

Karatsuba Multiplication (Fast)

Apply the Karatsuba multiplication algorithm. Fill in each blank with the appropriate value.

$$\begin{array}{c} a_L \ a_R \\ b_L \ b_R \\ 1203 \ * \ 4536 \end{array}$$

$$c_2 = (\underline{\hspace{2cm}} * \underline{\hspace{2cm}}) \quad n = \underline{\hspace{2cm}}$$

$$c_0 = (\underline{\hspace{2cm}} * \underline{\hspace{2cm}})$$

$$c_1 = (\underline{\hspace{2cm}} + \underline{\hspace{2cm}}) * (\underline{\hspace{2cm}} + \underline{\hspace{2cm}}) - \underline{\hspace{2cm}} - \underline{\hspace{2cm}}$$

$$\text{return } \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$c_2(10^n) + c_1(10^{n/2}) + c_0$$

| | |
|---|---|
| $a_L \ a_R$ $\underline{\hspace{2cm}} \quad * \quad \underline{\hspace{2cm}}$ | $b_L \ b_R$ $\underline{\hspace{2cm}}$ |
| $c_2 = (\underline{\hspace{2cm}} * \underline{\hspace{2cm}})$ | $n = \underline{\hspace{2cm}}$ |
| $c_0 = (\underline{\hspace{2cm}} * \underline{\hspace{2cm}})$ | |
| $c_1 = (\underline{\hspace{2cm}} + \underline{\hspace{2cm}}) * (\underline{\hspace{2cm}} + \underline{\hspace{2cm}}) - \underline{\hspace{2cm}} - \underline{\hspace{2cm}}$ | |
| $\text{return } \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ | |
| $c_2(10^n) + c_1(10^{n/2}) + c_0$ | |

| | |
|---|---|
| $a_L \ a_R$ $\underline{\hspace{2cm}} \quad * \quad \underline{\hspace{2cm}}$ | $b_L \ b_R$ $\underline{\hspace{2cm}}$ |
| $c_2 = (\underline{\hspace{2cm}} * \underline{\hspace{2cm}})$ | $n = \underline{\hspace{2cm}}$ |
| $c_0 = (\underline{\hspace{2cm}} * \underline{\hspace{2cm}})$ | |
| $c_1 = (\underline{\hspace{2cm}} + \underline{\hspace{2cm}}) * (\underline{\hspace{2cm}} + \underline{\hspace{2cm}}) - \underline{\hspace{2cm}} - \underline{\hspace{2cm}}$ | |
| $\text{return } \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ | |
| $c_2(10^n) + c_1(10^{n/2}) + c_0$ | |

$a_L \ a_R$

$b_L \ b_R$

*

$$c_2 = (\underline{\quad} * \underline{\quad}) \qquad n = \underline{\quad}$$

$$c_0 = (\underline{\quad} * \underline{\quad})$$

$$c_1 = (\underline{\quad} + \underline{\quad}) * (\underline{\quad} + \underline{\quad}) - \underline{\quad} - \underline{\quad}$$

$$\text{return } \frac{\underline{\quad} + \underline{\quad} + \underline{\quad}}{c_2(10^n) + c_1(10^{n/2}) + c_0} = \underline{\quad}$$