

A mix-up of factoring techniques

Key

Factor the following – they all factor in some way and all 5 techniques will be used

a) $8x^2 - 12x$

$4x(2x-3)$

b) $4x^3 - 2x^2 - 6x$

$2x(2x^2 - x - 3)$
 $2x^2 - 3x + 2x - 3$
 $x(2x-3) + 1(2x-3)$
 $2x(2x-3)(x+1)$

c) $x^2 + 6x + 8$

$(x+4)(x+2)$

d) $x^2 - 4x - 45$

$(x-9)(x+5)$

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

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

f) $x^2 - 9x - 90$

$(x-15)(x+6)$

g) $x^2 - x - 20$

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

h) $x^2 - 7x + 12$

$(x-4)(x-3)$

i) $81 - 4x^2$

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

j) $4x^2 - 7x + 3$

$4x^2 - 4x - 3x + 3$
 $4x(x-1) - 3(x-1)$
 $(4x-3)(x-1)$

k) $6x^2 - 13x - 5$

$6x^2 - 15x + 2x - 5$
 $3x(2x-5) + 1(2x-5)$
 $(3x+1)(2x-5)$

l) $4x^2 - 5x - 6$

$4x^2 - 8x + 3x - 6$
 $4x(x-2) + 3(x-2)$
 $(4x+3)(x-2)$

m) $64x^2 - y^2$

$(8x-y)(8x+y)$

n) $8x^3 - 8x^2$

$8x^2(x-1)$

o) $x^2y^2 - xy - 6$

$(xy-3)(xy+2)$

p) $6x^2 - 31x + 5$

$6x^2 - 30x - 1x + 5$
 $6x(x-5) - 1(x-5)$
 $(6x-1)(x-5)$

q) $28x^2 + 9x - 4$

$28x^2 + 10x - 7x - 4$
 $7x(7x+4) - 1(7x+4)$
 $(7x-1)(7x+4)$

r) $urax^2 - qtrix^2$

$x^2(urax - qtrix)$

s) $y^4 - x^2$

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

t) $9x^6 - 49x^2$

$x^2(9x^4 - 49)$
 $x^2(3x^2 - 7)(3x^2 + 7)$

u) $21x^2 + 8x - 4$

$21x^2 + 14x - 6x - 4$
 $7x(3x + 2) - 2(3x + 2)$
 $(7x - 2)(3x + 2)$

v) $x^2y^2 - 2xyzp - 8z^2p^2$

$(xy - 4zp)(xy + 2zp)$

w) $x^6 - 3x^3y - 54y^2$

$(x^3 - 9y)(x^3 + 6y)$

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

$4x^2 + 6x + 6x + 9$
 $2x(2x + 3) + 3(2x + 3)$
 $(2x + 3)(2x + 3)$

y) $20x^2 + 11x - 3$

$20x^2 + 15x - 4x - 3$
 $5x(4x + 3) - 1(4x + 3)$
 $(5x - 1)(4x + 3)$

z) $25x^2 - 70x + 49$

$25x^2 - 35x - 35x + 49$
 $5x(5x - 7) - 7(5x - 7)$
 $(5x - 7)(5x - 7)$

π) $21x^2 + 8x - 4$

$21x^2 + 14x - 6x - 4$
 $7x(3x + 2) - 2(3x + 2)$
 $(7x - 2)(3x + 2)$

2) Explain why you can't factor

a) $x^2 + 9$

↑
 the x^2

b) $x^2 + 9x + 10$

↑
 $10x - 1 = +9$
 but -10

c) $2x^2 - x + 10$

20
 $5 \times 4 = 20$
 $-5 \times 4 = -1$ but
 no -20

3) How might you factor

a) $8x(x^2 + 4) - 5(x^2 + 4)$

$(x^2 + 4)(8x - 5)$

b) $17x(x^2 - x - 12) - 2(x^2 - x - 12)$

$(x^2 - x - 12)(17x - 2)$
 $(x - 4)(x + 3)(17x - 2)$