}{(6)} \\
 + \quad (3) - (6) \\
 \quad \quad \quad +3-6 \\
 \quad \quad \quad \underline{-3}
 \end{array}
 \begin{array}{l}
 18 \\
 (1)(18) \\
 (2)(9) \\
 (3)(6)
 \end{array}
 \begin{array}{l}
 (5y-1)^2 - 3(5y-1) - 18 \\
 = \underline{\underline{(5y-1+3)(5y-1-6)}} \\
 = (5y-1+3)(5y-1-6) \\
 = (5y+2)(5y-7)
 \end{array}$$

$$136) x^2 - 14x - 32$$

$$\begin{array}{l}
 (x + \underset{\uparrow}{(2)}) (x - \underset{\uparrow}{(16)}) \\
 + \quad (2) - (16) \\
 \quad \quad \quad +2-16 \\
 \quad \quad \quad \underline{-14}
 \end{array}
 \begin{array}{l}
 32 \\
 (1)(32) \\
 (2)(16) \\
 (4)(8)
 \end{array}
 \begin{array}{l}
 x^2 - 14x - 32 \\
 = \underline{\underline{(x+2)(x-16)}}
 \end{array}$$

$$138) q^2 - 29qr - 96r^2$$

$$\begin{array}{l}
 (q + \underset{\uparrow}{(3)}r) (q - \underset{\uparrow}{(32)}r) \\
 + \quad (3) - (32) \\
 \quad \quad \quad +3-32 \\
 \quad \quad \quad \underline{-29}
 \end{array}
 \begin{array}{l}
 96 \\
 (1)(96) \\
 (2)(48) \\
 (3)(32) \\
 (4)(24) \\
 (6)(16) \\
 (8)(12)
 \end{array}
 \begin{array}{l}
 q^2 - 29qr - 96r^2 \\
 = \underline{\underline{(q+3r)(q-32r)}}
 \end{array}$$

$$140) 12x^2 + 36y - 24z = \underline{\underline{12(x^2 + 3y - 2z)}} \quad 6.2 \quad \underline{15}$$

$$142) 3q^2 + 6q + 2$$

$$\begin{array}{c} 3 \\ (1)(3) \end{array} \quad \begin{array}{c} ()q + () \\ + () () \end{array} \quad \begin{array}{c} ()q + () \\ + () () \end{array} \quad \begin{array}{c} 2 \\ (1)(2) \end{array}$$

not factorable
"Prime"

$$144) 5n^2 + 25n + 30$$

$$= 5(n^2 + 5n + 6) \quad \begin{array}{c} 6 \\ (1)(6) \\ (2)(3) \end{array}$$

$$\begin{array}{c} (n + (2)) (n + (3)) \\ + (2) + (3) \end{array}$$

$$\begin{array}{c} +2+3 \\ +5 \end{array}$$

$$5n^2 + 25n + 30$$

$$= 5(n^2 + 5n + 6)$$

$$= \underline{\underline{5(n+2)(n+3)}}$$

$$146) 7x^2 - 21x = \underline{\underline{7x(x-3)}}$$

$$148) 18m^2 + 15m + 3$$

$$= 3(6m^2 + 5m + 1)$$

$$\begin{array}{c} 6 \\ (1)(6) \\ (2)(3) \end{array} \quad \begin{array}{c} (3)m + (1) \\ + (2) (1) \end{array} \quad \begin{array}{c} (2)m + (1) \\ + (3) (1) \end{array} \quad \begin{array}{c} 1 \\ (1)(1) \end{array}$$

$$+2+3$$

$$+5$$

$$18m^2 + 15m + 3$$

$$= 3(6m^2 + 5m + 1)$$

$$= \underline{\underline{3(3m+1)(2m+1)}}$$

150) $4a^2 + 5a + 2$

$\begin{matrix} 4 \\ (1)(4) \\ (2)(2) \end{matrix}$

$(()_a + ())(()_a + ())$

$+ (()() + (()())$

$(1)^2(2)$

not factorable
"Prime"

152) $x^4 - 7x^2 - 8$

$$= (x^2)^2 - 7(x^2) - 8$$

$$\begin{aligned} & (x^2 + (1))(x^2 - (8)) \\ & + \quad (1) - (8) \\ & + 1 - 8 \\ & - 7 \end{aligned}$$

8
(1)(8)
(2)(4)

$$x^4 - 7x^2 - 8$$

$$= \underline{(x^2+1)(x^2-8)}$$

$$= (x^2+1)(x+\sqrt{8})(x-\sqrt{8})$$

$$= (x^2+1)(x+2\sqrt{2})(x-2\sqrt{2})$$

after section 6.3

$$154) (x+2)^2 - 25(x+2) - 54$$

$$\begin{aligned} & ((x+2) + (2))((x+2) - (27)) \\ & + (2) - (27) \end{aligned}$$

54
(1)(54)
(2)(27)
(3)(18)
(6)(9)

$$\begin{aligned} & (x+2)^2 - 25(x+2) - 54 \\ &= \underline{\underline{(x+2)+2 \quad (x+2)-27)}} \end{aligned}$$

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

$$= (x+4)(x-25)$$