Do now

1.ʊ Expand: $3(7 - q)$	2.ʊ Expand: $9(n + 3)$	3.ʊ Expand: $10(7 + 6j)$	4.ʊ Expand: $8(8r + 4)$
5.ʊ Expand: $4(7 - g)$	6.ʊ Expand: $10(9 + 10q)$	7.ʊ Expand: $8(f + g - 6)$	8.ʊ Expand: $5(h - j + 3)$
9.ʊ Expand: $7(10 - 2k)$	10.ʊ Expand: $5t^2(8uv - 9t^3)$	11.ʊ Expand: $-8(r + t - 10)$	12.ʊ Expand: $-7f^2(8gh + 9f^4)$
13.ʊ Expand: $-5(y - a - 9)$	14.ʊ Expand: $-6(h + j - 2)$	15.ʊ Expand: $-8x^3(5ya + 2x^2)$	16.ʊ Expand: $-8m^5(3m^5 + 6np)$

Walt Factorise algebraic terms

Success criteria I know how to find the highest common factor I need to put a bracket after removing the common factor to keep the remaining terms inside the bracket.

Factorisation is the reverse process of expansion.

For example: $3(x + 2) = 3x + 6$ is *expansion*

$3x + 6 = 3(x + 2)$ is *factorisation.*

In the factorisation of an algebraic expression we have to insert a bracket.

To do this we find the **HCF** (**highest common factor**) of all terms in the expression and place it before the bracket to be inserted.

Example 34

Find the HCF of:

a $3a$ and 9 **b** $4ab$ and $2b$ **c** $5x^2$ and $10x$

a $3a = 3 \times a$, $9 = 3 \times 3$, $\therefore$ HCF $= 3$

b $4ab = 2 \times 2 \times a \times b$, $2b = 2 \times b$, $\therefore$ HCF $= 2b$

c $5x^2 = 5 \times x \times x$, $10x = 2 \times 5 \times x$, $\therefore$ HCF $= 5x$

Introduction to factorisation

1 Find the missing factor:

a $3 \times \square = 3x$ **b** $3 \times \square = 12b$ **c** $5 \times \square = 10xy$

d $\square \times 4x = 4x^2$ **e** $\square \times 5y = 10y^2$ **f** $\square \times 3a = 3a^2$

g $x \times \square = 2xy$ **h** $\square \times 2x = 6x^2$ **i** $6y \times \square = 12y^2$

2 Find the HCF of:

a $4x$ and 12 **b** $3x$ and 6 **c** $4y$ and 14

d $3ab$ and $6b$ **e** $4y$ and $4xy$ **f** $5ad$ and $10a$

g $6x^2$ and $2x$ **h** $3y$ and $9y^2$ **i** $12a$ and $3a^2$

Example 35

Factorise: **a** $2a + 6$ **b** $ab - bd$

a
$$2a + 6$$
$$= 2 \times a + 2 \times 3$$
$$= 2(a + 3)$$

{In **a**, 2 is the HCF of $2a$ and 6}

b
$$ab - bd$$
$$= a \times b - b \times d$$
$$= b(a - d)$$

{In **b**, b is the HCF of ab and bd}

3 Factorise:

a $5a + 10$ **b** $6a + 8$ **c** $6a + 12b$ **d** $4 + 8x$

e $11a + 22b$ **f** $16x + 8$ **g** $4a + 8$ **h** $10 + 15y$

i $25x + 20$ **j** $x + ax$ **k** $3x + mx$ **l** $ac + an$

4 Factorise:

a $2a - 10$ **b** $4y - 20$ **c** $3b - 12$ **d** $6x - 24$

e $6x - 14$ **f** $14y - 7$ **g** $5a - 15$ **h** $10 - 15b$

i $20b - 25$ **j** $16b - 24$ **k** $x - xy$ **l** $ab - ac$

Example 36

Factorise: **a** $3x^2 + 12x$ **b** $4y - 2y^2$

a $3x^2 + 12x$
$= 3 \times x \times x + 4 \times 3 \times x$
$= 3x(x + 4)$

b $4y - 2y^2$
$= 2 \times 2 \times y - 2 \times y \times y$
$= 2y(2 - y)$

5 Factorise:

a $x^2 + 3x$ **b** $2x^2 + 8x$ **c** $3x^2 - 12x$ **d** $6x - x^2$

e $8x - 4x^2$ **f** $15x - 6x^2$ **g** $2x^3 + 4x^2$ **h** $2x^3 + 2x^2 + 4x$

Factorise expressions simple examples

1.ъ 21 - 3q	2.ъ 9n + 27	3.ъ 70 + 60j	4.ъ 64r + 32
5.ъ 28 - 4g	6.ъ 90 + 100q	7.ъ 8f + 8g - 48	8.ъ 5h - 5j + 15
9.ъ 70 - 14k	10.ъ $40t^2uv - 45t^5$	11.ъ -8r + -8t - -80	12.ъ $-56f^2gh + -63f^6$
13.ъ -5y - -5a - -45	14.ъ -6h + -6j - -12	15.ъ $-40x^3ya + -16x^5$	16.ъ $-24m^{10} + -48m^5np$

Answers

1 **a** x **b** $4b$ **c** $2xy$ **d** x **e** $2y$ **f** a
g $2y$ **h** $3x$ **i** $2y$

2 **a** 4 **b** 3 **c** 2 **d** $3b$ **e** $4y$ **f** $5a$
g $2x$ **h** $3y$ **i** $3a$

3 **a** $5(a+2)$ **b** $2(3a+4)$ **c** $6(a+2b)$
d $4(1+2x)$ **e** $11(a+2b)$ **f** $8(2x+1)$
g $4(a+2)$ **h** $5(2+3y)$ **i** $5(5x+4)$
j $x(1+a)$ **k** $x(3+m)$ **l** $a(c+n)$

4 **a** $2(a-5)$ **b** $4(y-5)$ **c** $3(b-4)$
d $6(x-4)$ **e** $2(3x-7)$ **f** $7(2y-1)$
g $5(a-3)$ **h** $5(2-3b)$ **i** $5(4b-5)$
j $8(2b-3)$ **k** $x(1-y)$ **l** $a(b-c)$

5 **a** $x(x+3)$ **b** $2x(x+4)$ **c** $3x(x-4)$
d $x(6-x)$ **e** $4x(2-x)$ **f** $3x(5-2x)$
g $2x^2(x+2)$ **h** $2x(x^2+x+2)$