

The Ninth Grade Math Competition Class

Radical Expressions and Rationalizing Denominators Problems

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1. Find $\sqrt{9 + \sqrt{56}} - \sqrt{9 - \sqrt{56}}$.

2. Rationalize the denominator of $\frac{1}{2-\sqrt[3]{2}}$.

3. Rationalize the following denominator $\frac{8}{\sqrt{15}-\sqrt{7}}$.

4. In how many real values of x is $\sqrt{120 - \sqrt{x}}$ an integer?

5. Let $a^2 = \frac{4}{11}$, $b^2 = \frac{(2+\sqrt{5})^2}{11}$, where a is a negative real number and b is a positive real number. If $(a + b)^3$ can be expressed in the simplified form $\frac{x\sqrt{y}}{z}$, where x, y, z are positive integers. Find $x + y + z$.

6. Rationalize the denominator of $\frac{1}{\sqrt[3]{2} + \sqrt[3]{16}}$.

7. What is the product of the real roots of the equation $x^2 + 18x + 30 = 2\sqrt{x^2 + 18x + 45}$.

8. Determine the rational number $\frac{a}{b}$ in lowest terms that equal to

$$\frac{1}{\sqrt{2} + 2} + \frac{1}{2\sqrt{3} + 3\sqrt{2}} + \frac{1}{3\sqrt{4} + 4\sqrt{3}} + \cdots + \frac{1}{(2013^2 - 1)\sqrt{2013^2} + 2013^2\sqrt{2013^2 - 1}}$$