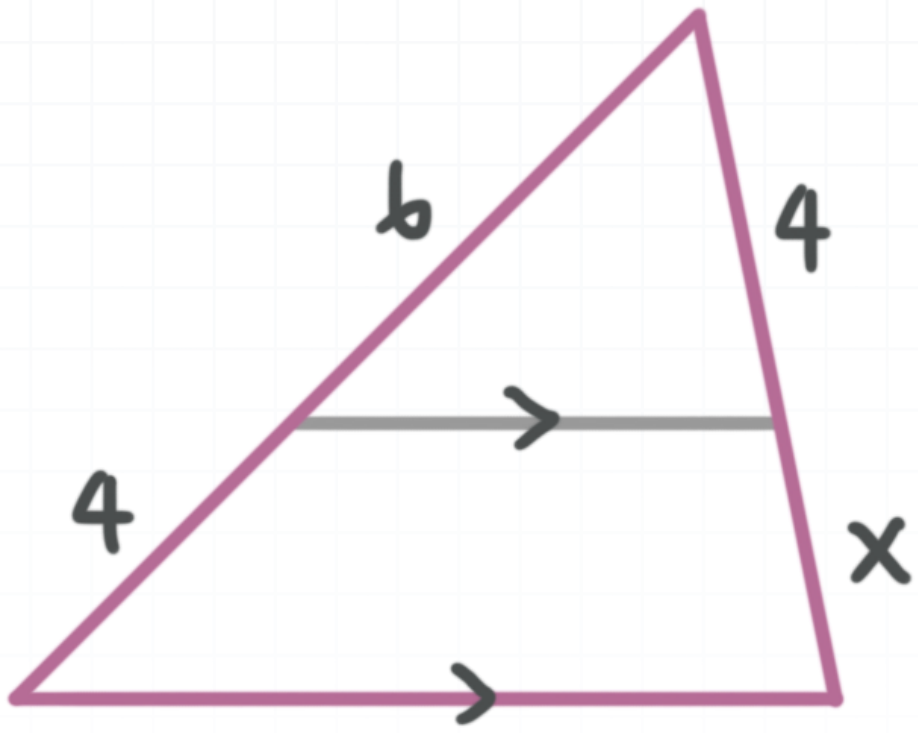
Topic: Triangle side-splitting theorem

Question: Solve for the value of x.



Answer choices:

A 2

B $\frac{8}{3}$

C 3

D $\frac{7}{2}$

Solution: B

The ratio $6/4$ has to be equal to $4/x$.

$$\frac{6}{4} = \frac{4}{x}$$

Cross multiply.

$$6x = 16$$

$$x = \frac{16}{6}$$

$$x = \frac{8}{3}$$

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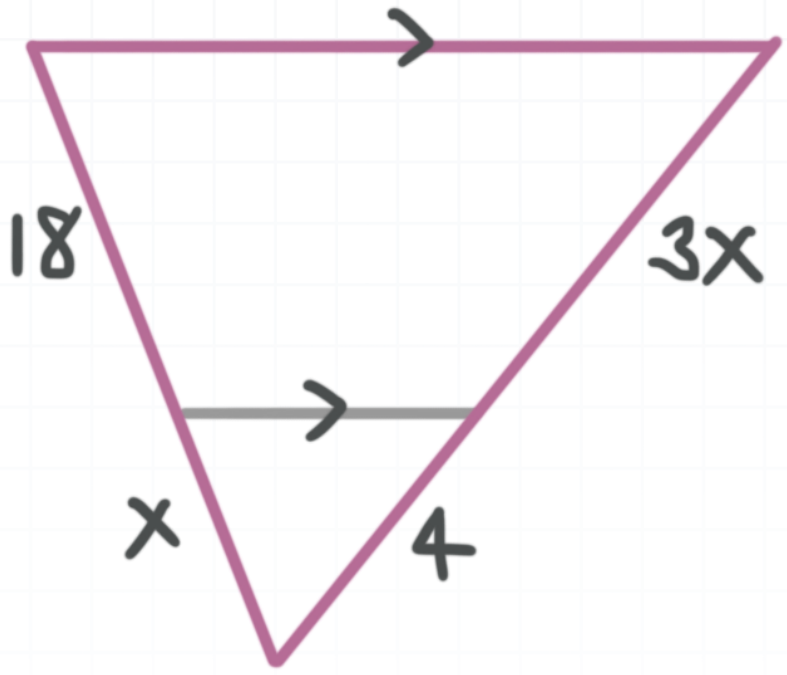

