

Advanced_Grade-9_Real Numbers

Rationalization

1. Prove that

$$\frac{1}{3+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{3}} + \frac{1}{\sqrt{3}+1} = 1$$

2. Prove that

$$\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} + \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} = 1$$

3. If $x = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ and $y = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$, then find the value of $x^2 + y^2$

4. If $x = \frac{\sqrt{2}-1}{\sqrt{2}+1}$ and $y = \frac{\sqrt{2}+1}{\sqrt{2}-1}$, then find the value of $x^2 + 5xy + y^2$

5. If $x = \frac{\sqrt{5}-1}{\sqrt{5}+1}$ and $y = \frac{\sqrt{5}+1}{\sqrt{5}-1}$, then find the value of $x^2 + y^2$

6. If $a = \frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}}$ and $b = \frac{\sqrt{5}-\sqrt{2}}{\sqrt{4}+\sqrt{2}}$, then find the value of $\frac{a^2+ab+b^2}{a^2-ab+b^2}$