

Topic: Solving with conjugate method**Question:** Use conjugate method to find the limit.

$$\lim_{m \rightarrow 0} \frac{\sqrt{m+4} - 2}{m}$$

Answer choices:

- A 0
- B 4
- C $\frac{1}{4}$
- D ∞



Solution: C

The conjugate of $\sqrt{m+4} - 2$ is $\sqrt{m+4} + 2$. Multiply both the numerator and denominator by this conjugate.

$$\lim_{m \rightarrow 0} \frac{\sqrt{m+4} - 2}{m} \left(\frac{\sqrt{m+4} + 2}{\sqrt{m+4} + 2} \right)$$

$$\lim_{m \rightarrow 0} \frac{m + 4 + 2\sqrt{m+4} - 2\sqrt{m+4} - 4}{m(\sqrt{m+4} + 2)}$$

$$\lim_{m \rightarrow 0} \frac{m + 4 - 4}{m(\sqrt{m+4} + 2)}$$

$$\lim_{m \rightarrow 0} \frac{m}{m(\sqrt{m+4} + 2)}$$

Cancel the common factor of m from both the numerator and denominator.

$$\lim_{m \rightarrow 0} \frac{1}{\sqrt{m+4} + 2}$$

Now use substitution to evaluate the limit.

$$\frac{1}{\sqrt{0+4} + 2}$$

$$\frac{1}{2+2}$$



$$\frac{1}{4}$$



Topic: Solving with conjugate method**Question:** Use conjugate method to find the limit.

$$\lim_{x \rightarrow 9} \frac{x - 9}{\sqrt{x} - 3}$$

Answer choices:

- A 6
- B 3
- C 9
- D 0



Solution: A

The conjugate of $\sqrt{x} - 3$ is $\sqrt{x} + 3$. Multiply both the numerator and denominator by this conjugate.

$$\lim_{x \rightarrow 9} \frac{x - 9}{\sqrt{x} - 3} \left(\frac{\sqrt{x} + 3}{\sqrt{x} + 3} \right)$$

$$\lim_{x \rightarrow 9} \frac{(x - 9)(\sqrt{x} + 3)}{(\sqrt{x} - 3)(\sqrt{x} + 3)}$$

$$\lim_{x \rightarrow 9} \frac{(x - 9)(\sqrt{x} + 3)}{x + 3\sqrt{x} - 3\sqrt{x} - 9}$$

$$\lim_{x \rightarrow 9} \frac{(x - 9)(\sqrt{x} + 3)}{x - 9}$$

Cancel the common factor of $x - 9$ from both the numerator and denominator.

$$\lim_{x \rightarrow 9} (\sqrt{x} + 3)$$

Now use substitution to evaluate the limit.

$$\sqrt{9} + 3$$

$$3 + 3$$

$$6$$



Topic: Solving with conjugate method**Question:** Use conjugate method to find the limit.

$$\lim_{x \rightarrow 16} \frac{16 - x}{4 - \sqrt{x}}$$

Answer choices:

- A 4
- B 8
- C 0
- D 16



Solution: B

The conjugate of $4 - \sqrt{x}$ is $4 + \sqrt{x}$. Multiply both the numerator and denominator by this conjugate.

$$\lim_{x \rightarrow 16} \frac{16 - x}{4 - \sqrt{x}} \left(\frac{4 + \sqrt{x}}{4 + \sqrt{x}} \right)$$

$$\lim_{x \rightarrow 16} \frac{(16 - x)(4 + \sqrt{x})}{(4 - \sqrt{x})(4 + \sqrt{x})}$$

$$\lim_{x \rightarrow 16} \frac{(16 - x)(4 + \sqrt{x})}{16 + 4\sqrt{x} - 4\sqrt{x} - x}$$

$$\lim_{x \rightarrow 16} \frac{(16 - x)(4 + \sqrt{x})}{16 - x}$$

Cancel the common factor of $16 - x$ from both the numerator and denominator.

$$\lim_{x \rightarrow 16} (4 + \sqrt{x})$$

Now use substitution to evaluate the limit.

$$4 + \sqrt{16}$$

$$4 + 4$$

$$8$$

