MASTER COACHING

NAME

FACTORISING

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Edition 1

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Factorising

We discuss here only two types ... binomial and then trinomial.

a Binomial expressions of the type $12a^5b^3 + 15a^3b^4$

re-write the expressions in expanded form, as shown below

viz $2 \times 2 \times 3 \times a \times a \times a \times a \times a \times b \times b \times b \quad + \quad 3 \times 5 \times a \times a \times a \times b \times b \times b \times b$

viz $2 \times 2 \times 3 \times a \times a \times a \times a \times a \times b \times b \times b \quad + \quad 3 \times 5 \times a \times a \times a \times b \times b \times b \times b$

The common factor is now circled and this goes outside the bracket.
The uncircled factor goes inside the bracket.

Thus the solution to the above is $12a^5b^3 + 15a^3b^4 = 3a^3b^3\left(4a^2 + 5b\right)$

This method is only used as a starting point.
You will soon recognise that the lowest power occurring is the highest common factor of the algebraic part.

You are advised to mentally check your answer by doing the multiplication.

b Trinomial expressions of the type $ax^2 + bx + c$

The method used is known as the 'cross' method.
Master Coaching recommends a slight variation to all the text book solutions.

i First, check to see if a, b and c have a common factor.
If they do, this common factor must be taken out at the first instance.

ii If a, b and c don't have a common factor then this means that none of the factor brackets formed can have a common factor.

Point ii has escaped most authors and it is this fact that makes the cross method so appealing.
Eliminating common factors in the bracket often greatly reduces the number of trials.

An Example :

Note : when c is *positive* the two terms on the cross *add up b,*
and when c is *negative* the two terms on the cross *subtract to b*.

Consider $4x^2 + 16x + 15$ ... we note $4x^2 = 4x \times 1x$ or $4x^2 = 2x \times 2x$

the factors could be $(4x + N) \times (1x + M)$ or $(2x + N) \times (2x + M)$
where $N + M$ has to equal 16, and N x M equals 15

Answers

Set 1

a $(x-7)(x-1)$
b $(x-4)(x-9)$
c $(x+3)(x-2)$
d $(x+2)(x-4)$
e $(x-2)(x-14)$
f $(x+1)(x-3)$
g $(x+5)(x-3)$
h $(x-9)(x+7)$
i $(x+9)(x+5)$

Set 2

a $(x-5)^2$
b $(x-9)(x+8)$
c $(x+1)^2$
d $(x-11)(x+1)$
e $(x-2)^2$
f $(x+2)(x-12)$
g $(x-5)(x-7)$
h $(x+5)(x+1)$
i $(x-4)(x-25)$

Set 3

a $(x+12)(x+3)$
b $(x-7)(x+5)$
c $(x-1)(x-8)$
d $(x-10)(x-12)$
e $(x-5)(x+1)$
f $(x+1)(x-15)$
g $(x+6)(x-7)$
h $(x+10)(x-11)$
i $(x+11)(x-7)$

Set 4

a $(3x+2)(x+1)$
b $(2x+1)(x+2)$
c $(2x+1)(x+3)$
d $(3x+1)(2x+7)$
e $(3x+1)(x+4)$
f $(2x-3)(x-4)$
g $(2x+5)(4x+3)$
h $3(x-1)(3x-10)$
i $(5x+1)(x+2)$
j $(5x-1)(x-3)$
k $(4x-3)(x-2)$
l $(2x+1)(x-1)$
m $(4x+3)(x+5)$
n $(2x-3)(x+4)$
o $(x+4)(x-9)$

Set 5

a $(4+x)(1-x)$
b $(2x-3)^2$
c $(3x-2)(x+7)$
d $(3x+7)(x+1)$
e $(2x-1)(x+2)$
f $(x+3)(3x-2)$
g $(5x-3)(x-6)$
h $(x+8)(2x-1)$
i $(x+5)(3x-1)$
j $(3x+4)^2$
k $(3x-2)(2x+3)$
l $(4x-3)(3x+4)$
m $(3x+1)(2x-3)$
n $(3x-7)(x-2)$
o $(3+2x)(4-5x)$

Set 6

a $(3x-4)(x-2)$
b $(3x-y)(4x-y)$
c $(2x+5y)(2x+3y)$
d $(1-5x)(1-7x)$
e $(2x+3)(x-6)$
f $(3x-7)(2x+3)$
g $(2+5x)(1-2x)$
h $(7x+5)(x-3)$
i $(6x+1)(3x-2)$
j $(4-7x)(3-2x)$
k $(6x-5y)(2x+3y)$
l $(7x+3)(x-1)$
m $(2x+1)(5x-9)$
n $(2x-3)(13x-1)$
o $(5x+y)(x-7y)$

