Pakistan School
Kingdom of Bahrain

Welcome Class 10th (arts)

Algebraic Formulas and Applications

Objectives

Students will be able to:

Simplify and rationalize the surds

Rationalize the denominator of the following

(i) $\dfrac{1}{\sqrt{3}+2}$

Solution:

$$\frac{1}{\sqrt{3}+2} = \frac{1}{\sqrt{3}+2} \times \frac{\sqrt{3}-2}{\sqrt{3}-2}$$

$$= \frac{\sqrt{3}-2}{(\sqrt{3}+2)(\sqrt{3}-2)}$$

$$= \frac{\sqrt{3}-2}{(\sqrt{3})^2-(2)^2}$$

$$= \frac{\sqrt{3}-2}{3-4} = \frac{\sqrt{3}-2}{-1}$$

$$= -(\sqrt{3}-2)$$

$$= 2-\sqrt{3}$$

(iv) $\dfrac{\sqrt{x}-\sqrt{y}}{\sqrt{x}+\sqrt{y}}$

Solution:

$$\frac{\sqrt{x}-\sqrt{y}}{\sqrt{x}+\sqrt{y}} = \frac{\sqrt{x}-\sqrt{y}}{\sqrt{x}+\sqrt{y}} \times \frac{\sqrt{x}-\sqrt{y}}{\sqrt{x}+\sqrt{y}}$$

$$= \frac{\left(\sqrt{x}-\sqrt{y}\right)^2}{\left(\sqrt{x}+\sqrt{y}\right)\left(\sqrt{x}-\sqrt{y}\right)}$$

$$= \frac{\left(\sqrt{x}-\sqrt{y}\right)^2}{\left(\sqrt{x}\right)^2-\left(\sqrt{y}\right)^2}$$

$$= \frac{\left(\sqrt{x}-\sqrt{y}\right)^2}{x-y}$$

$$= \frac{\left(\sqrt{x}\right)^2+\left(\sqrt{x}\right)^2-2\sqrt{x}\sqrt{y}}{x-y}$$

$$= \frac{x+y-2\sqrt{xy}}{x-y}$$

(vii) $\dfrac{29}{11+3\sqrt{5}}$

Solution:

$$\frac{29}{11+3\sqrt{5}} = \frac{29}{11+3\sqrt{5}} \times \frac{11-3\sqrt{5}}{11-3\sqrt{5}}$$

$$= \frac{29\left(11-3\sqrt{5}\right)}{\left(11+3\sqrt{5}\right)\left(11-3\sqrt{5}\right)}$$

$$= \frac{29\left(11-3\sqrt{5}\right)}{(11)^2-\left(2\sqrt{5}\right)^2}$$

$$= \frac{29\left(11-3\sqrt{5}\right)}{121-45}$$

$$= \frac{29\left(11-3\sqrt{5}\right)}{76}$$

(viii) $\dfrac{17}{3\sqrt{7}+2\sqrt{3}}$

Solution:

$$\frac{17}{3\sqrt{7}+2\sqrt{3}} = \frac{17}{3\sqrt{7}+2\sqrt{3}} \times \frac{3\sqrt{7}-2\sqrt{3}}{3\sqrt{7}-2\sqrt{3}}$$

$$= \frac{17\left(3\sqrt{7}-2\sqrt{3}\right)}{\left(3\sqrt{7}+2\sqrt{3}\right)\left(3\sqrt{7}-2\sqrt{3}\right)}$$

$$= \frac{17\left(3\sqrt{7}-2\sqrt{3}\right)}{\left(3\sqrt{7}\right)^2-\left(2\sqrt{3}\right)^2}$$

$$= \frac{17\left(3\sqrt{7}-2\sqrt{3}\right)}{9(7)-4(3)}$$

$$= \frac{17\left(3\sqrt{7}-2\sqrt{3}\right)}{63-12}$$

$$= \frac{17\left(3\sqrt{7}-2\sqrt{3}\right)}{51} = \frac{3\sqrt{7}-2\sqrt{3}}{3}$$

Activity

Rationalize the denominator of the following

$$\frac{4\sqrt{3}}{\sqrt{7}+\sqrt{5}}$$

Solution

$$\frac{4\sqrt{3}}{\sqrt{7}+\sqrt{5}} = \frac{4\sqrt{3}}{\sqrt{7}+\sqrt{5}} \times \frac{\sqrt{7}-\sqrt{5}}{\sqrt{7}-\sqrt{5}}$$

$$= \frac{4\sqrt{3}\left(\sqrt{7}-\sqrt{5}\right)}{\left(\sqrt{7}+\sqrt{5}\right)\left(\sqrt{7}-\sqrt{5}\right)}$$

$$= \frac{4\sqrt{3}\left(\sqrt{7}-\sqrt{5}\right)}{\left(\sqrt{7}\right)^2-\left(\sqrt{5}\right)^2}$$

$$= \frac{4\sqrt{3}\left(\sqrt{7}-\sqrt{5}\right)}{7-5}$$

$$= \frac{4\sqrt{3}\left(\sqrt{7}-\sqrt{5}\right)}{2}$$

$$= 2\sqrt{3}\left(\sqrt{7}+\sqrt{5}\right)$$

Homework

Ex 1.3 remaining parts