$\dfrac{17}{(x-1)(x^2+16)} = \dfrac{A}{x-1} + \dfrac{Bx+C}{x^2+16}$. Multiply both sides by $(x-1)(x^2+16)$ to get
$17 = A(x^2+16) + (Bx+C)(x-1) \quad (\star)$. Substituting 1 for x gives $17 = 17A \Leftrightarrow A = 1$. Substituting 0 for x gives $17 = 16A - C \Rightarrow C = -1$. The coefficients of the x^2-terms in $(\star)$ must be equal, so $0 = A + B \Rightarrow B = -1$. Thus,

$$\begin{aligned}
\int \frac{17}{(x-1)(x^2+16)}\,dx &= \int \left(\frac{1}{x-1} + \frac{-x-1}{x^2+16}\right) dx \\
&= \int \left(\frac{1}{x-1} - \frac{x}{x^2+16} - \frac{1}{x^2+16}\right) dx \\
&= \ln|x-1| - \tfrac{1}{2}\ln(x^2+16) - \tfrac{1}{4}\tan^{-1}\left(\tfrac{x}{4}\right) + C
\end{aligned}$$

In the second term we used the substitution $u = x^2 + 16$ and in the last term we used the formula $\int \dfrac{dx}{x^2+a^2} = \dfrac{1}{a}\tan^{-1}\left(\dfrac{x}{a}\right) + C$.