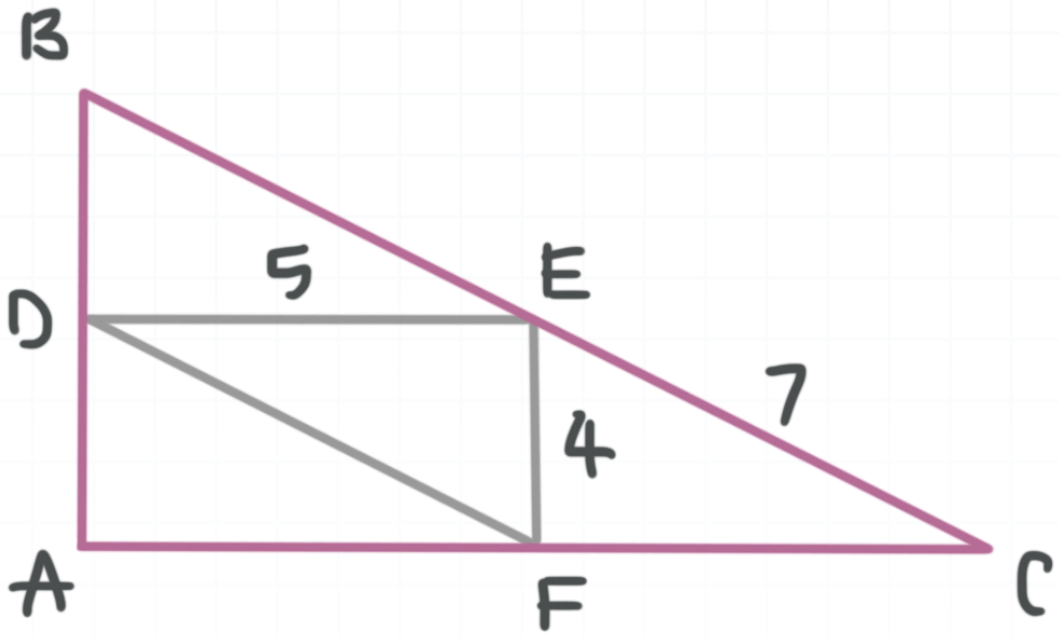
Topic: Midsegments of triangles

Question: In $\triangle ABC$, the midpoints of sides $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ are D, E, and F, respectively. What is the perimeter of $\triangle ABC$?



Answer choices:

A 16

B 21

C 24

D 32

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Solution: D

The points D, E, and F are the midpoints of the sides of $\triangle ABC$. Therefore,

$$\overline{AB} = 2(\overline{EF}) = 2(4) = 8$$

$$\overline{BC} = 2(\overline{EC}) = 2(7) = 14$$

$$\overline{AC} = 2(\overline{DE}) = 2(5) = 10$$

Thus the perimeter is

$$P = \overline{AC} + \overline{BC} + \overline{AC}$$

$$P = 8 + 14 + 10$$

$$P = 32$$

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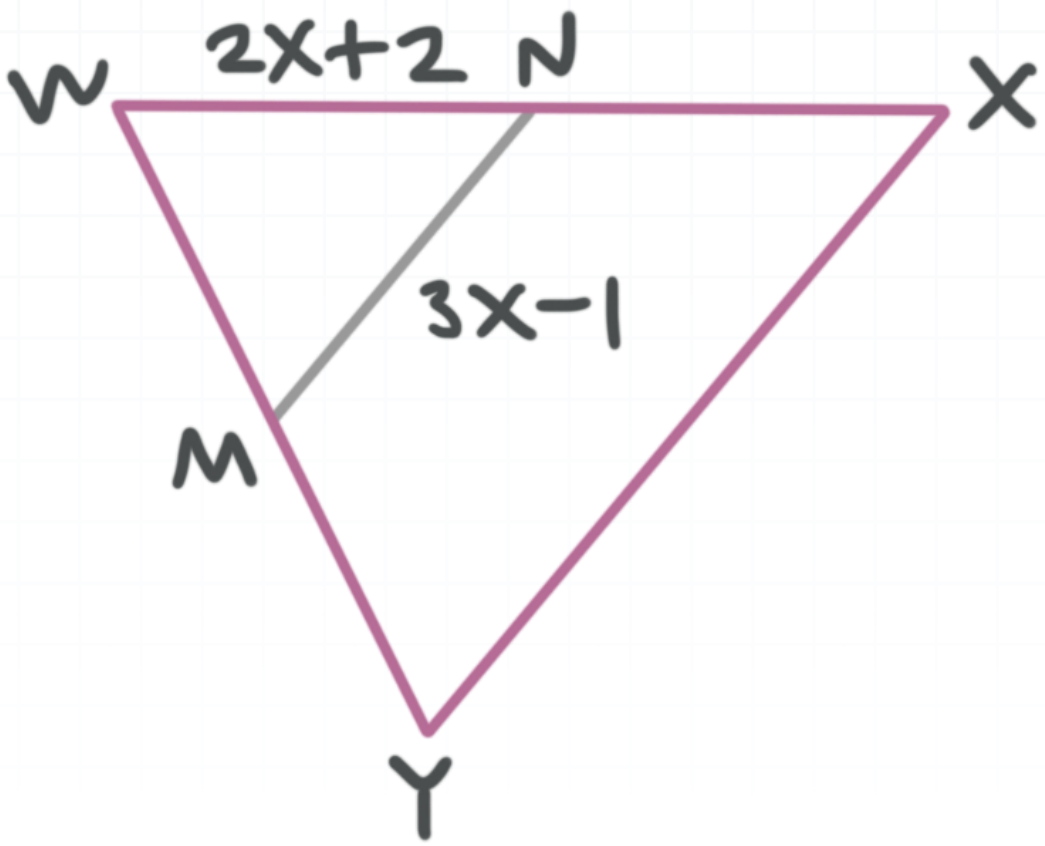
Topic: Midsegments of triangles