Answer choices:

A $6\sqrt{2}$

B $\frac{9}{2}$

C 6

D $2\sqrt{6}$

Solution: D

The ratio $x/18$ has to be equal to $4/3x$.

$$\frac{x}{18} = \frac{4}{3x}$$

Cross multiply.

$$3x^2 = 72$$

$$x^2 = 24$$

$$x = \sqrt{24}$$

$$x = \sqrt{4} \cdot \sqrt{6}$$

$$x = 2\sqrt{6}$$

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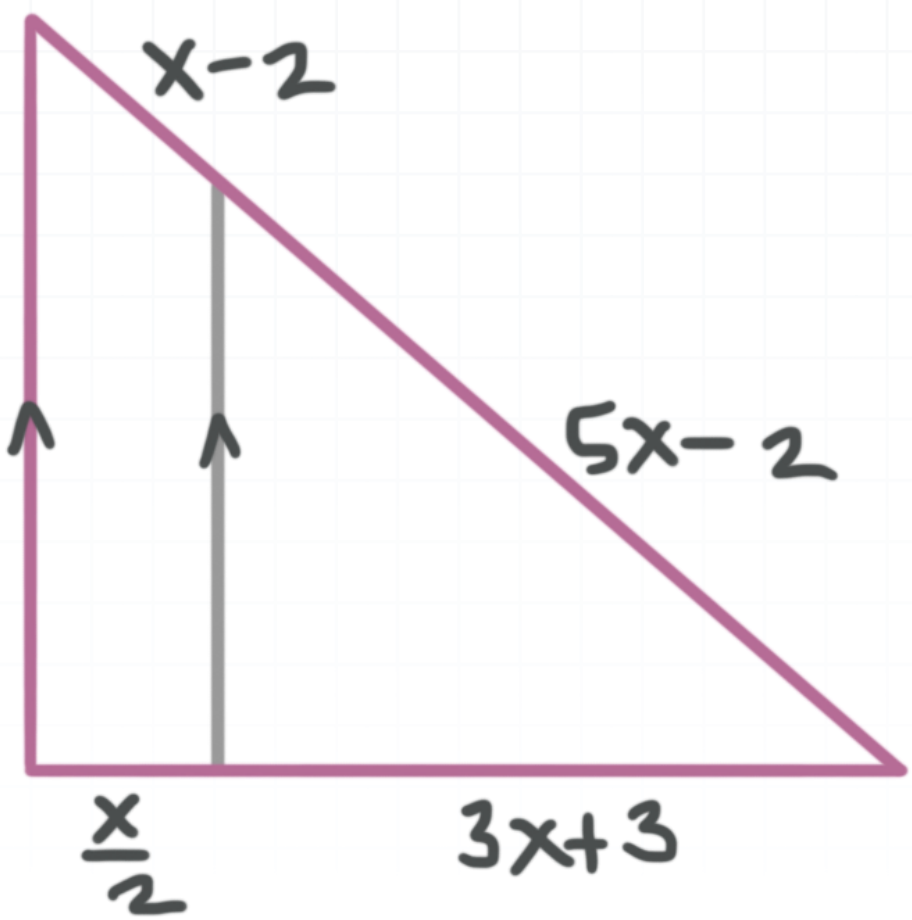

Answer choices:

A 6

B 7

C 4

D 5

Solution: A

The ratio $(x-2)/(5x-2)$ has to be equal to $(x/2)/(3x+3)$.

$$\frac{x-2}{5x-2} = \frac{\frac{x}{2}}{3x+3}$$

Cross multiply.

$$(x-2)(3x+3) = (5x-2)\left(\frac{x}{2}\right)$$

$$3x^2 + 3x - 6x - 6 = \frac{5x^2}{2} - x$$

$$3x^2 - 3x - 6 = \frac{5x^2}{2} - x$$

To clear the fraction, multiply both sides of this equation by 2.

$$6x^2 - 6x - 12 = 5x^2 - 2x$$

Combine like terms and factor.

$$x^2 - 4x - 12 = 0$$

$$(x-6)(x+2) = 0$$

$x = 6$ or $x = -2$

Rule out $x = -2$ because that would give negative values for the lengths of both parts of each of the two sides of the triangle that are split:

$$x - 2 = -2 - 2 = -4$$

$$5x - 2 = 5(-2) - 2 = -10 - 2 = -12$$

$$\frac{x}{2} = \frac{-2}{2} = -1$$

$$3x + 3 = 3(-2) + 3 = -6 + 3 = -3$$

Therefore, $x = 6$.