Name: _____ Date: <u>March 6</u> Hour: <u>5th</u>
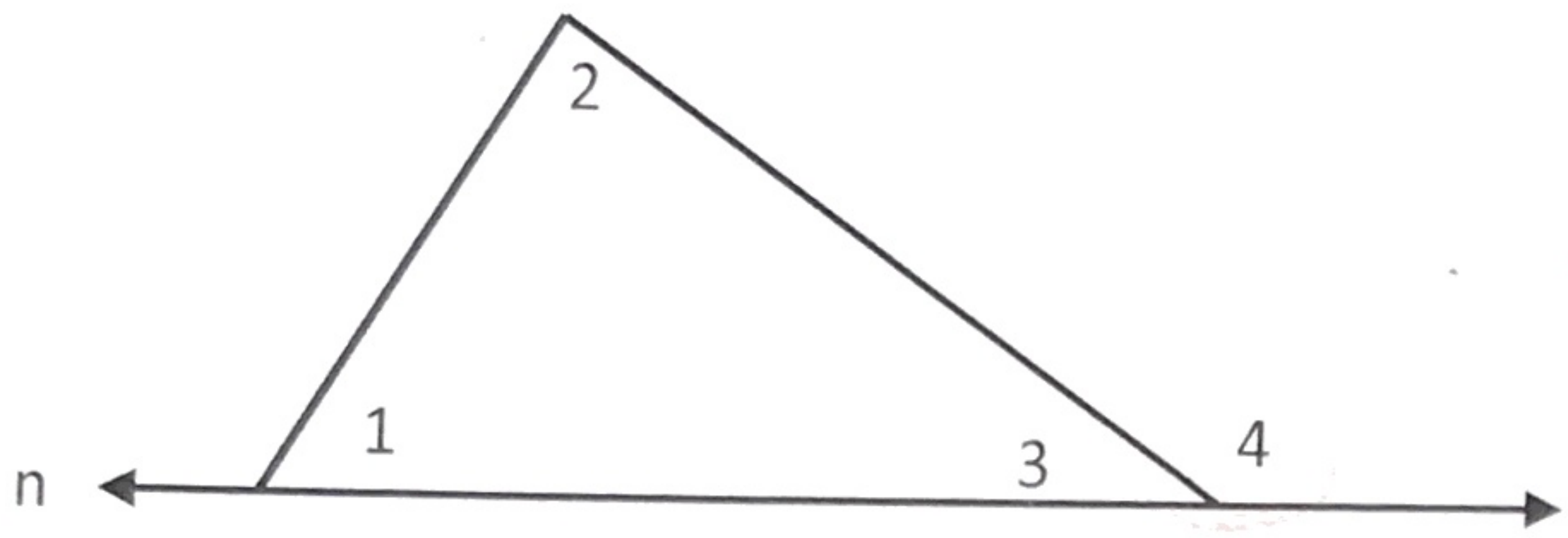
Unit 6B Day 18: Exterior Angles of a Triangle

Focus Question: What is always true about the exterior angle measures in a triangle and why?

A. Exterior Angles

The exterior angle of a triangle

1. How would you describe the location of angle 4?

   $\angle 4$ is outside (exterior) to the triangle

2. What do you know about angles 3 and 4? Explain.

   They are supplementary b/c they're linear

3. What do you know about angles 1, 2, and 3? Explain.

   $\angle 1, \angle 2, \& \angle 3$ add up to $180°$ b/c they're inside the $\triangle$.