Question: In $\triangle WXY$, the midpoints of sides $\overline{WY}$ and $\overline{WX}$ are M and N, respectively, and $\overline{WX} = 24$. Find $\overline{XY}$.



Answer choices:

A 18

B 22

C 24

D 28

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Solution: D

Because $\overline{WX} = 24$ and N is the midpoint of $\overline{WX}$, we have

$$2(2x + 2) = 24$$

$$4x + 4 = 24$$

$$4x = 20$$

$$x = 5$$

Because M and N are the midpoints of $\overline{WY}$ and $\overline{WX}$, respectively, we know that

$$\overline{MN} = \frac{1}{2}\overline{XY}$$

$$3x - 1 = \frac{1}{2}\overline{XY}$$

Substitute 5 for x.

$$3(5) - 1 = \frac{1}{2}\overline{XY}$$

$$14 = \frac{1}{2}\overline{XY}$$

$$28 = \overline{XY}$$

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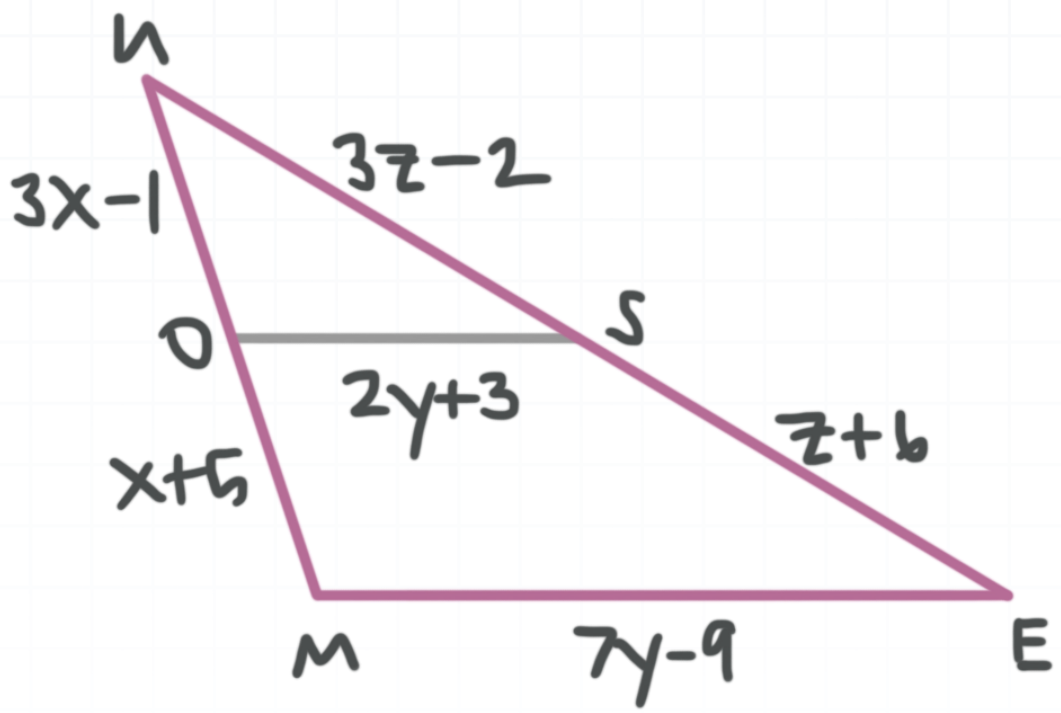
Topic: Midsegments of triangles

Question: In $\triangle MUE$, the midpoints of sides $\overline{UM}$ and $\overline{UE}$ are O and S, respectively. Find the value of $x + y + z$.



Answer choices:

A 12

B 15

C 24

D 25

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Solution: A

Because O is the midpoint of $\overline{UM}$,

$$3x - 1 = x + 5$$

$$2x = 6$$

$$x = 3$$

Because O and S are the midpoints of $\overline{UM}$ and $\overline{UE}$, respectively,

$$\overline{OS} = \frac{1}{2}\overline{ME}$$

$$2y + 3 = \frac{1}{2}(7y - 9)$$

Multiplying both sides of this equation by 2 (to clear the fraction), we get

$$4y + 6 = 7y - 9$$

$$15 = 3y$$

$$y = 5$$

Because S is the midpoint of $\overline{UE}$,

$$3z - 2 = z + 6$$

$$2z = 8$$

$$z = 4$$

Therefore,

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$$x + y + z = 3 + 5 + 4 = 12$$

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