Competitive Math Assessment - Efficiency Practice Quiz #1

Here are some suggestions for how to practice replicating testing conditions:

- Make sure you have a quiet place to practice on your own for an extended period of time. This will help model the actual experience of a competition. When you have finished the quiz, check your solutions using the online Brilliant quiz.
- Set a timer, or at least keep an eye on the clock to learn your own pace. If you want to set a specific time goal, math competitions provide an average of about 2 minutes per problem, so you should give yourself 30-40 minutes to complete these problems. Keep in mind that the general difficulty of problems increases as you move forward.
- Some competitions allow students to use calculators while others do not. We encourage you to use a calculator only for the most in-depth calculations on this practice quiz.

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1. _____ Evaluate:

$$9+6\div3-4+5^2\,.$$

2. _____ If $a \star b = \frac{2a}{3b+2}$, then what is $10 \star (7 \star 4)$?

3. _____ If C and D represent two different digits from 1 to 9, what is the value of D?

$$\begin{array}{r} C\ \ C \\ +\ C\ \ C \\ \hline D\ \ 4 \end{array}$$

4. _____ Evaluate

$$\frac{1+2+3+...+78+79+80}{1+2+3+...+13+14+15}\,.$$

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5. _____ If x is an integer such that $\sqrt{8^4} = x^2$ and $x < 0,$ what is the value of x?

6. _____ Evaluate

$$7 \times 16 + 38 + 7 \times 14 + 22\,.$$

7. _____ In the equation below, the $\square$ symbols can be filled with any of the symbols $+,\ -,\ \times,$ or $\div$. What symbol must go in the square farthest to the right?

$$2\square 2\square 2\square 2 = -6$$

A. $\div$ **B.** $+$

C. $\times$ **D.** $-$

8. _____ Which statement places the values below in the correct order?

$$a = 2\sqrt{8}$$
$$b = 2\sqrt{10}$$
$$c = \sqrt{35}$$
$$d = 6$$
$$e = 2\sqrt{9}$$

A. $a < c < d = e < b$ **B.** $a < d = e < c < b$

C. $c < d < a < e < b$ **D.** $d < a < e < b < c$

9. _____ Let n be a whole number such that $n > 1.$ If n is a perfect square and also a perfect cube, what is the smallest possible value for n?

10. _____ Which of the following shows the numbers below arranged from least to greatest?

A. $16^8 < 8^{16} < 4^{32} < 32^4$

B. $4^{32} < 8^{16} < 16^8 < 32^4$

C. $32^4 < 16^8 < 4^{32} < 8^{16}$

D. $32^4 < 16^8 < 8^{16} < 4^{32}$

11. _____ How many times should 7^2 appear under the square root sign for the equation below to be true?

$$\sqrt{7^2 + 7^2 + 7^2 + \ldots + 7^2 + 7^2 + 7^2} = 7^2 + 7^2 + 7^2$$

12. _____ Which of the following has the greatest value?

A. 7^{12} **B.** 5^{16}

C. 3^{24} **D.** 2^{36}

13. _____ What is the value of

$$50^2 - 49^2 + 48^2 - 47^2 + \ldots + 4^2 - 3^2 + 2^2 - 1^2 \ ?$$

14. _____ What is equivalent to $\sqrt{2\sqrt{2\sqrt{2}}}$?

A. $8^{1/8}$ **B.** $8^{1/3}$

C. $64^{1/4}$ **D.** $128^{1/8}$

15. _____ If P and Q represent two different digits from 1 to 9, find the value of the 2-digit integer PQ.

$$\begin{array}{rcc} & 9 & P \\ - & P & Q \\ \hline & Q & 6 \end{array}$$