4. Using your answers to #2 and #3, what can you conclude about angles 1, 2, and 4?

$m\angle 3 + m\angle 4 = 180°$

$m\angle 1 + m\angle 2 + m\angle 3 = 180°$

$180 = 180$
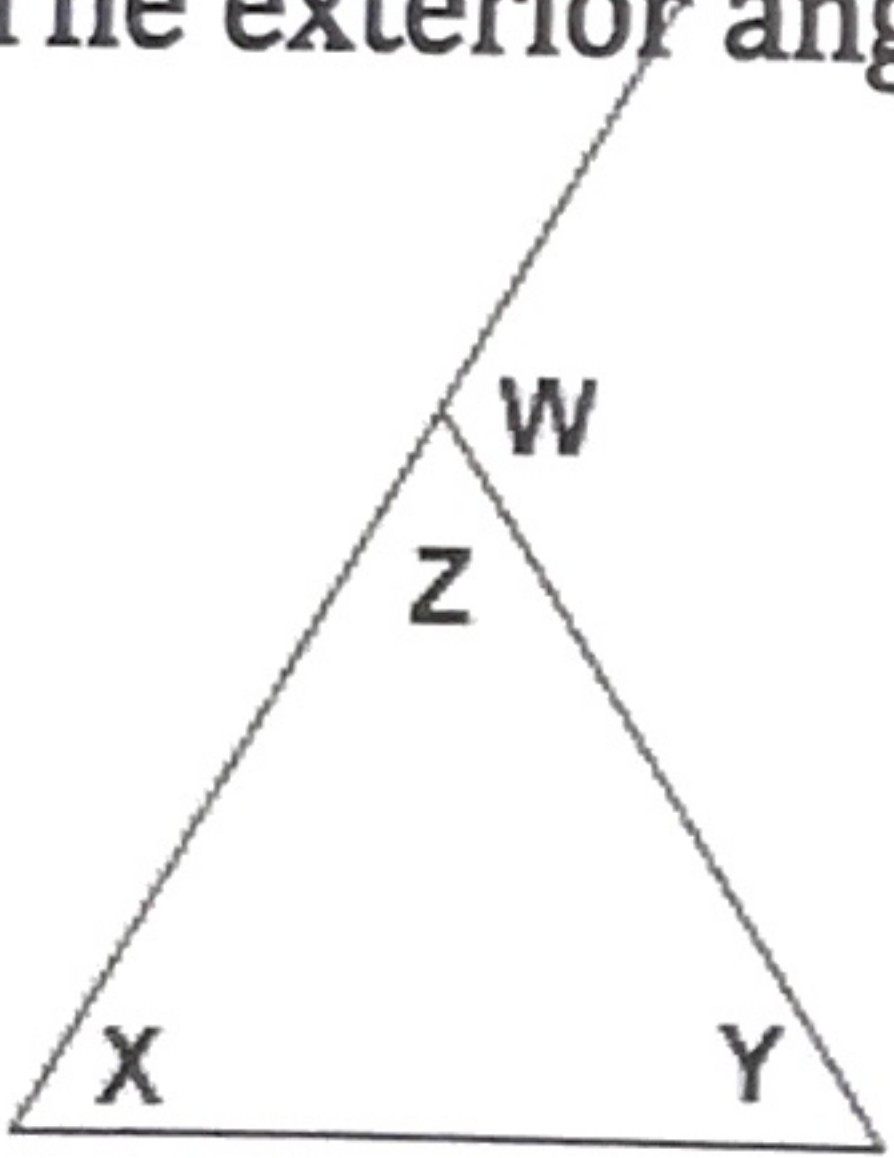
$m\angle 3 + m\angle 4 = m\angle 1 + m\angle 2 + m\angle 3$

$-m\angle 3 \qquad\qquad -m\angle 3$
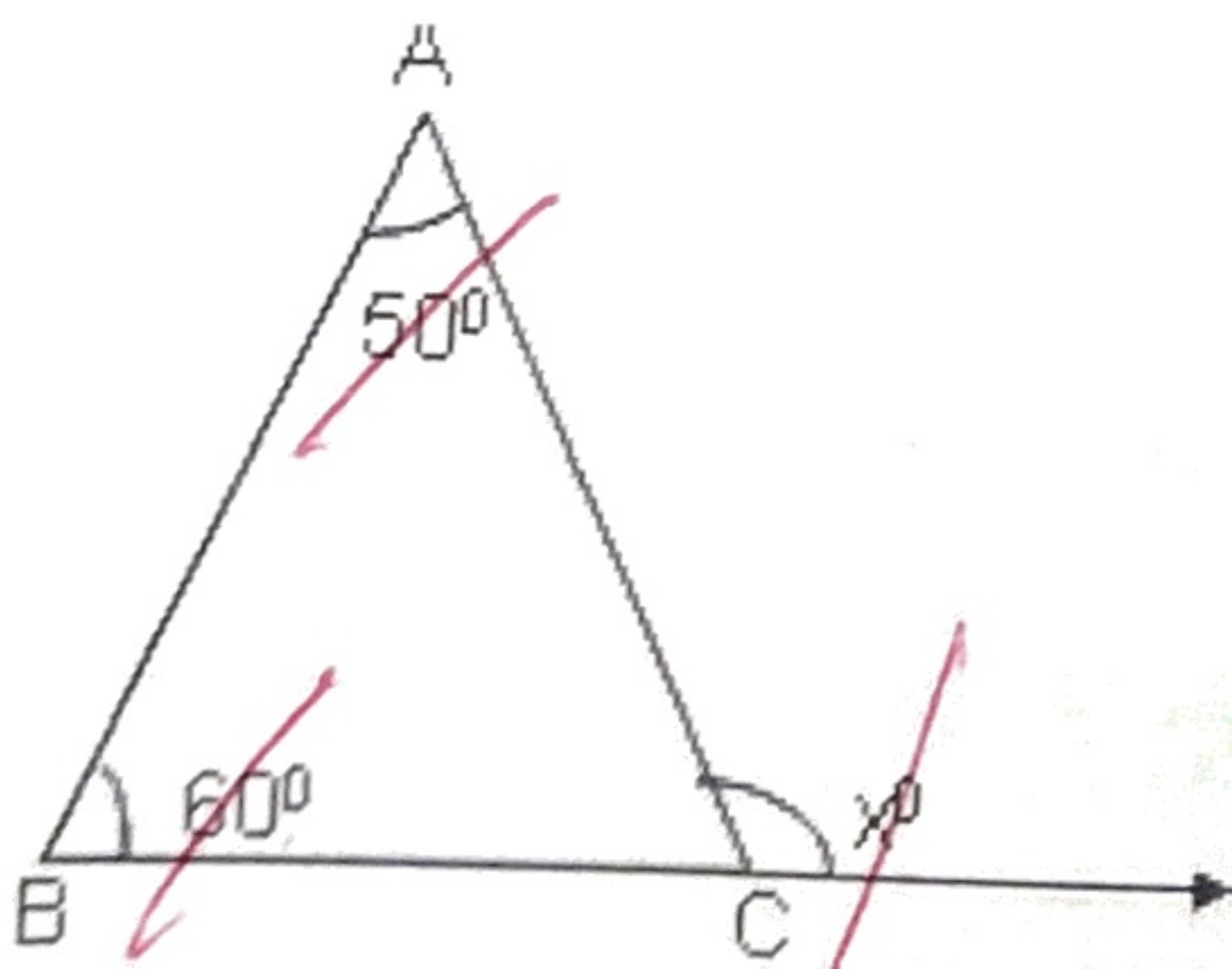
$m\angle 4 = m\angle 1 + m\angle 2$

