

act no assume

$$f(n) = 8n^2 + 5n + 12$$

where n represents the no. of instructions executed.

For the smaller value of n , such as for $n = 1, 2, 3, \dots, 9$

the value of $f(n)$ depends on the whole equation.

If $n = 1$:

Percentage of time taken due to —

$$8n^2 = \left\{ \frac{8}{(8+5+12)} \right\} \times 100 = 32\%$$

$$5n = \left\{ \frac{5}{(8+5+12)} \right\} \times 100 = 20\%$$

$$12 = \left\{ \frac{12}{(8+5+12)} \right\} \times 100 = 48\%$$

NOTES

Most of the time taken by 12, but we can conclude the time complexity, based on only one value.

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∴ We need to calculate the growth factor —

<u>n</u>	<u>$8n^2$</u>	<u>$5n$</u>	<u>12</u>
1	32%	20%	48%
10	92.8%	5.8%	1.4%
100	99.36%	0.62%	0.015%
1000	99.93%	0.06%	≈ 0%

∴ for larger value of n , $n \rightarrow \infty$

The value of $f(n)$ depends only the higher power and hardly depends upon the other value in the eqⁿ.

Therefore time complexity —

$$\boxed{f(n) = 8n^2}$$

This is the approximate time complexity, which is very close to the actual result. The measure of approximate complexity is known as Asymptotic Complexity.