

U2/L4

More Factoring Examples

Remind them :

CF's (incl. binom. CF's)
 DS
 PST
 GT
 Cubics

Factor fully. All are or involve DS.

$$\begin{aligned} \text{a) } (x+3)^2 - 9y^2 & \text{ DS} \\ &= (x+3-3y)(x+3+3y) \\ &= (x-3y+3)(x+3y+3) \\ & \quad \nwarrow \text{alphabet. order} \end{aligned}$$

$$\begin{aligned} \text{b) } 25x^2 - (y-4)^2 & \text{ DS} \\ &= [5x+(y-4)][5x-(y-4)] \\ &= (5x+y-4)(5x-y+4) \end{aligned}$$

$$\begin{aligned} \text{c) } 9(x-2)^2 - 25(x+1)^2 & \text{ DS} \\ &= [3(x-2)+5(x+1)][3(x-2)-5(x+1)] \\ &= (3x-6+5x+5)(3x-6-5x-5) \\ &= (8x-1)(-2x-11) \end{aligned}$$

$= -(2x+11)(8x-1)$ \nearrow Factor should have a +ve leading coefficient so factor -1 out of this set of brackets

$$\begin{aligned} \text{d) } y^2 - 4x^2 + 12x - 9 & \text{ PST} \\ &= y^2 - (4x^2 - 12x + 9) \\ &= y^2 - (2x-3)^2 \quad \text{DS} \\ &= [y-(2x-3)][y+(2x-3)] \\ &= (-2x+y+3)(2x+y-3) \\ &= -(2x-y-3)(2x+y-3) \end{aligned}$$

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Practice Q's Text p.103 6 7d,e,f 9 d,e,f 10 ← factor first then answer the Q

Yesterday's Worksheet 4 a,c 5(all) 6g 9h,i,k,l " " (all)

p.103

6. a) $x^2 - 9 = (x+3)(x-3)$ b) $4n^2 - 49 = (2n+7)(2n-7)$ c) $x^8 - 1 = (x^4+1)(x^4-1) = (x^4+1)(x^2+1)(x^2-1) = (x^4+1)(x^2+1)(x+1)(x-1)$ d) $9(y-1)^2 - 25 = (3(y-1)+5)(3(y-1)-5) = (3y-3+5)(3y-3-5) = (3y+2)(3y-8)$

* e) $3x^2 - 27(2-x)^2 = 3[x^2 - 9(2-x)^2] = 3[x+3(2-x)][x-3(2-x)] = 3(x+6-3x)(x-6+3x) = 3(-2x+6)(4x-6) = 3(-2)(x-3)(2)(2x-3) = -12(x-3)(2x-3)$

f) $-p^2q^2 + 81 = -(p^2q^2 - 81) = -(pq+9)(pq-9)$

7. d) $1 - x^2 + 6x - 9 = 1 - (x^2 - 6x + 9) = 1 - (x-3)^2 = [1+(x-3)][1-(x-3)] = (x-2)(-x+4) = -(x-4)(x-2)$

Take one step further. * Text has $(4-x)(x-2)$

e) $a^2 - b^2 + 25 + 10a$ Rearrange $= a^2 + 10a + 25 - b^2 = (a+5)^2 - b^2 = (a+5-b)(a+5+b) = (a-b+5)(a+b+5)$

f) $2m^2 + 10m + 10n - 2n^2 = 2(m^2 + 5m + 5n - n^2) = 2(m^2 - n^2 + 5m + 5n) = 2[(m+n)(m-n) + 5(m+n)] = 2[(m+n)(m-n+5)] = 2(m+n)(m-n+5)$

9. d) $y^2 - 49 + 14x - x^2 = y^2 - x^2 + 14x - 49 = y^2 - (x^2 - 14x + 49) = y^2 - (x-7)^2 = (y-x+7)(y+x-7) = -(x-y-7)(x+y-7)$

e) $6x^2 - 21x - 12x + 42 = 6x^2 - 33x + 42 = 3(2x^2 - 11x + 14) = 3(2x-7)(x-2)$

OR

$= 3(2x^2 - 7x - 4x + 14) = 3[2x^2 - 4x - 7x + 14] = 3[2x(x-2) - 7(x-2)] = 3(2x-7)(x-2)$

9.f) $12m^3 - 14m^2 - 30m + 35$
 $= 2m^2(6m - 7) - 5(6m - 7)$
 $= (2m^2 - 5)(6m - 7)$

10. $f(n) = 2n^3 + n^2 + 6n + 3$

$= n^2(2n+1) + 3(2n+1)$
 $= (n^2+3)(2n+1)$

Since 'n' is a natural number i.e. $N: \{1, 2, 3, \dots\}$
 the expression $2n+1$ always results in an odd number
 that is greater than 1 eg. if $n=2$ then $(2n+1) = 2(2)+1 = 5$

$= 35 \leftarrow 35$ is divisible by 5
 5 is an odd # > 1

13/14 Handout

4.a/c 5 all (done by accident in 13 a/c's)
 6 g, 9 h, i, k, l all

4.a) $9a^3 - 12a = 3a(3a^2 - 4)$
 c) $4a^3b^4 - 6a^2b^2 + 2ab = 2ab(2a^2b^3 - 3ab + 1)$

9.h) $5x^2 - 30x + 45 = 5(x^2 - 6x + 9) = 5(x-3)^2$

9.i) $4x^2 + 19x - 5 = (4x-1)(x+5)$

6.g) $x^4 + 15x^2 + 50 = (x^2+10)(x^2+5)$

9.k) $4x^4 + 28x^2 + 49 = (2x^2+7)^2$

9.l) $12x^2 + 8x + 28 = 4(3x^2 + 2x + 7)$

11.a) $(x+2)^2 - 3(x+2) + 2 = (x+2-1)(x+2-2) = (x+1)(x-1)$

11.b) $(x-1)^4 - 1 = ((x-1)^2+1)((x-1)^2-1) = (x^2-2x+2)(x-2)(x+2)$

c) $x^2 - 8x + 16 - 4y^2 = (x-4)^2 - 4y^2 = (x-4+2y)(x-4-2y)$