(exterior) = (int) + (int)

The exterior angle of a triangle is equal to the sum of the 2 non-adjacent the interior angles.

$m\angle \underline{W} = m\angle \underline{X} + m\angle \underline{Y}$

ext. = in + in

$\boxed{\text{ext} \ne \text{in} + \text{in}}$ ✱

B. Find the value of x. (7th grade stuff!)

ext $\ne$ in + in

$x = 50 + 60$

$\boxed{x = 110°}$

$x = \underline{110}°$

$x = \underline{60°}$
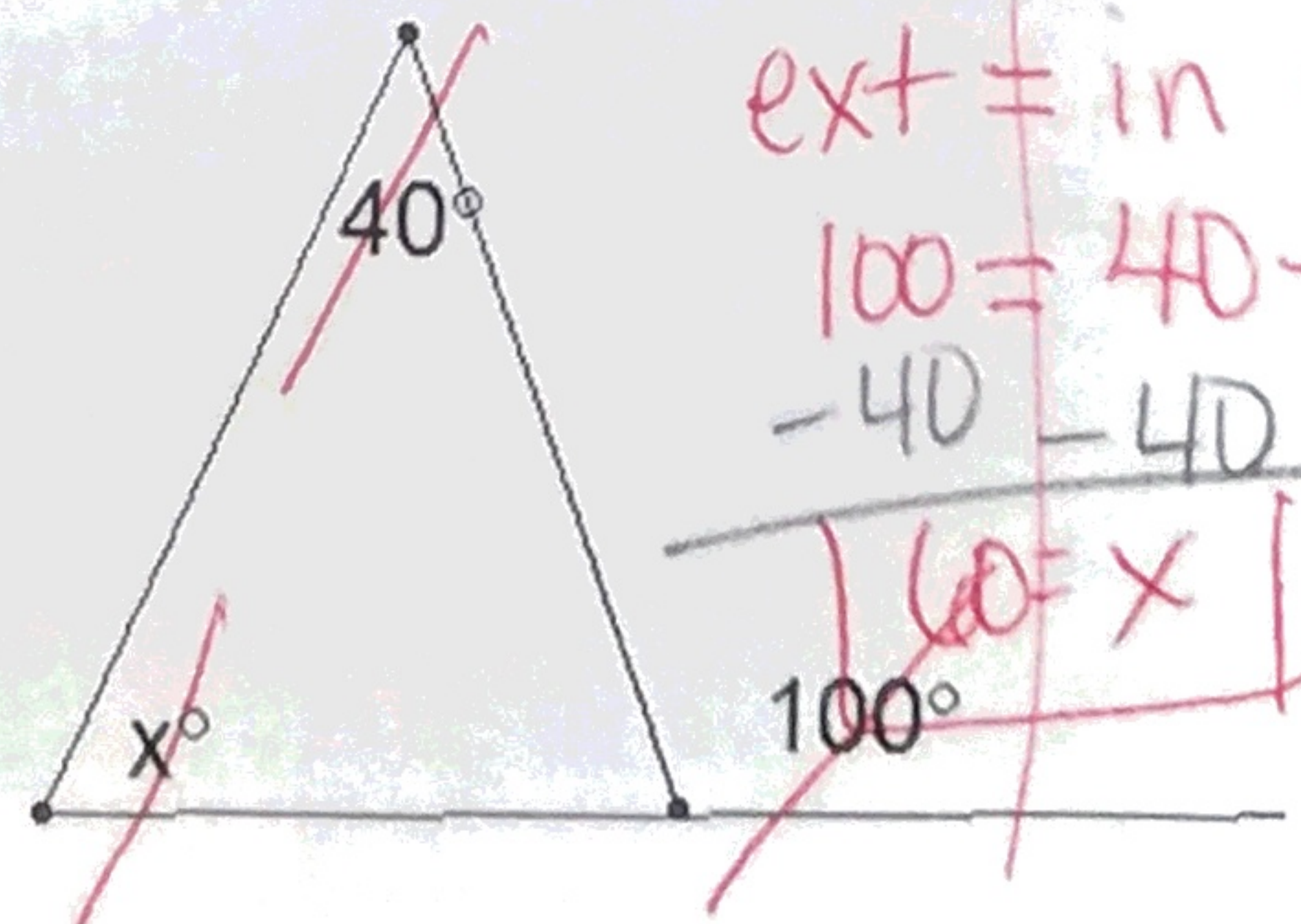
ext $\ne$ in + in

$100 = 40 + x$

$-40 \quad -40$

$\boxed{60 = x}$

C. Find the value of x. (8th grade stuff!)

1.

