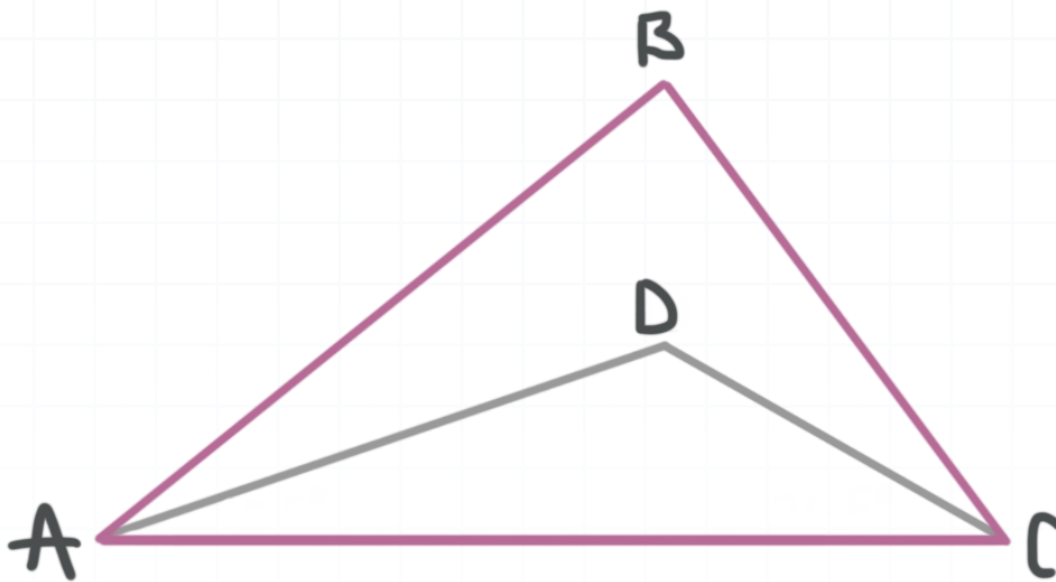


Topic: Perpendicular and angle bisectors

Question: The line segments \overline{AD} and \overline{CD} are bisectors of $\angle CAB$ and $\angle BCA$, respectively. What is $m\angle ADC$, if $m\angle CAB = 39^\circ$ and $m\angle BCA = 53^\circ$?

**Answer choices:**

- A 88°
- B 112°
- C 123°
- D 134°



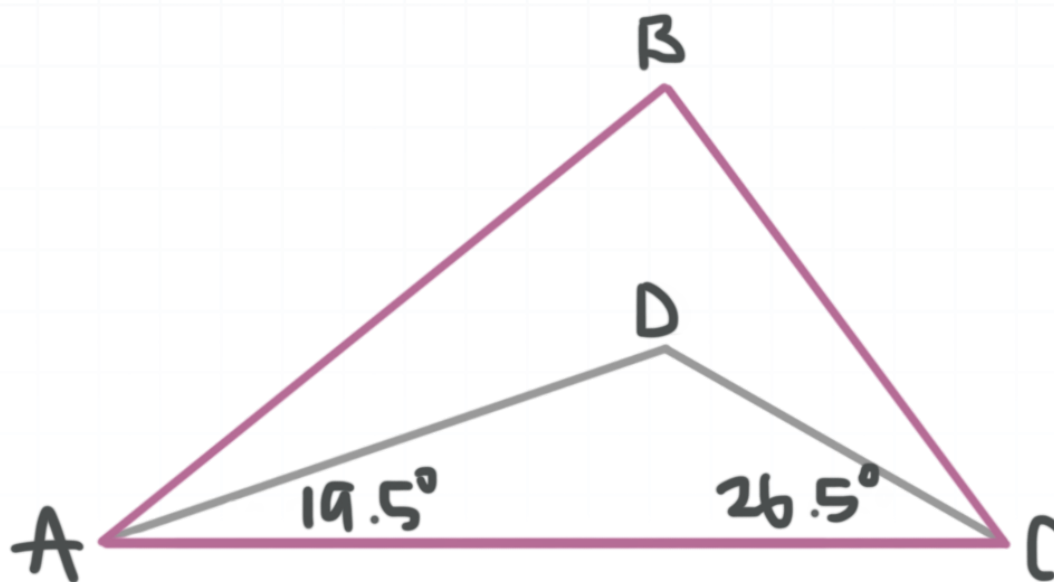
Solution: D

Using what we already know, we see that

$$m\angle CAD = \frac{1}{2}m\angle CAB = \frac{1}{2}(39^\circ) = 19.5^\circ$$

$$m\angle DCA = \frac{1}{2}m\angle BCA = \frac{1}{2}(53^\circ) = 26.5^\circ$$

Add these measures to the figure.



The measures of the three interior angles of $\triangle ADC$ (or any triangle) add up to 180° . Therefore,

$$m\angle CAD + m\angle DCA + m\angle ADC = 180^\circ$$

$$19.5^\circ + 26.5^\circ + m\angle ADC = 180^\circ$$

$$46^\circ + m\angle ADC = 180^\circ$$

$$m\angle ADC = 134^\circ$$



Topic: Perpendicular and angle bisectors

Question: The perpendicular bisector of a line segment does which of these things?

