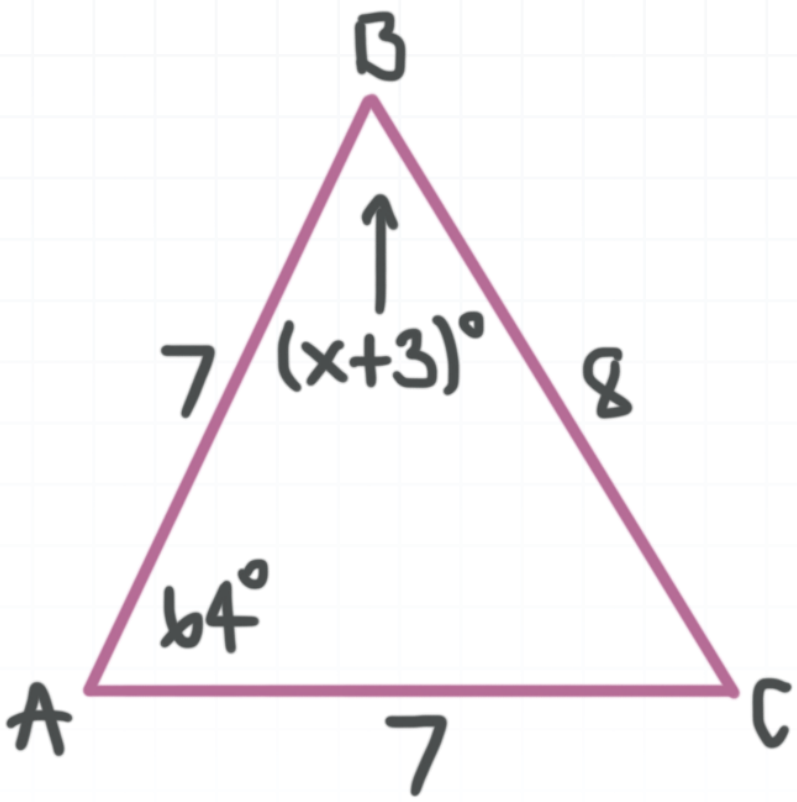
Topic: Isosceles triangle theorem

Question: Solve for x.



Answer choices:

A 49

B 52

C 55

D 58

Solution: C

We know that $\overline{AC} \cong \overline{AB}$, so $\angle B \cong \angle C$ and $m\angle C = (x + 3)^\circ$. The measures of the interior angles of a triangle always sum to 180°, so