60° P

x° Q R (2x + 4)°
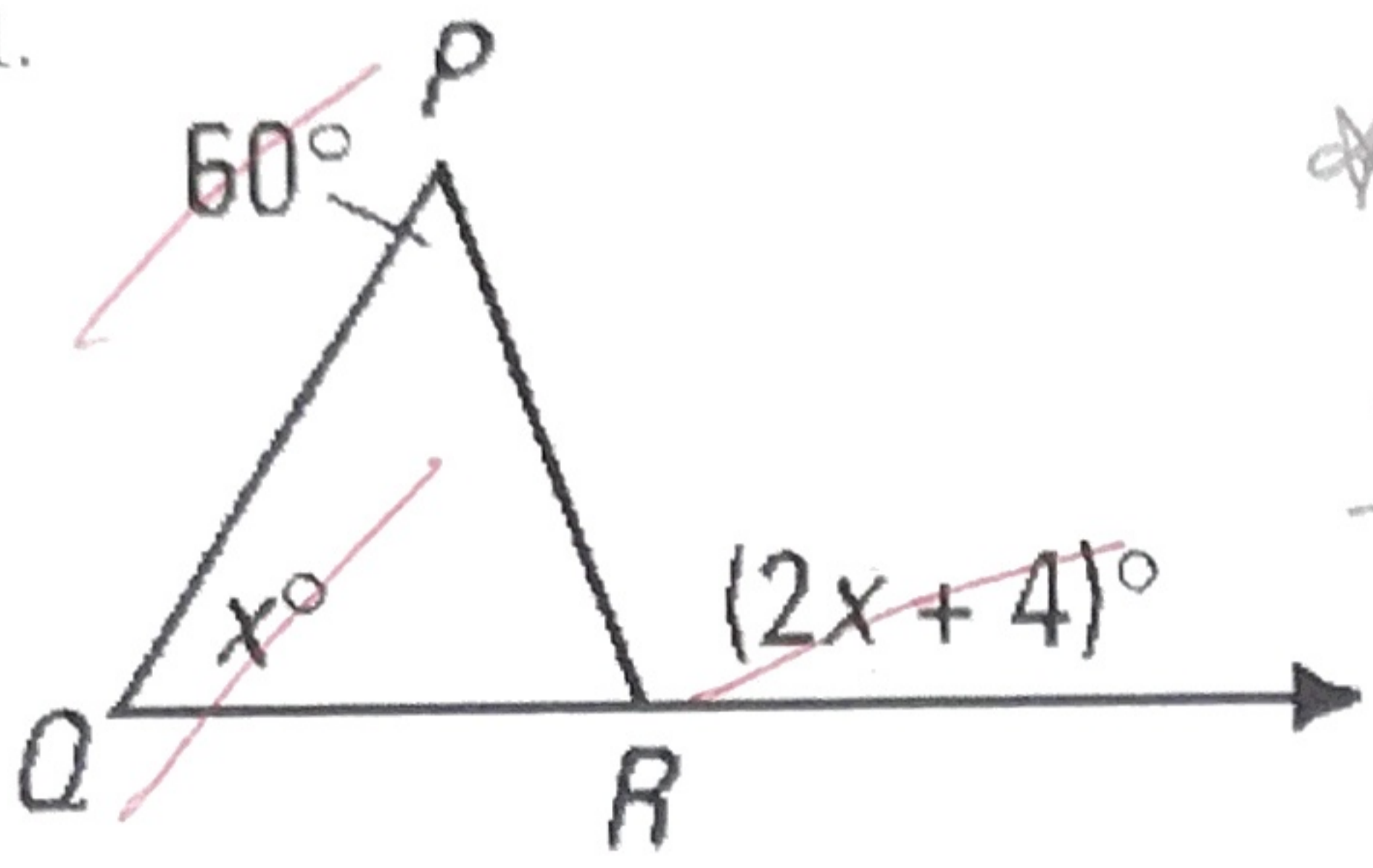
ext = in + in

*$2x + 4 = 60 + x$
$-x - x$

$x + 4 = 60$
$- 4 - 4$

$\boxed{x = 56}$

2.