Answer choices:

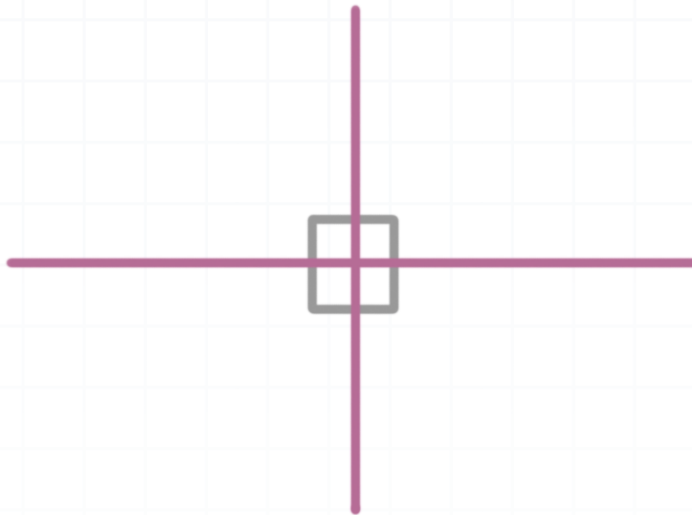
- A Forms at least two right angles
- B Forms two line segments of equal length
- C Passes through the midpoint of the original segment
- D All of these



Solution: D

All of these are true.

a) The figures below show how you could get two or four right angles.



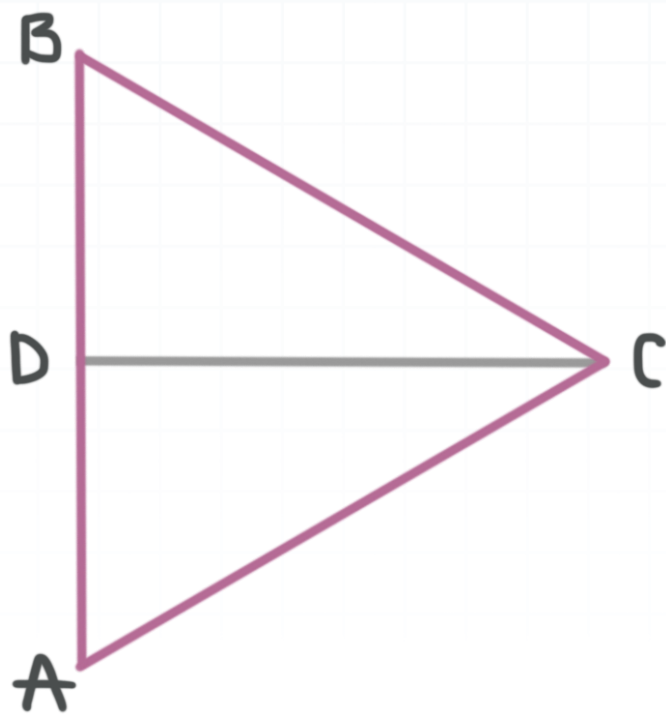
b) The word bisector tells us that the segment is split into two equal parts.

c) The point at which any line segment is divided into two equal segments is its midpoint.



Topic: Perpendicular and angle bisectors

Question: $\triangle ABC$ is an equilateral triangle (a triangle in which all three sides are of equal length). \overline{CD} is the perpendicular bisector of \overline{AB} . $\overline{AD} = 5x - 2$ and $\overline{DB} = 3x + 6$. What is the perimeter of $\triangle ABC$ (the sum of the lengths of its sides)?

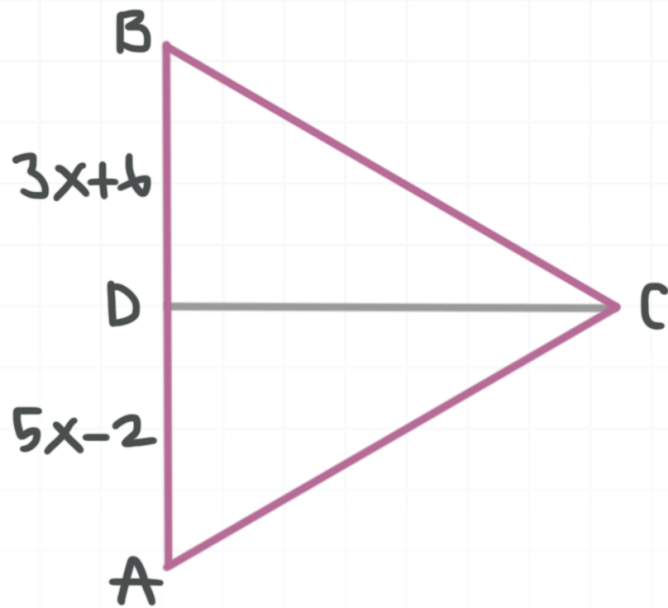
**Answer choices:**

- A 24
- B 54
- C 108
- D 156



Solution: C

Let's label what we've been given.



Because \overline{CD} bisects \overline{AB} ,

$$3x + 6 = 5x - 2$$

$$8 = 2x$$

$$4 = x$$

Notice that

$$\overline{AB} = \overline{AD} + \overline{DB}$$

$$\overline{AB} = (5x - 2) + (3x + 6)$$

Substituting 4 for x , we get

$$\overline{AB} = 5(4) - 2 + 3(4) + 6$$

$$\overline{AB} = 36$$



Since $\triangle ABC$ is equilateral, its perimeter is

$$3 \cdot \overline{AB} = 3 \cdot 36 = 108$$

