

SOLUTION: Whale of Fortune

Author: Chris Jeuell



When each expression is simplified, its value is an integer between 1 and 26, inclusive. This fact along with the puzzle's title – a pun of the game show *Wheel of Fortune* – suggests mapping each number to the letter matching that number's position in the alphabet.

$$\sin^2 17^\circ + \frac{1 + \cos 34^\circ}{2} = \sin^2 17^\circ + \frac{1 + (2\cos^2 17^\circ - 1)}{2} = \sin^2 17^\circ + \cos^2 17^\circ = \mathbf{1} \rightarrow \mathbf{A}$$

$$3\log_{\sqrt{40}} 2 + \log_{\sqrt{40}} 5 = \log_{\sqrt{40}} 2^3 + \log_{\sqrt{40}} 5 = \log_{\sqrt{40}} 40 = \mathbf{2} \rightarrow \mathbf{B}$$

$$4! + 1 = 24 + 1 = \mathbf{25} \rightarrow \mathbf{Y}$$

$$3^3 - 2^3 = 27 - 8 = \mathbf{19} \rightarrow \mathbf{S}$$

$$\left\lfloor \frac{2017}{101} \right\rfloor = \lfloor 19.9702 \dots \rfloor = \mathbf{19} \rightarrow \mathbf{S}$$

$$\sqrt{17^2 - 8^2} = \sqrt{289 - 64} = \sqrt{225} = \mathbf{15} \rightarrow \mathbf{O}$$

$$0 \times 10 = \mathbf{16}_{10} \rightarrow \mathbf{P}$$

$$4.8 + \frac{1}{4.8 + \frac{1}{4.8 + \frac{1}{4.8 + \dots}}} = \mathbf{5} \text{ (i.e., the positive solution to the equation } x = 4.8 + \frac{1}{x} \text{)} \rightarrow \mathbf{E}$$

$$\sqrt[3]{10^3 + 9^3 - 1^3} = \sqrt[3]{1000 + 729 - 1} = \sqrt[3]{1728} = \mathbf{12} \rightarrow \mathbf{L}$$

$$-e^{\pi i} = \mathbf{1} \text{ (Euler's formula)} \rightarrow \mathbf{A}$$

$$\sqrt{42 + \sqrt{42 + \sqrt{42 + \sqrt{42 + \dots}}}} = \mathbf{7} \text{ (i.e., the positive solution to the equation } x = \sqrt{42 + x} \text{)} \rightarrow \mathbf{G}$$

$$|1 - \sqrt{2}| + |10 - \sqrt{2}| = \sqrt{2} - 1 + 10 - \sqrt{2} = \mathbf{9} \rightarrow \mathbf{I}$$

$$i^2 + i^4 + i^8 + i^{16} + i^{32} = -1 + 1 + 1 + 1 + 1 = \mathbf{3} \rightarrow \mathbf{C}$$

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