110°

(4x + 2)°
(2x - 9)°
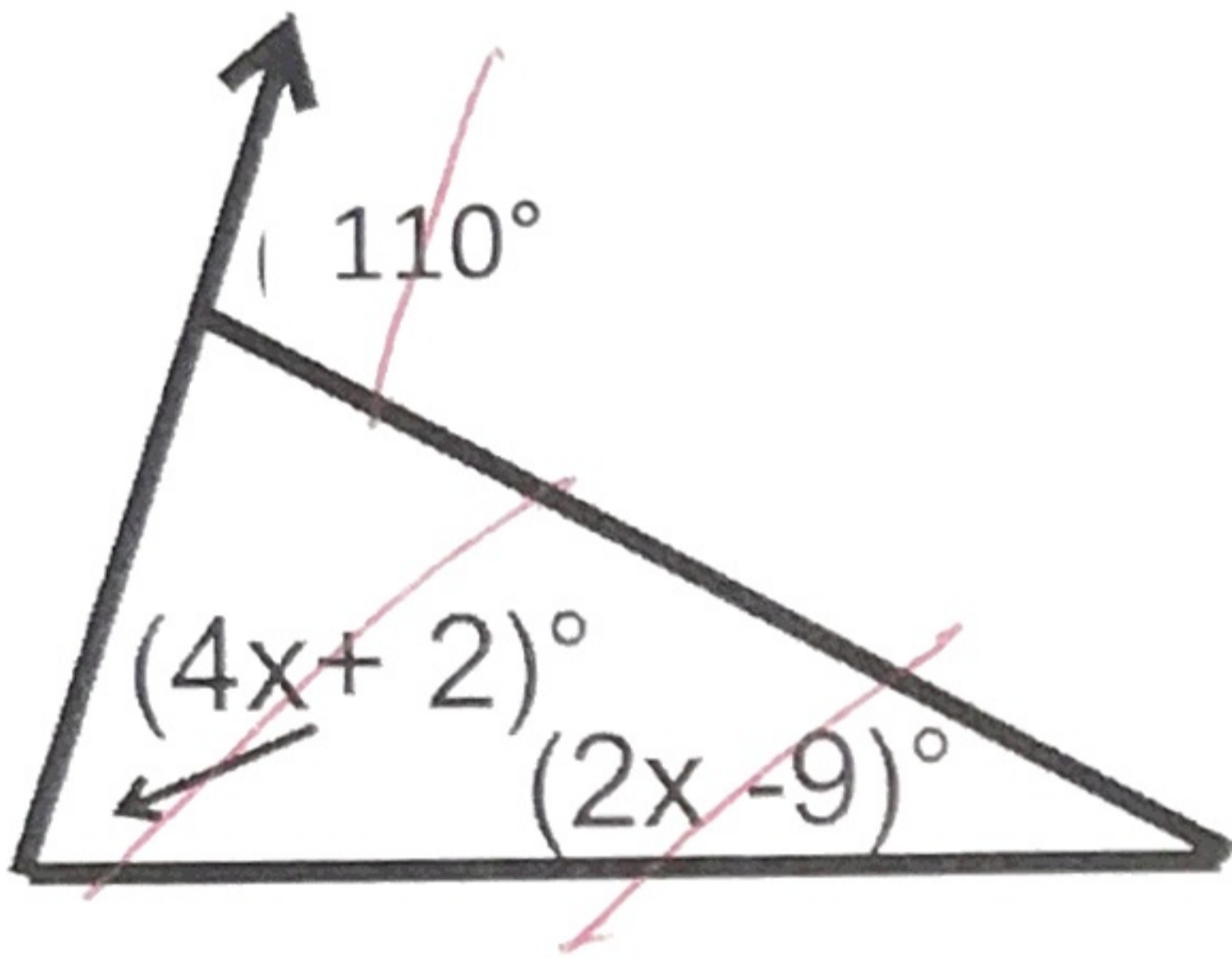
ext = in + in

$110 = 4x + 2 + 2x - 9$

$110 = 6x - 7$
$+7 +7$

$\dfrac{117 = 6x}{6 6}$

$\boxed{x = 19.5}$

3.

