Quiz 1. *True/False*: $9/3 + 2(3^2 + 10) - 8 + 4 \cdot 3 = 45$

Solution. The statement is *false*. To see this, we can simply follow the order of operations—using PEMDAS as a guide:

$$\begin{aligned}
9/3 + 2(3^2 + 10) - 8 + 4 \cdot 3 &\stackrel{?}{=} 55 \\
9/3 + 2(9 + 10) - 8 + 4 \cdot 3 &\stackrel{?}{=} 55 \\
9/3 + 2(19) - 8 + 4 \cdot 3 &\stackrel{?}{=} 55 \\
3 + 2(19) - 8 + 4 \cdot 3 &\stackrel{?}{=} 55 \\
3 + 38 - 8 + 4 \cdot 3 &\stackrel{?}{=} 55 \\
3 + 38 - 8 + 12 &\stackrel{?}{=} 55 \\
41 - 8 + 12 &\stackrel{?}{=} 55 \\
33 + 12 &\stackrel{?}{=} 55 \\
45 &\neq 55
\end{aligned}$$

Quiz 2. *True/False*: $\gcd(2^3 \cdot 3 \cdot 5, 2 \cdot 3^2 \cdot 7) = 2^3 \cdot 3^2 \cdot 5 \cdot 7$.

Solution. The statement is *false*. Remember given a prime factorization of the numbers, we find the gcd by choosing the *smallest* powers of each prime that appears in the factorizations. So we should have $\gcd(2^3 \cdot 3 \cdot 5, 2 \cdot 3^2 \cdot 7) = 2 \cdot 3$. Instead, the largest power of each prime that appears in the factorizations was chosen which is how we compute the lcm. Therefore, we have $\operatorname{lcm}(2^3 \cdot 3 \cdot 5, 2 \cdot 3^2 \cdot 7) = 2^3 \cdot 3^2 \cdot 5 \cdot 7$.

Quiz 3. *True/False*: $\dfrac{\frac{3}{10}}{\frac{12}{5}} = \dfrac{1}{8}$

Solution. The statement is *true*. Note that division by a nonzero number is the same as multiplying by its reciprocal. So we have

$$\frac{\frac{3}{10}}{\frac{12}{5}} = \frac{3}{10} \cdot \frac{5}{12} = \frac{\cancel{3}^1}{\cancel{10}^2} \cdot \frac{\cancel{5}^1}{\cancel{12}^4} = \frac{1}{8}$$

One can also rewrite the problem as...

$$\frac{\frac{3}{10}}{\frac{12}{5}} = \frac{3}{10} \div \frac{12}{5}$$

But then to divide, we multiply by the reciprocal and proceed as in the solution above.

Quiz 4. *True/False*: The number $0.\overline{19}$ is rational.

Solution. The statement is *true*. Any real number with a decimal expansion that either terminates or repeats is a rational and hence can be expressed as a/b, where a and b are integers and $b \neq 0$. Moreover, every rational number, i.e. the a/b's, have a decimal expansion that either terminates or repeats. We can even find a rational expression for $0.\overline{19}$:

$$\begin{array}{rrcc} & 100r & = & 19.191919191919\ldots \\ - & r & = & 0.191919191919\ldots \\ \hline & 99r & = & 19 \end{array}$$

But then $r = 0.\overline{19} = \dfrac{19}{99}$.

Quiz 5. *True/False*: $\sqrt[3]{2^8 \cdot 3^3 \cdot 5^1 \cdot 7^5} = 2^2 \cdot 3^1 \cdot 7\sqrt[3]{2^2 \cdot 5^1 \cdot 7^2}$

Solution. The statement is *true*. There are two ways to think about this. First, we should write out the numbers and group them into threes and pull out/leave the terms appropriately:

$$\sqrt[3]{2^8 \cdot 3^3 \cdot 5^1 \cdot 7^5} = \sqrt[3]{\underline{2 \cdot 2 \cdot 2} \cdot \underline{2 \cdot 2 \cdot 2} \cdot 2 \cdot 2 \cdot \underline{3 \cdot 3 \cdot 3} \cdot 5 \cdot \underline{7 \cdot 7 \cdot 7} \cdot 7 \cdot 7} = 2^2 \cdot 3^1 \cdot 7\sqrt[3]{2^2 \cdot 5 \cdot 7^2}$$

Alternatively, we can use division. We know that $8/3$ is 2 with remainder 2, $3/3$ is 1 with remainder 0, $1/3$ is 0 with remainder 1, and $5/3$ is 1 with remainder 2. So we can pull out two 3's with 2 remaining, one 3 with 0 remaining, no 5's with 1 remaining, and two 7's with 2 remaining, which gives:

$$\sqrt[3]{2^8 \cdot 3^3 \cdot 5^1 \cdot 7^5} = 2^2 \cdot 3^1 \cdot 7\sqrt[3]{2^2 \cdot 5^1 \cdot 7^2}$$