

Counting:

[illegible]

Addition:

$$\begin{array}{c} \textcolor{red}{5} + \textcolor{blue}{3} = 8 \\ [\textcolor{red}{\bullet}] [\textcolor{red}{\bullet}] [\textcolor{red}{\bullet}] [\textcolor{red}{\bullet}] [\textcolor{red}{\bullet}] + [\textcolor{blue}{\bullet}] [\textcolor{blue}{\bullet}] [\textcolor{blue}{\bullet}] = [\textcolor{red}{\bullet}] [\textcolor{red}{\bullet}] [\textcolor{red}{\bullet}] [\textcolor{red}{\bullet}] [\textcolor{red}{\bullet}] [\textcolor{blue}{\bullet}] [\textcolor{blue}{\bullet}] [\textcolor{blue}{\bullet}] \end{array}$$

Multiplication:

$$\textcolor{red}{5} \cdot \textcolor{blue}{3} = 15$$

$$\begin{array}{c} \textcolor{red}{\boxed{\bullet}} \textcolor{red}{\boxed{\bullet}} \textcolor{red}{\boxed{\bullet}} \textcolor{red}{\boxed{\bullet}} \textcolor{red}{\boxed{\bullet}} \cdot \textcolor{blue}{\boxed{\bullet}} \textcolor{blue}{\boxed{\bullet}} \textcolor{blue}{\boxed{\bullet}} = \begin{array}{c} \textcolor{violet}{\boxed{\bullet}} \textcolor{red}{\boxed{\bullet}} \textcolor{red}{\boxed{\bullet}} \textcolor{red}{\boxed{\bullet}} \textcolor{red}{\boxed{\bullet}} \\ \textcolor{blue}{\boxed{\bullet}} \textcolor{black}{\boxed{\bullet}} \textcolor{black}{\boxed{\bullet}} \textcolor{black}{\boxed{\bullet}} \textcolor{black}{\boxed{\bullet}} \\ \textcolor{blue}{\boxed{\bullet}} \textcolor{black}{\boxed{\bullet}} \textcolor{black}{\boxed{\bullet}} \textcolor{black}{\boxed{\bullet}} \textcolor{black}{\boxed{\bullet}} \end{array} \end{array}$$

Brackets:

$$(5 + 3) \cdot 4 = 8 \cdot 4 = 32$$

$$5 + (3 \cdot 4) = 5 + 12 = 17$$

Exponentiation:

$$5^2 = \overbrace{5 \cdot 5}^2 = 25$$

$$6^5 = \overbrace{6 \cdot 6 \cdot 6 \cdot 6 \cdot 6}^5 = 7776$$

$$7^4 = \overbrace{7 \cdot 7 \cdot 7 \cdot 7}^4 = 2401$$

Subtraction and negative numbers:

$$5 - 1 = 4 \qquad \Leftrightarrow 4 + 1 = 5$$

$$50 - 3 = 47 \qquad \Leftrightarrow 47 + 3 = 50$$

$$4 - 6 = \textcolor{red}{-2} \qquad \Leftrightarrow 6 + (\textcolor{red}{-2}) = 4$$

Powers of i :

$$i^0 = 1$$

$$i^1 = i$$

$$i^2 = -1$$

$$i^3 = -i$$

$$i^4 = 1$$

$$(ab)^n = a^n b^n:$$

$$\begin{aligned}(7 \cdot i)^3 &= 7 \cdot i \cdot 7 \cdot i \cdot 7 \cdot i \\ &= 7 \cdot 7 \cdot 7 \cdot i \cdot i \cdot i \\ &= 7^3 \cdot i^3 = 7^3 \cdot (-i)\end{aligned}$$

Fractions:

$$\begin{aligned}\frac{10}{2} &= 5 && \Leftarrow 5 \cdot 2 = 10 \\ \frac{240}{3} &= 80 && \Leftarrow 80 \cdot 3 = 24\end{aligned}$$

Factorials:

$$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$$

Definitions of exp, sin, cos:

$$\begin{aligned}\exp \square &= \frac{\square^0}{0!} + \frac{\square^1}{1!} + \frac{\square^2}{2!} + \frac{\square^3}{3!} + \dots \\ \sin \square &= \frac{\square^1}{1!} - \frac{\square^3}{3!} + \frac{\square^5}{5!} - \frac{\square^7}{7!} + \dots \\ \cos \square &= \frac{\square^0}{0!} - \frac{\square^2}{2!} + \frac{\square^4}{4!} - \frac{\square^6}{6!} + \dots\end{aligned}$$

Euler's identity:

$$\begin{aligned}\exp(\square \cdot i) &= \frac{\square^0 i^0}{0!} + \frac{\square^1 i^1}{1!} + \frac{\square^2 i^2}{2!} + \frac{\square^3 i^3}{3!} + \dots \\ &= \frac{\square^0 i^0}{0!} + i \cdot \frac{\square^1 i^0}{1!} + \frac{\square^2 i^2}{2!} + i \cdot \frac{\square^3 i^2}{3!} + \dots \\ &= \left(\frac{\square^0 i^0}{0!} + \frac{\square^2 i^2}{2!} + \dots \right) + i \cdot \left(\frac{\square^1 i^0}{1!} + \frac{\square^3 i^2}{3!} + \dots \right) \\ &= \left(\frac{\square^0}{0!} - \frac{\square^2}{2!} + \dots \right) + i \cdot \left(\frac{\square^1}{1!} - \frac{\square^3}{3!} + \dots \right) \\ &= \cos \square + i \cdot \sin \square\end{aligned}$$