Set 7

a $(3y+4)(4y-9)$
b $(12a-1)(a+9)$
c $(3m-4)(8m-3)$
d $(8t+3)(3t-4)$
e $3(x+2)(x-2)$
f $4(t+2)(t-2)$
g $(x+2)(x-1)$
h $(x+y+1)(x+y-1)$
i $2x(x+y)$
j $(5t+3)(2t+5)$
k $(5y-2)(4y+5)$
l $(4k+5)(3k-8)$
m $(7m-2)(3m+7)$
n $(16k+9)(3k-4)$
o $(25t-3)(t+5)$

Answers

Set 8

a $(x-11)(x+10)$ **b** $(x-10y)(x-2y)$ **c** $x^2y(x^2+y^2)(x+y)(x-y)$

d $4x(x-2)(x+2)$ **e** $3(x-3)(x+3)$ **f** $(10x-y)(x+y)$

g $7(1-5t)(1+5t)$ **h** $(a+b-1)(a-b+1)$ **i** $(a+1)^2(1-a)$

j $11ac(c-3a)$ **k** $3(x-2)(x+1)$ **l** $(1+x)(3-x)$

m $(x-y)(x-y-2)$ **n** $3x(4x-1)(4x-1)$ **o** $7y^2(y^2+12y-36)$

p $3(a-2)(b-c)$ **q** $(6x+1)(4x-1)$ **r** $(4x^2+y^2)(2x-y)(2x+y)$

s $(2+x)(1-x)(1+x)$ **t** $(bx+1)(ax+1)$ **u** $2(x+y+z)(x+y-z)$

v No factors **w** $(a+c)(a-c+1)$ **x** $(1+2x-2y)(1-2x+2y)$

Set 9

a $2(4t^2+v^2)(2t+v)(2t-v)$ **b** $(x-4)(x+3)$ **c** $3a(x^3+a^3)(x^3-a^3)$ etc

d $(x-2)(x+2)(x^2+3)$ **e** $(x+1)(x^6+1)$ **f** $(5x+7)(3x-5)$

g $(4x-3)(x^2+1)$ **h** $(x-a)(x+a-4b)$ **i** $(a-b+x+y)(a-b-x-y)$

j $ab(b^2+a^2)(b+a)(b-a)$ **k** $(x-1)(x^3-1)$ etc **l** $(a+b+x+y)(a+b-x-y)$

m $(a-b+c)(a-b-c)$ **n** $(a+2b)(a+1)$ **o** $(x+y+1)(x+y-1)$

p $(c+a+b)(c-a-b)$ **q** $-2b(a+b)$ **r** $3x^2(x^2-y-6y^2)$

s $(x-1)(x+1)(x-1)(x+1)$ **t** $(a+2b-c)(a-c)$ **u** $(a+b)(a-b+2c)$

v $(2y-5)(y+6)$ **w** $2(a-1)^2$ **x** $(a^2+a+1)(a^2+a-1)$

Master Coaching

Master Coaching Pledge

Master Coaching Keys to Learning:

The following charter has been produced to prepare you the pursuit of excellence that leads to a life-time of rewards and fulfillment. This is a partnership agreement that allows both parties to mutually benefit from your time at Master Coaching

At the coaching session:

1. Smile, relax, you are focused and in control
2. Concentrate, visualize, execute: claim the reward
3. Assume success. Our members should approach each test in life enthusiastically; every challenge presents an opportunity to demonstrate your prowess. Relish but don't underestimate the magnitude of the test, instead focus your thoughts towards a positive outcome, a chance to excel; a time to enjoy your moment in the sun.

Master Coaching Pledge

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- that your welfare is the paramount consideration in everything that we do
- to be diligent in our preparations which directs our actions in support of you
- show care and give encouragement to you in your striving for excellence
- to personalise all our efforts to your specific needs in all areas
- to encourage you to dare to dream, and to expect that dreams do come true

My Commitment to Master Coaching

- to be honest in all my dealings and
- to accept their accolades and focus my efforts on achieving the zenith in all my endeavours
- to appreciate my cohorts and support them in any way possible
- to live the dream, strive for excellence in everything that I do
- visualise my ultimate success

Christian Avent

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Your complete satisfaction is the focus of everything we do.