S.2 Maths | Binomial Products (Continued)

Example 2:

Choose the appropriate identity and use it to expand the following.

a) $(2x + 3)^2$

b) $(4x – 1)^2$

c) $(2x + y) (2x – y)$

d) $(3x – 2y) (3x + 2y)$

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

f) $(2a + b)^2$

EXERCISE

1) Choose an appropriate identity and use it to evaluate the following.

a) 52^2

b) 105^2

c) 10.5 x 9.5

d) 7.98^2

e) 49 x 51

2) Choose an appropriate identity and use it to expand:

a) $(2y - x) (2y - x)$

b) $(10a + b) (10a + b)$

c) $(3p - q) (3p + q)$

d) $(4c + d) (4c + d)$

Common factors

Expanding **a**(b + c) gives **a**b + **a**c

Therefore **a**b + **a**c = **a**(b + c)

a is a common factor of the terms **a**b and **a**c

A common factor is a factor that appears in all the terms. Once there exists such a factor that appear in all the terms, then the expressions can be factorized.

Example 1:

Factorise the following expressions.

i) $ab + 2bc$

ii) $de + d$

iii) $3pq^2 – 6p^2q$

iv) $y^2 + 2yz$

v) $12h – 4h^2 + 6$

vi) $tu + uv – vw$

Solutions

i) **a**b + 2**a**c = **a** x b + 2 x **a** x c

= **a** x b + **a** x 2c

Both terms contain **a** and therefore, **a** is a common factor. We now introduce brackets and factorise the expressions.

Factorising is the opposite of expanding.

= **a**b + 2**a**c = **a**(b + 2c)

ii) de + d = **d** x e + **d** x 1 (Note that: d = d x 1)

= **d**(e + 1)

iii) $3pq^2 – 6p^2q$ = **3** x **p** x **q** x q – 2 x **3** x **p** x p x **q**

= **3pq** x q – **3pq** x 2p

= **3pq**(q – 2p)

iv) $y^2 + 2yz$ = **y** x y + 2 x **y** x z

= **y**(y + 2z)

v) $12h – 4h^2 + 6$ = **2** x 6h – **2** x $2h^2$ + **2** x 3

= **2**($6h – 2h^2 + 3$)

vi) tu + uv – vw

Although u is a common factor in the first two terms and v of the last two, there is no factor common to all the three terms:

Therefore, tu + uv – vw cannot be factorized.

Example 2:

Evaluate by factorization,

i) 19 x 17 + 19 x 13

ii) 2.8 x 27 – 2.8 x 15

iii) 3.5 x 1.4 + 0.9 x 0.6 – 2.6 x 1.4

Solution

i) 19 x 17 + 19 x 13 = 19(17 + 13)

= 19 x 30

= 570

ii) 2.8 x 27 – 2.8 x 15 = 2.8(27 – 15)

= 2.8 x 12

= 33.6

iii) 3.5 x 1.4 + 0.9 x 0.6 – 2.6 x 1.4 = 1.4(3.5 – 2.6) + 0.9 x 0.6

= 1.4 x 0.9 + 0.9 x 0.6

= 0.9(1.4 + 0.6)

= 0.9 x 2.0

= 1.8

EXERCISE

1) Factorise the following expressions if possible.

a) 4x – 12

b) ab + ac

c) $y^2 + 2yz$

e) $3ab - 6b^2$

f) $m^2n - 2np + 3mp$

2) Evaluate the expressions using common factors

a) 2.3 x 16 + 2.3 x 14

b) 0.58 x 3.9 – 0.58 x 1.9

c) 0.74 x 26 + 26 x 0.06

d) 490 x 6.2 + 490 x 3.8

e) 5.9 x 4.7 + 4.7 x 2.3 – 8.2 x 3.7

f) 0.6 x 3.1 + 3.9 x 0.9 + 3.1 x 0.3