C

(3x + 10)°

(x + 40)°
A
(6x)°
B
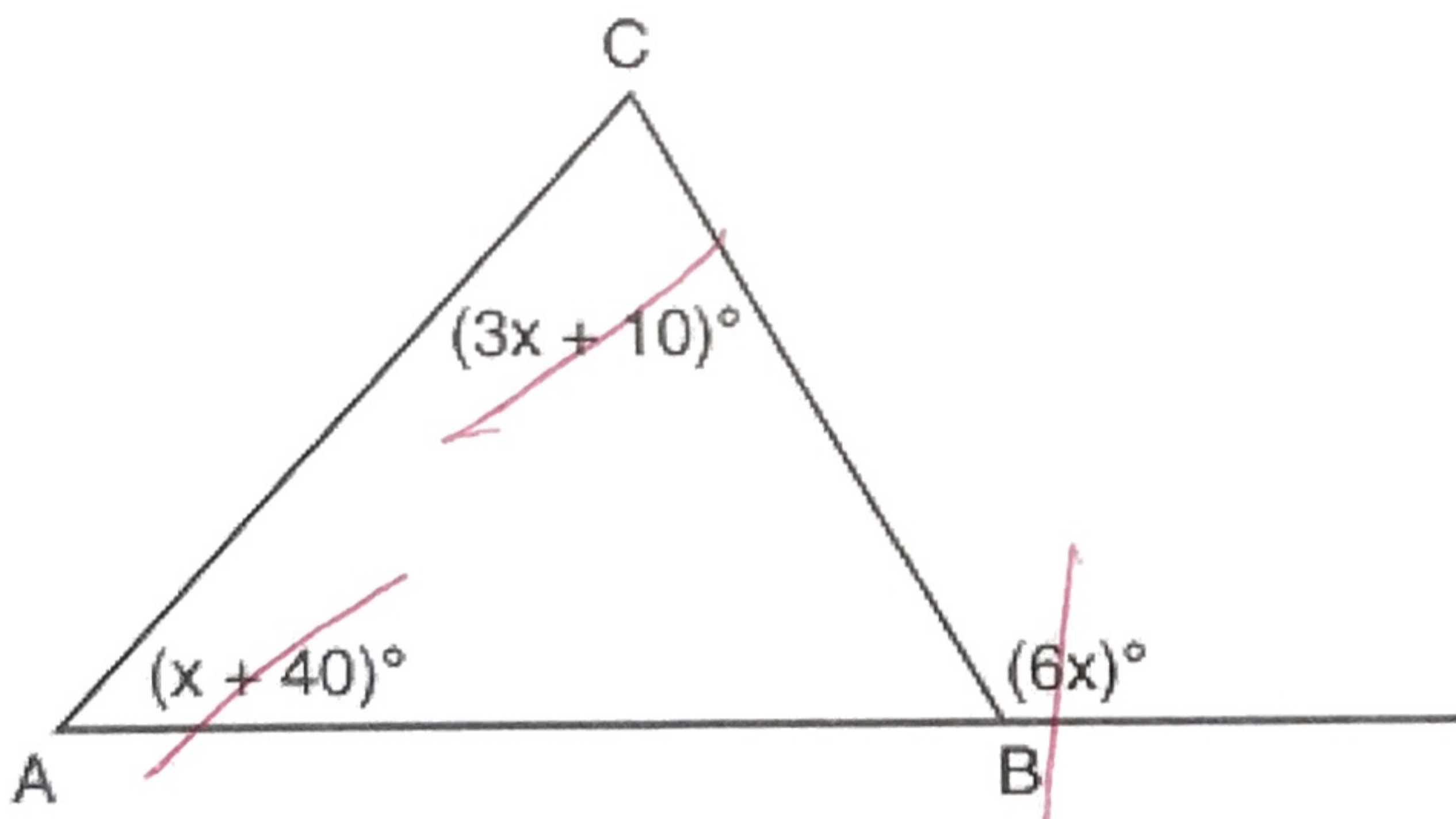
ext = in + in

$6x = x + 40 + 3x + 10$

*$6x = 4x + 50$
$-4x -4x$

$\dfrac{2x = 50}{2 2}$

$\boxed{x = 25}$

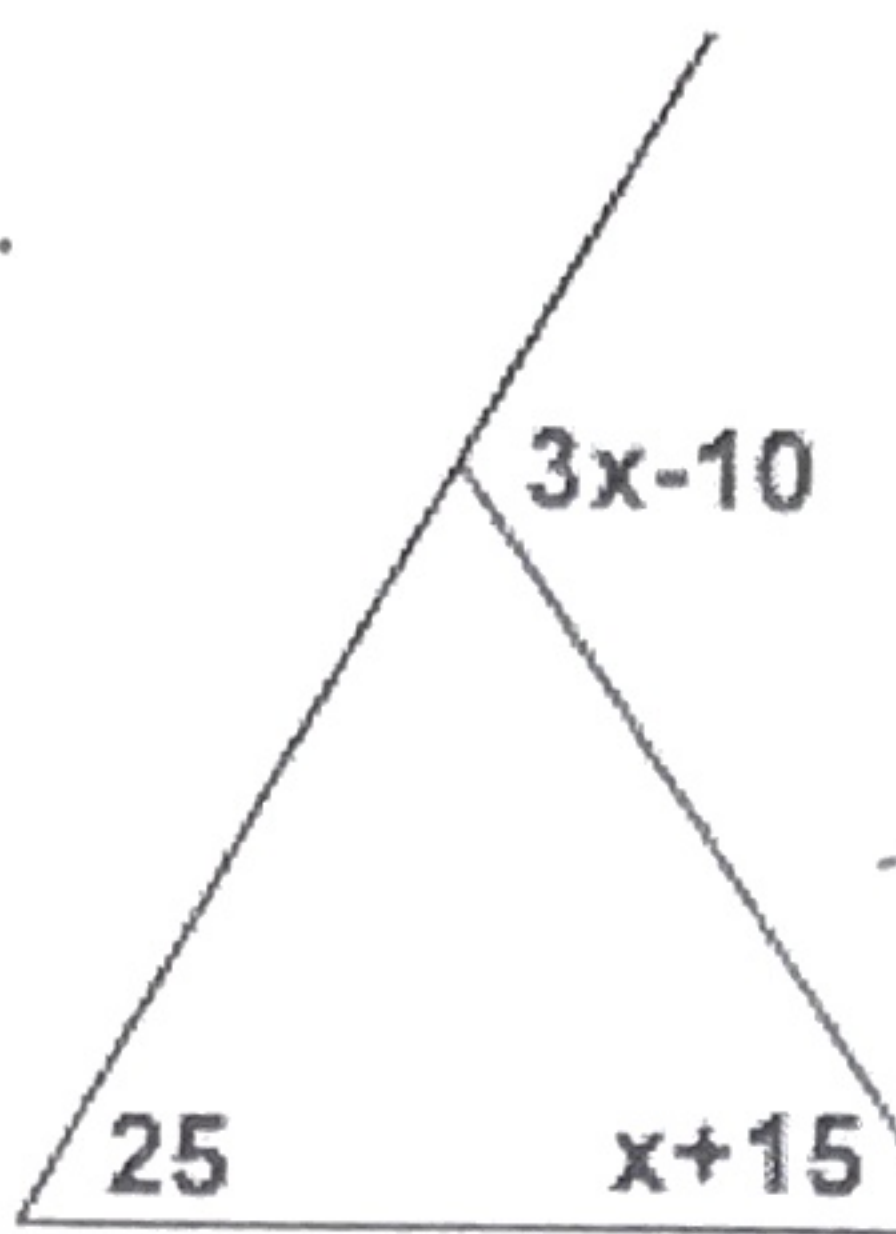4. Practice using the provided worksheet
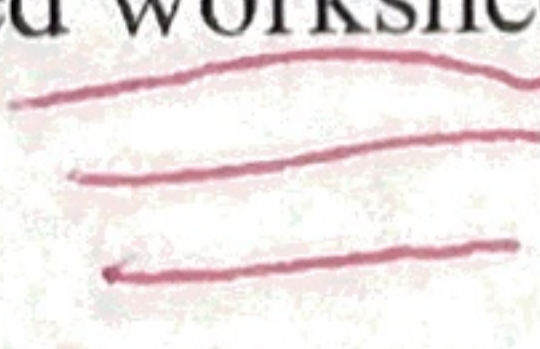
Exterior Angles of a Triangle Practice   Name: _____

