

Topic: Rationalize the denominator

Question: Simplify the expression, making sure to rationalize the denominator.

$$2\sqrt{\frac{3}{5}} - 5\sqrt{\frac{5}{3}} + \sqrt{135}$$

Answer choices:

A $\frac{26\sqrt{15}}{15}$

B $-\frac{26\sqrt{15}}{15}$

C $\frac{3\sqrt{15}}{5}$

D $\frac{7\sqrt{5}}{15}$



Solution: A

We know that when we take the square root of a fraction, we can take the square root of the numerator and denominator separately.

$$2\sqrt{\frac{3}{5}} - 5\sqrt{\frac{5}{3}} + \sqrt{135}$$

$$2\frac{\sqrt{3}}{\sqrt{5}} - 5\frac{\sqrt{5}}{\sqrt{3}} + \sqrt{27 \cdot 5}$$

$$2\frac{\sqrt{3}}{\sqrt{5}} - 5\frac{\sqrt{5}}{\sqrt{3}} + \sqrt{9 \cdot 3 \cdot 5}$$

$$2\frac{\sqrt{3}}{\sqrt{5}} - 5\frac{\sqrt{5}}{\sqrt{3}} + \sqrt{9}\sqrt{3 \cdot 5}$$

$$2\frac{\sqrt{3}}{\sqrt{5}} - 5\frac{\sqrt{5}}{\sqrt{3}} + 3\sqrt{15}$$

Now we need to find a common denominator so that we can combine the fractions. Since we have two denominators, $\sqrt{5}$ and $\sqrt{3}$, the common denominator will be

$$\sqrt{5} \cdot \sqrt{3}$$

$$\sqrt{5 \cdot 3}$$

$$\sqrt{15}$$



We'll multiply the numerator and denominator of each fraction by whatever gets us $\sqrt{15}$ in the denominator.

$$2\frac{\sqrt{3}}{\sqrt{5}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right) - 5\frac{\sqrt{5}}{\sqrt{3}}\left(\frac{\sqrt{5}}{\sqrt{5}}\right) + 3\sqrt{15}\left(\frac{\sqrt{15}}{\sqrt{15}}\right)$$

$$2\frac{3}{\sqrt{5}\sqrt{3}} - 5\frac{5}{\sqrt{3}\sqrt{5}} + \frac{3(15)}{\sqrt{15}}$$

$$2\frac{3}{\sqrt{5 \cdot 3}} - 5\frac{5}{\sqrt{3 \cdot 5}} + \frac{45}{\sqrt{15}}$$

$$2\frac{3}{\sqrt{15}} - 5\frac{5}{\sqrt{15}} + \frac{45}{\sqrt{15}}$$

$$\frac{6}{\sqrt{15}} - \frac{25}{\sqrt{15}} + \frac{45}{\sqrt{15}}$$

$$\frac{26}{\sqrt{15}}$$

Now we need to rationalize the denominator.

$$\frac{26}{\sqrt{15}}\left(\frac{\sqrt{15}}{\sqrt{15}}\right)$$

$$\frac{26\sqrt{15}}{15}$$



Topic: Rationalize the denominator

Question: Simplify the expression, making sure to rationalize the denominator.

$$2\sqrt{\frac{3}{5}} - 6\sqrt{\frac{5}{3}}$$

Answer choices:

A $\sqrt{15} - \sqrt{3}$

B $\sqrt{\frac{15}{5}} - \sqrt{\frac{30}{3}}$

C $\frac{-8\sqrt{15}}{5}$

D $\frac{8\sqrt{15}}{5}$



Solution: C

When we take the square root of a fraction, we can take the square root of the numerator and denominator separately. Therefore, we can rewrite the expression as

$$2\sqrt{\frac{3}{5}} - 6\sqrt{\frac{5}{3}}$$

$$2\frac{\sqrt{3}}{\sqrt{5}} - 6\frac{\sqrt{5}}{\sqrt{3}}$$

Now we need to find a common denominator, which we can do by multiplying each fraction by the denominator from the other fraction.

$$2\frac{\sqrt{3}}{\sqrt{5}} \cdot \frac{\sqrt{3}}{\sqrt{3}} - 6\frac{\sqrt{5}}{\sqrt{3}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

$$2\frac{\sqrt{3}\sqrt{3}}{\sqrt{5}\sqrt{3}} - 6\frac{\sqrt{5}\sqrt{5}}{\sqrt{3}\sqrt{5}}$$

$$2\frac{\sqrt{9}}{\sqrt{15}} - 6\frac{\sqrt{25}}{\sqrt{15}}$$

$$\frac{2\sqrt{9} - 6\sqrt{25}}{\sqrt{15}}$$

$$\frac{2(3) - 6(5)}{\sqrt{15}}$$



$$\frac{6 - 30}{\sqrt{15}}$$

$$\frac{-24}{\sqrt{15}}$$

Now we need to rationalize the denominator.

$$\frac{-24}{\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}}$$

$$\frac{-24\sqrt{15}}{15}$$

$$\frac{-8\sqrt{15}}{5}$$



Topic: Rationalize the denominator

Question: Simplify the expression, making sure to rationalize the denominator.

$$\frac{9}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

Answer choices:

A $\frac{9\sqrt{2}}{2}$

B $\frac{9\sqrt{2}}{4}$

C $\frac{9}{2}$

D 9



Solution: A

We can multiply across the numerators and denominators.

$$\frac{9}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$\frac{9\sqrt{2}}{\sqrt{2}\sqrt{2}}$$

$\sqrt{2}$ multiplied by itself is just 2, so the denominator simplifies.

$$\frac{9\sqrt{2}}{2}$$

