

chapter

2

Algebra 2

Section 2.8 Algebraic surd equations

PROJECT MATHS

Text & Tests 6

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4. Show that $\frac{-1 + \sqrt{3}}{1 + \sqrt{3}} = 2 - \sqrt{3}$.

multiply
above and
below by
conjugate of
denominator

$$\frac{(-1 + \sqrt{3})(1 - \sqrt{3})}{(1 + \sqrt{3})(1 - \sqrt{3})}$$

DOTS

$$\frac{-1 + \sqrt{3} + \sqrt{3} - 3}{1 - 3}$$

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

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

5. Express $\frac{\sqrt{3}}{1-\sqrt{3}} - \frac{1}{\sqrt{3}}$ as a single fraction and simplify by rationalising the denominator.

Bow Tie

RATIONALISE

FOIL

$$\frac{\sqrt{3}(\sqrt{3}) - 1(1-\sqrt{3})}{(1-\sqrt{3})(\sqrt{3})}$$

$$\frac{3 - 1 + \sqrt{3}}{\sqrt{3} - 3}$$

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

$$= \frac{-6 - 2\sqrt{3} - 3\sqrt{3} - 3}{9 - 3}$$

$$= \frac{-9 - 5\sqrt{3}}{6}$$

7. Solve the following equations and check your solutions in each case:

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

(ii) $\sqrt{3x+10} = x$

(iii) $\sqrt{2x-1} = \sqrt{x+8}$

Square (i)

$$\begin{aligned} \sqrt{2x+1} &= 3 \\ 2x+1 &= 9 \\ 2x &= 8 \\ x &= 4 \end{aligned}$$

check $\sqrt{2(4)+1}$
 $= \sqrt{9}$
 $= 3 \quad \checkmark$

Square (ii)

$$\begin{aligned} \sqrt{3x+10} &= x \\ 3x+10 &= x^2 \\ x^2-3x-10 &= 0 \\ (x+2)(x-5) &= 0 \\ x &= -2 \quad \text{or} \quad x = 5 \end{aligned}$$

check: $x = -2$

$$\begin{aligned} \sqrt{3(-2)+10} &\stackrel{?}{=} -2 \\ \sqrt{-6+10} &\stackrel{?}{=} -2 \\ \sqrt{4} &\stackrel{?}{=} -2 \\ 2 &\stackrel{?}{=} -2 \end{aligned}$$

not true \Rightarrow reject.

$x = 5$

$$\begin{aligned} \sqrt{3(5)+10} &\stackrel{?}{=} 5 \\ \sqrt{25} &= 5 \quad \checkmark \quad \text{true} \end{aligned}$$