Quadratic Expressions and Quadratic Equations

$$
\begin{aligned}
\text { Consider } & (x+a)(x+b) \\
= & x^{2}+a x+b x+a b \\
= & x^{2}+(a+b) x+a b
\end{aligned}
$$

This is called expanding brackets
Factorising is the reverse of this process

Consider

$$
\begin{array}{r}
x^{2}+5 x+6 \\
=(x+2)(x+3)
\end{array}
$$

$$
\begin{aligned}
& +1+6 \\
& -1-6 \\
& +2+3 \\
& -2-3
\end{aligned}
$$

why do this?
Suppose we are solving

$$
\begin{aligned}
& x^{2}+5 x+6=0 \\
& (x+2)(x+3)=0
\end{aligned}
$$

Either $x+2=0$ or $x+3=0$

$$
x=-2
$$

$$
x=-3
$$

Example 2

$$
\begin{array}{ll}
x^{2}+6 x+8 & +1+8 \\
=(x+2)(x+4) & -1-8 \\
& +2+4 \\
-2-4
\end{array}
$$

We are looking for two numbers which multiply to +8 and add to +6

Ex 3

$$
=\begin{array}{ccc}
x^{2}+11 x+24 & +1+24 \\
=(x+3)(x+8) & -1 & -24 \\
& +2+12 \\
& -2-12 \\
& +3+8 \\
& -3 & -8 \\
& +4 & +6 \\
& -4 & -6
\end{array}
$$

Exercise Factorise

1) $x^{2}+9 x+8=(x+1)(x+8)$
2) $x^{2}+7 x+10=(x+2)(x+5)$
3) $x^{2}+2 x+1=(x+1)(x+1)$
4) $x^{2}+13 x+30=(x+3)(x+10)$
5) $x^{2}+9 x+14=(x+2)(x+7)$

Ex

$$
\begin{aligned}
& x^{2}-6 x+5 \\
= & +1+5 \\
& (x-1)(x-5)
\end{aligned}
$$

Exercise

1) $x^{2}-8 x+15=(x-3)(x-5)$
2) $x^{2}-4 x+3=(x-1)(x-3)$

Exs

$$
\begin{array}{lll}
x^{2}+5 x-14 & +1 & -14 \\
=(x-2)(x+7) & -1 & +14 \\
& +2 & -7 \\
& -2 & +7
\end{array}
$$

E×6

$$
\begin{aligned}
& x^{2}-x-12 \\
= & (x+3)(x-4)
\end{aligned}
$$

$$
\begin{array}{ll}
+1 & -12 \\
-1 & +12 \\
+2 & -6 \\
-2 & +6 \\
+3 & -4 \\
-3 & +4
\end{array}
$$

Exercise
1)

$$
\begin{aligned}
& x^{2}-7 x-8 \\
= & (x+1)(x-8)
\end{aligned}
$$

2) 

$$
\begin{aligned}
& x^{2}+3 x-10 \\
= & (x-2)(x+5)
\end{aligned}
$$

3) 

$$
\begin{aligned}
& x^{2}+x-2 \\
= & (x-1)(x+2)
\end{aligned}
$$

4) $x^{2}-8 x-20$

$$
=(x+2)(x-10)
$$

5) 

$$
\begin{aligned}
& x^{2}-4 x-21 \\
= & (x+3)(x-7)
\end{aligned}
$$

$+1-10$
$-1+16$
$+2-5$
$-2+5-$
$+1-2$
$-1+2 V$
$+1-20$
$+1+20$
$+2+10$
$+2-10$
$-2+10$
$+4-5$
$-4+5$
$+1-21$
$-1+21$
$+3-7$,
$-3+7$