$$m\angle A + m\angle B + m\angle C = 180^\circ$$

$$64^\circ + (x + 3)^\circ + (x + 3)^\circ = 180^\circ$$

$$70^\circ + 2x^\circ = 180^\circ$$

$$2x^\circ = 110^\circ$$

$$x^\circ = 55^\circ$$

$$x = 55$$

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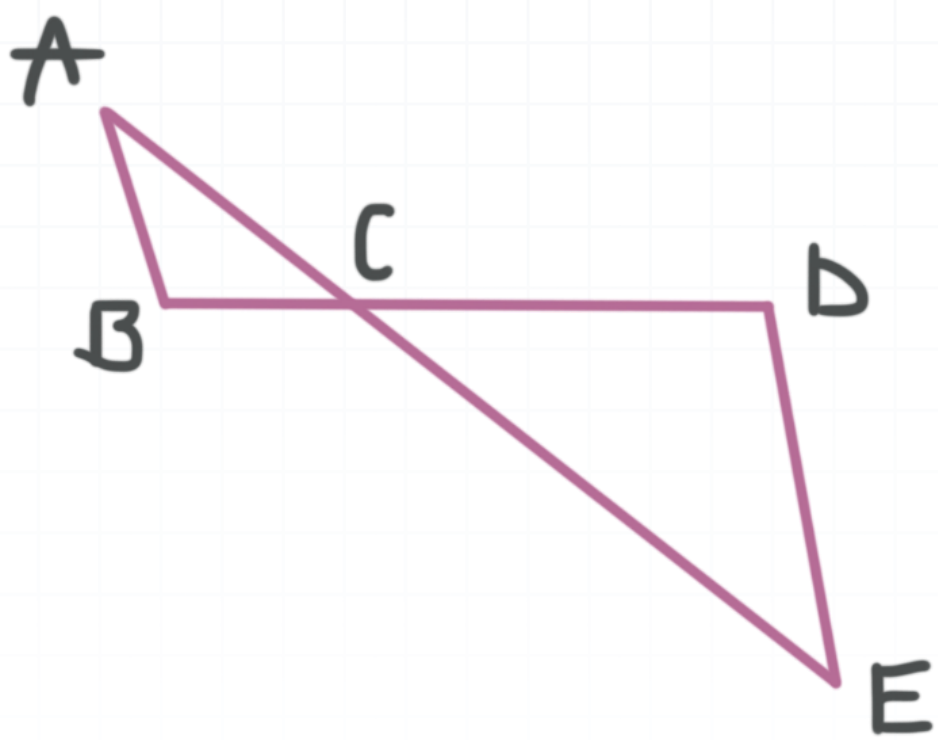
Question: Find the measure of $\angle CDE$, given that $\overline{AB} \cong \overline{BC}$, $\overline{CD} \cong \overline{DE}$, and $m\angle BAC = 35°$.



Answer choices:

A $95°$

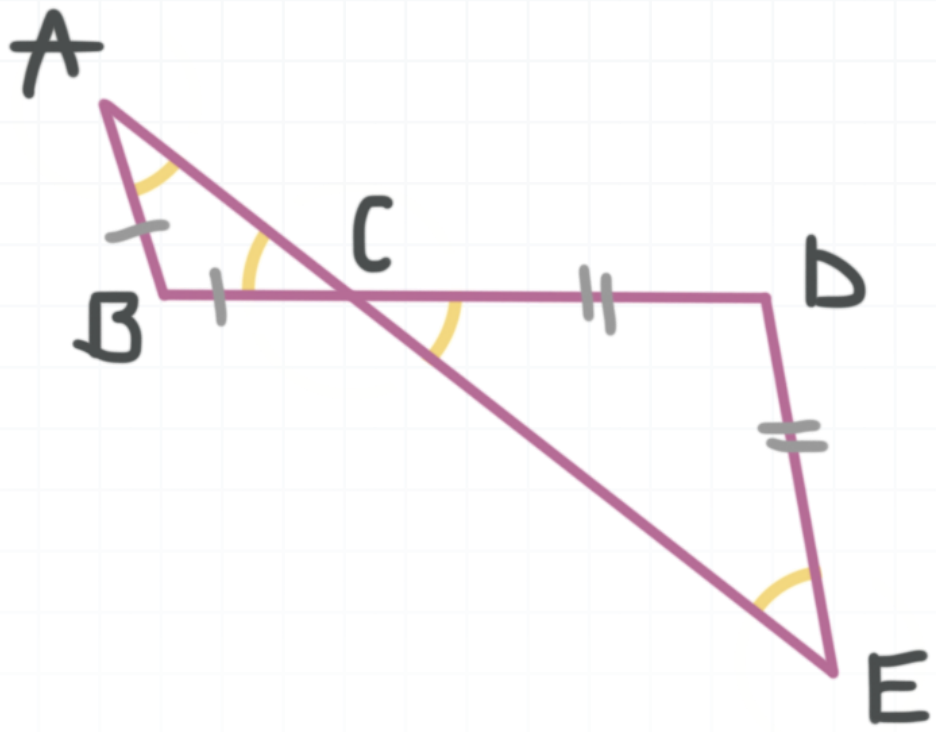
B $110°$

C $118°$

D $122°$

Solution: B

Fill in the figure with the given information.



Because we know $\overline{AB} \cong \overline{BC}$, we can say $\angle BAC \cong \angle ACB$ and $m\angle ACB = 35°$.

