Exercise 7.7

Factorise each of the following expressions:

(1) $x^2+12x-45$

Solution: By using Middle term splitting we have

$15+(-3)=12$, $15x-3=-45$

$\therefore\ x^2+12x-45 = x^2+15x-3x-45$

$= x(x+15)-3(x+15)$

$= (x+15)(x-3)$

(2) $40+3x-x^2$

$= -(x^2-3x-40)$

In order to factorise we have.

$-8+5=-3$, $-8\times5=-40$

$\therefore\ -(x^2-3x-40) = -\{x^2-8x+5x-40\}$

$= -\{x(x-8)+5(x-8)\}$

$= -(x-8)(x+5)$

$= -(-x+8)(x+5)$

(3) $a^2+3a-88$

In order to factorize, we have.

$11-8=3$, $11\times-8=-88$

$\Rightarrow a^2+3a-88 = a^2+11a-8a-88$

$= a(a+11)-8(a+11)$

$= (a+11)(a-8)$

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(4) $a^2 - 14a - 51$

In order to factorize, we have

$-17 + 3 = -14, \quad -17 \times 3 = -51$

$\therefore a^2 - 14a - 51 = a^2 - 17a + 3a - 51$

$= a(a-17) + 3(a-17)$

$= (a-17)(a+3)$

(5) $x^2 + 14x + 45$

In order to factorize, we have

$9 + 5 = 14, \quad 9 \times 5 = 45$

$\therefore x^2 + 14x + 45 = x^2 + 9x + 5x + 45$

$= x(x+9) + 5(x+9)$

$= (x+9)(x+5)$

(6) $x^2 - 22x + 120$

In order to factorize, we have.

$-10 - 12 = -22, \quad -10 \times -12 = 120$

$\therefore x^2 - 22x + 120 = x^2 - 10x - 12x + 120$

$= x(x-10) - 12(x-10)$

$= (x-10)(x-12)$

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(7) $x^2 - 11x - 42$

In order to factorize, we have

$-14 + 3 = -11, \quad -14 \times 3 = -42$

$\therefore x^2 - 11x - 42 = x^2 - 14x + 3x - 42$

$= x(x-14) + 3(x-14)$

$= (x-14)(x+3)$

(8) $a^2 + 2a - 3 = a^2 + (3-1)a - 3$

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

$= a(a+3) - 1(a+3)$

$= (a+3)(a-1)$

(9) $a^2 + 14a + 48 = a^2 + (8+6)a + 48$

$= a^2 + 8a + 6a + 48$

$= a(a+8) + 6(a+8)$

$= (a+8)(a+6)$

(10) $x^2 - 4x - 21 = x^2 - (7-3)x - 21$

$= x^2 - 7x + 3x - 21$

$= x(x-7) + 3(x-7)$

$= (x-7)(x+3)$

(11) $y^2 + 5y - 36 = y^2 + (9-4)y - 36$

$= y^2 + 9y - 4y - 36$

$= y(y+9) - 4(y+9)$

$= (y+9)(y-4)$

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(12) $(a^2-5a)^2-36$

$= (a^2-5a)^2-(6)^2$

$= \{a^2+5a+6\}\{a^2-5a-6\}$

(13) $(a+7)(a-10)+16$

$= a^2+7a-10a-70+16$

$= a^2-3a-54$

$= a^2-(9-6)a-54$

$= a^2-9a+6a-54$

$= a(a-9)+6(a-9)$

$= (a-9)(a+6)$

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