Find the value of each variable. **Be careful, not all angles that are exterior will be used as exterior angles.**
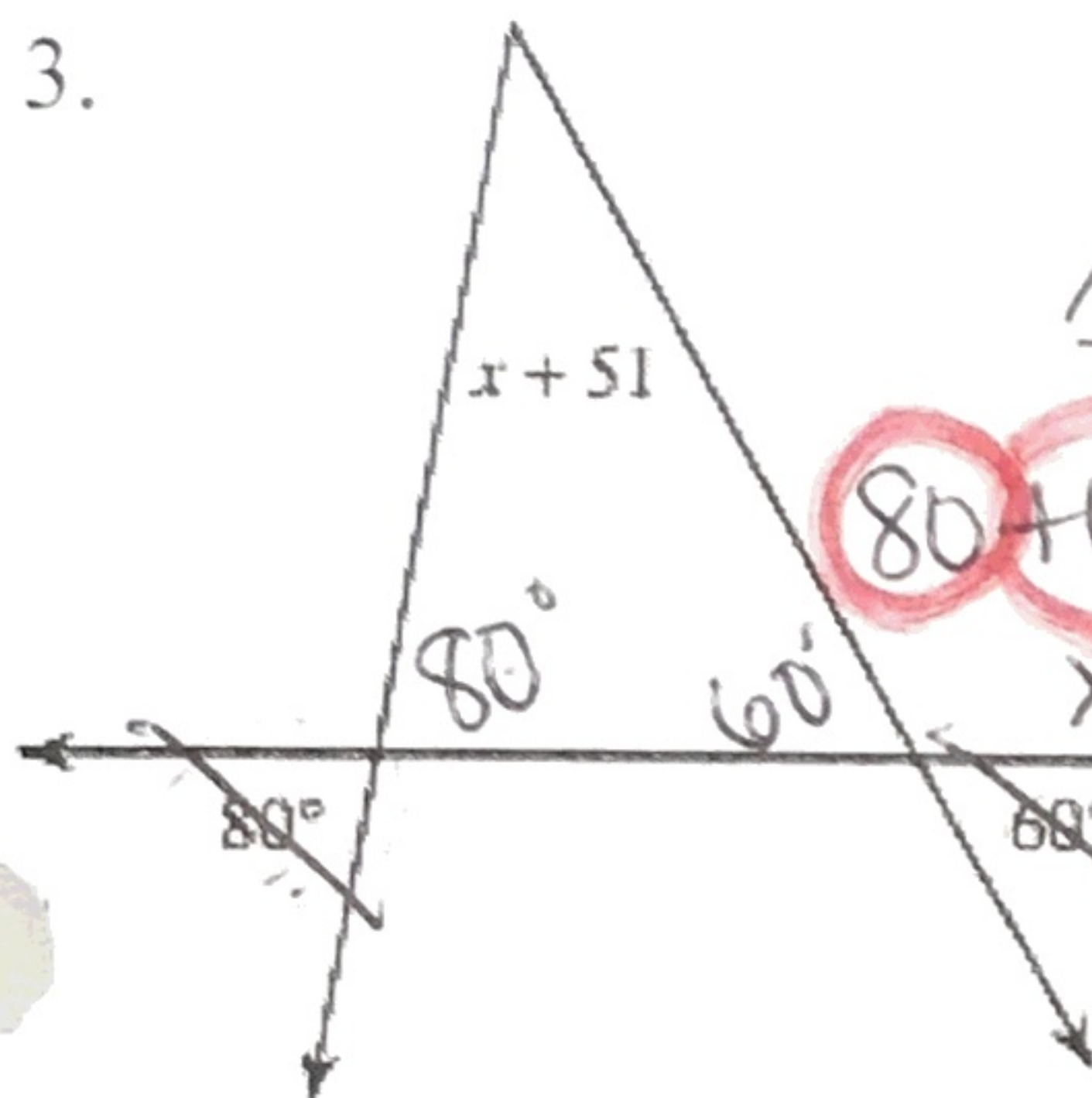
1.