The angles $\angle ACB$ and $\angle ECD$ are a pair of vertical angles, so $m\angle ECD = 35°$, because vertical angles are congruent.

Then we can say $\overline{CD} \cong \overline{DE}$, so $\angle DEC \cong \angle ECD$ and $m\angle DEC = 35°$.

The measures of the interior angles of a triangle always sum to $180°$, so

$$m\angle ECD + m\angle DEC + m\angle CDE = 180°$$

$$35° + 35° + m\angle CDE = 180°$$

$$m\angle CDE = 110°$$

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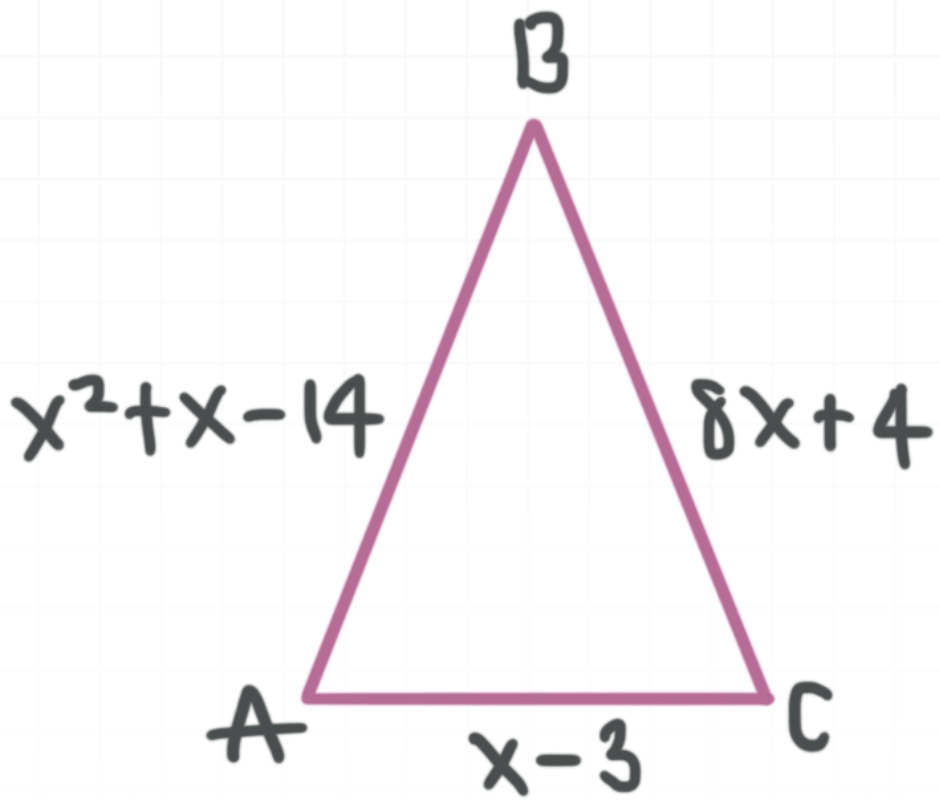
Question: Find the length of $\overline{AC}$, given that $\angle C \cong \angle A$.



Answer choices:

A 1

B 2

C 5

D 6

Solution: D

With the given information, $\angle C \cong \angle A$, we can say that $\overline{BA} = \overline{BC}$.

Equate the given expressions for $\overline{BA}$ and $\overline{BC}$, then solve for x.

$$x^2 + x - 14 = 8x + 4$$

$$x^2 - 7x - 18 = 0$$

$$(x - 9)(x + 2) = 0$$

$x = 9$ or $x = -2$

Using $x = -2$ will lead to a negative value for $\overline{BA}$ (because $(-2)^2 + (-2) - 14 = 4 - 2 - 14 = -12$) and $\overline{BC}$ (because $8(-2) + 4 = -16 + 4 = -12$), so rule out $x = -2$. That leaves $x = 9$.

$$\overline{AC} = x - 3$$

$$\overline{AC} = 9 - 3$$

$$\overline{AC} = 6$$