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Rationalize the Denominator

$$(a + b)(a - b) = a^2 + ab - ab - b^2 = a^2 - b^2$$

$$\frac{3}{5 - \sqrt{7}}$$

Make the new fraction equal to 1
from the conjugate of the denominator.

To write a conjugate just multiply
the second term of the second binomial by negative 1.

- 1 Define the conjugate of $a + b$ and its use.
- 2 Simplify $\frac{2}{\sqrt{3}}$ as well as $\frac{2}{4\sqrt{3}}$.
- 3 Determine the steps for simplifying $\frac{3}{5 - \sqrt{7}}$.
- 4 Find the right factor to simplify the fraction.
- 5 Calculate the ratios.
- 6 Simplify the given fractions.
- + with lots of tips, answer keys, and detailed answer explanations for all of the problems.



The complete package, including all problems, hints, answers, and detailed answer explanations is available for all [sofatutor.com](https://www.sofatutor.com) subscribers.



Define the conjugate of $a + b$ and its use.

Choose the correct statement(s).

What is the conjugate of the binomial $a + b$ and what is it good for?

- A
We get the conjugate by changing the sign of b .
- B
We change the sign of a as well as the sign of b .
- C
The conjugate of the binomial above is $-a - b$.
- D
If we multiply any binomial by its conjugate we get the sum of two squares.
- E
If we multiply any binomial by its conjugate we get the difference of two squares.



Hints for solving these problems

1
of 6

Define the conjugate of $a + b$ and its use.

Hint #1

For example, the conjugate of $5 - \sqrt{7}$ is $5 + \sqrt{7}$.

Hint #2

Use the FOIL method to multiply:

$$(5 - \sqrt{7})(5 + \sqrt{7}) = 25 - 5\sqrt{7} + 5\sqrt{7} - 7 = 25 - 7 = 18.$$

Hint #3

Calculate $(a + b)(-a - b)$ as well as $(a + b)(a - b)$.



Answers and detailed answer explanations for these problems

1
of 6

Define the conjugate of $a + b$ and its use.

Answer key: A, E

To get rid of denominators like $5 - \sqrt{7}$ we have to expand by the conjugate of the denominator.

So what is the conjugate of a binomial? The conjugate of the binomial $a + b$ is given by changing the sign of the second term to $a - b$; i.e. we multiply the second term in the binomial by -1 .

Why should we do that?

If we multiply $a + b$ with the conjugate $a - b$, for example using the FOIL method, we get

$$(a + b)(a - b) = a^2 - ab + ab - b^2 = a^2 - b^2,$$

the difference of two squares.