Solution

Simplify $\frac{1}{3x+2}+\frac{2}{3}+\frac{2}{3x+1}$: $\frac{18x^2+45x+19}{3(3x+2)(3x+1)}$

Steps

$\frac{1}{3x+2}+\frac{2}{3}+\frac{2}{3x+1}$

Least Common Multiplier of $3x+2, 3, 3x+1$: $3(3x+2)(3x+1)$ *Show Steps*

Adjust Fractions based on the LCM *Hide Steps*

Multiply each numerator by the same amount needed to multiply its corresponding denominator to turn it into the LCM $3(3x+2)(3x+1)$

For $\frac{1}{3x+2}$: multiply the denominator and numerator by $3(3x+1)$

$\frac{1}{3x+2}=\frac{1\cdot 3(3x+1)}{(3x+2)\cdot 3(3x+1)}=\frac{3(3x+1)}{3(3x+2)(3x+1)}$

For $\frac{2}{3}$: multiply the denominator and numerator by $(3x+2)(3x+1)$

$\frac{2}{3}=\frac{2(3x+2)(3x+1)}{3(3x+2)(3x+1)}=\frac{2(3x+2)(3x+1)}{3(3x+2)(3x+1)}$

For $\frac{2}{3x+1}$: multiply the denominator and numerator by $3(3x+2)$

$\frac{2}{3x+1}=\frac{2\cdot 3(3x+2)}{(3x+1)\cdot 3(3x+2)}=\frac{6(3x+2)}{3(3x+2)(3x+1)}$

$=\frac{3(3x+1)}{3(3x+2)(3x+1)}+\frac{2(3x+2)(3x+1)}{3(3x+2)(3x+1)}+\frac{6(3x+2)}{3(3x+2)(3x+1)}$

Apply the fraction rule: $\frac{a}{c}+\frac{b}{c}=\frac{a+b}{c}$

$=\frac{3(3x+1)+2(3x+2)(3x+1)+6(3x+2)}{3(3x+2)(3x+1)}$

Simplify $3(3x+1)+2(3x+2)(3x+1)+6(3x+2)$: $18x^2+45x+19$ *Hide Steps*

$3(3x+1)+2(3x+2)(3x+1)+6(3x+2)$

Expand $3(3x+1)$: $9x+3$ *Show Steps*

$=9x+3+2(3x+2)(3x+1)+6(3x+2)$

Expand $2(3x+2)(3x+1)$: $18x^2+18x+4$ *Show Steps*

$= 9x + 3 + 18x^2 + 18x + 4 + 6(3x + 2)$

Expand $6(3x + 2)$: $18x + 12$ *Show Steps*

$= 9x + 3 + 18x^2 + 18x + 4 + 18x + 12$

Simplify $9x + 3 + 18x^2 + 18x + 4 + 18x + 12$: $18x^2 + 45x + 19$ *Show Steps*

$= 18x^2 + 45x + 19$

$= \frac{18x^2 + 45x + 19}{3(3x + 2)(3x + 1)}$