14. If $\frac{a}{x-2}+\frac{b}{x+2}=\frac{4}{(x-2)(x+2)}$ for all values of x,

using algebraic identities, write down two equations in terms of a and b only.
Hence solve for a and b.
Verify your answers using the original equation.

multiply by LCD $(x-2)(x+2)$

$a(x+2)+b(x-2)=4$

expand

$ax+2a+bx-2b=4$

$(a+b)x+(2a-2b)=0x+4$

match coefficients $\Rightarrow$

$a+b=0$ (1)

$2a-2b=4$

$a-b=2$ (2)

Solve

$a+b=0$

$a-b=2$

$2a=2 \Rightarrow a=1$

sub into (1)

$1+b=0 \Rightarrow b=-1$

Verify

$\frac{1}{x-2}+\frac{-1}{x+2}=\frac{1(x+2)-1(x-2)}{(x-2)(x+2)}=\frac{x+2-x+2}{(x-2)(x+2)}$

$=\frac{4}{(x-2)(x+2)}$ QED