



1. Expand and simplify

a)
$$(\sqrt{2} + 1)(\sqrt{2} - 1)$$

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

c)
$$(2 + \sqrt{5})(2 - \sqrt{5})$$

d)
$$(2 - \sqrt{6})(2 + \sqrt{6})$$

What do you notice about all your answers?

2. Max says,

"to rationalise the expression $\frac{5}{\sqrt{3}-1}$ I should multiply the numerator and denominator by $\sqrt{3} + 1$ "

Show that Max is right.

3. Rationalise

a)
$$\frac{2}{3 + \sqrt{2}}$$

b)
$$\frac{2}{3-\sqrt{2}}$$

a)
$$\frac{2}{3+\sqrt{2}}$$
 b) $\frac{2}{3-\sqrt{2}}$ c) $\frac{\sqrt{2}}{3+\sqrt{2}}$

d)
$$\frac{\sqrt{2}}{1 + \sqrt{2}}$$

$$\frac{2}{3+\sqrt{2}} \text{ or } \frac{2}{3-\sqrt{2}}$$



4. Rationalise

a)
$$\frac{\sqrt{7}}{\sqrt{7} - 3}$$

b)
$$\frac{\sqrt{5}}{\sqrt{5}-3}$$

Which of the numbers is largest?

5. Compare the answers in question 4 to the answers in question 3.

What do you notice?

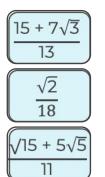
Why does this happen?

6. Amir has tried to rationalise $\frac{3\sqrt{6}}{\sqrt{6}-3}$ $\frac{3\sqrt{6}}{\sqrt{6}-3} \times \frac{\sqrt{6}-3}{\sqrt{6}-3}$ $\frac{18}{6-3\sqrt{6}-3\sqrt{6}+9}$

What mistake has he made?



7. Match the number cards to their rationalised form.



$$\begin{array}{c}
\frac{1}{3\sqrt{18}} \\
\hline
2\sqrt{5} \\
\hline
5 - \sqrt{3}
\end{array}$$

$$\begin{array}{c}
3 + \sqrt{3} \\
4 - \sqrt{3}
\end{array}$$



Answers



1. Expand and simplify

a)
$$(\sqrt{2} + 1)(\sqrt{2} - 1) = 1$$

b)
$$(\sqrt{3} + 1)(\sqrt{3} - 1) = 2$$

c)
$$(2 + \sqrt{5})(2 - \sqrt{5}) = -1$$

d)
$$(2 - \sqrt{6})(2 + \sqrt{6}) = -2$$

What do you notice about all your answers?

They are integer answers. There are no surds in the answer. 2. Max says,

"to rationalise the expression $\frac{5}{\sqrt{3}-1}$ I should multiply the numerator and denominator by $\sqrt{3} + 1$ "

Show that Max is right.
$$\frac{5}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} = \frac{5+5\sqrt{3}}{2}$$

3. Rationalise

a)
$$\frac{2}{3 + \sqrt{2}}$$
 b) $\frac{2}{3 - \sqrt{2}}$ c) $\frac{\sqrt{2}}{3 + \sqrt{2}}$ = $\frac{6 - 2\sqrt{2}}{7}$ e) Which is largest?

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



4. Rationalise

a)
$$\frac{\sqrt{7}}{\sqrt{7}-3} = -\frac{7+3\sqrt{7}}{2}$$
 b) $\frac{\sqrt{5}}{\sqrt{5}-3} = -\frac{5+3\sqrt{5}}{4}$

Which of the numbers is largest?

$$\frac{\sqrt{5}}{\sqrt{5}-3}$$

5. Compare the answers in question 4 to the answers in question 3.

What do you notice? Answers in Question 3 are all positive but negative in question 4 Why does this happen? (eg $\sqrt{5} - 3 < 0$)

6. Amir has tried to rationalise
$$\frac{3\sqrt{6}}{\sqrt{6}-3}$$

$$\frac{3\sqrt{6}}{\sqrt{6}-3} \times \frac{\sqrt{6}-3}{\sqrt{6}-3}$$
He should Multiply by
$$\frac{18-9\sqrt{6}}{6-3\sqrt{6}-3} \times \frac{\sqrt{6}+3}{\sqrt{6}+3}$$

What mistake has he made?



7. Match the number cards to their rationalised form.

