Irrational Numbers Example

Simplify a square root and distinguish its exact value from an approximation.

PROBLEM

sqrt(50)

Step-by-step solution

1 **Factor out a perfect square**

Use the largest perfect-square factor of 50.

50 = 25 x 2

2 **Simplify the radical**

The square root of 25 is 5.

sqrt(50) = 5 sqrt(2)

3 **Classify the result**

sqrt(2) is irrational; multiplying it by 5 keeps it irrational.

5 sqrt(2) is irrational

4 **Approximate if useful**

A decimal approximation does not replace the exact radical.

5 sqrt(2) approx 7.0711

ANSWER

sqrt(50) = 5 sqrt(2), an irrational number.

Check: (5 sqrt(2))^2 = 25 x 2 = 50.

The exact form and verification are shown above.