9. $f(x) = \sqrt{x}\left(\sqrt[5]{x} + 2\right)$

$= x^{\frac{1}{2}}\left(x^{\frac{1}{5}} + 2\right)$

$= x^{\frac{1}{2}+\frac{1}{5}} + 2x^{\frac{1}{2}}$

$= x^{\frac{5}{10}+\frac{2}{10}} + 2x^{\frac{1}{2}}$

$= x^{\frac{7}{10}} + 2x^{\frac{1}{2}}$

$f'(x) = \frac{7}{10}x^{\frac{7}{10}-1} + 2\cdot\frac{1}{2}x^{\frac{1}{2}-1}$

$= \frac{7}{10}x^{-\frac{3}{10}} + x^{-\frac{1}{2}}$

$= \frac{7}{10x^{3/10}} + \frac{1}{x^{1/2}}$

$= \frac{7}{10x^{3/10}} + \frac{1}{x^{5/10}}$

$= \frac{7\cdot x^{2/10}}{10x^{3/10}\cdot x^{2/10}} + \frac{1\cdot 10}{10x^{5/10}}$

$= \frac{7x^{1/5}}{10x^{5/10}} + \frac{10}{10x^{5/10}}$

$= \frac{7x^{1/5}+10}{10x^{5/10}}$

$= \frac{7x^{1/5}+10}{10x^{1/2}}$

$= \boxed{\frac{7\sqrt[5]{x}+10}{10\sqrt{x}}}$