15. $\int \frac{\sqrt{x-4}}{x+2}\,dx$

$u = \sqrt{x-4} \qquad u = (x-4)^{\frac{1}{2}}$

$du = \frac{1}{2}(x-4)^{-\frac{1}{2}}\,dx$

$= \frac{1}{2(x-4)^{\frac{1}{2}}}\,dx$

$u^2 = x-4$

$u^2+4 = x$

$du = \frac{1}{2\sqrt{x-4}}\,dx$

$= 2\int \frac{\sqrt{x-4}\ \sqrt{x-4}}{2\sqrt{x-4}\ (x+2)}\,dx$

$= 2\int \frac{u \cdot u}{u^2+4+2}\,du$

$= 2\int \frac{u^2}{u^2+6}\,du$

$= 2\int \left(1 - \frac{6}{u^2+6}\right)du$

$= 2\int 1\,du - 2\int \frac{6}{u^2+6}\,du$

$= 2u - 2\cdot 6\int \frac{1}{(\sqrt{6})^2 + (u)^2}\,du$

$a = \sqrt{6}$

$= 2u - 12\int \frac{1}{a^2+u^2}\,du$

$= 2u - 12 \cdot \frac{1}{a}\arctan\frac{u}{a} + C$

$= \boxed{2\sqrt{x-4} - 12\cdot\frac{1}{\sqrt{6}}\arctan\frac{\sqrt{x-4}}{\sqrt{6}} + C}$

$u^2+6 \overline{)\,u^2}$

$\ominus\ u^2 \oplus 6$

-6