98°

h°   160°

h = ____

$out = in + in$
$160 = 98 + h$
$-98 \quad -98$
$\boxed{62 = h}$

2.   X = ____
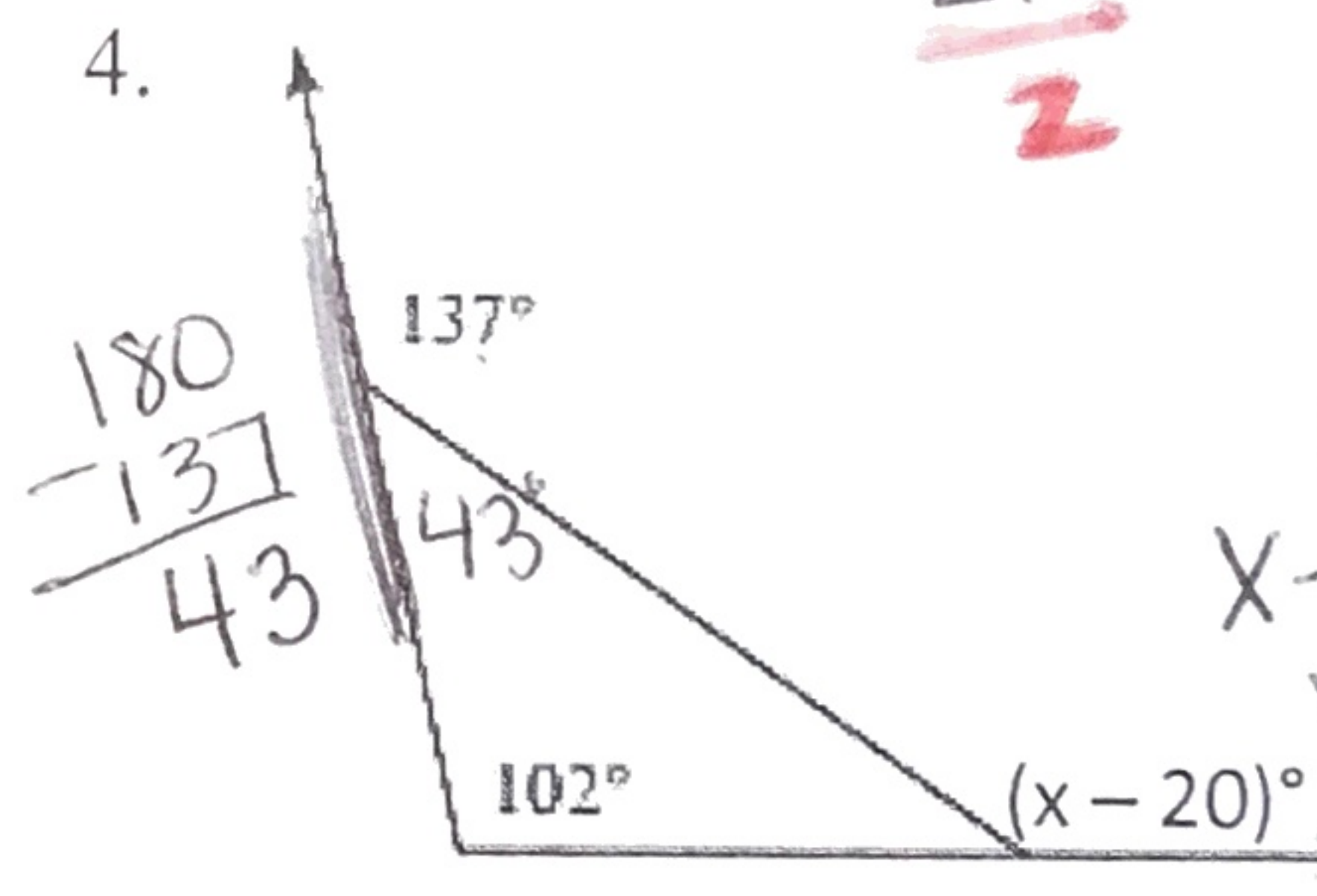
3x-10

25   x+15

$out = in + in$
$3x - 10 = 25 + x + 15$
$3x - 10 = x + 40$
$-x \qquad -x$
$2x - 10 = 40$
$+10 \quad +10$
$\dfrac{2x}{2} = \dfrac{50}{2}$
$\boxed{X = 25}$

3.   X = ____

x + 51

80°   60°

80°   60°

$\triangle = 180$
$80 + 60 + x + 51 = 180$
$x + 191 = 180$
$-191 \quad -191$
$\boxed{X = -11}$

4.

137°
43°

102°   (x − 20)°

180
−137
43

$out = in + in$
$x - 20 = 102 + 43$
$x - 20 = 145$
$+20 \quad +20$
$\boxed{X = 165}$

5. Marci was given the picture below and told to find the $m\angle HRQ$. Her answer is below.

P
30°   R   H
8 + 6x

4x + 2

Q
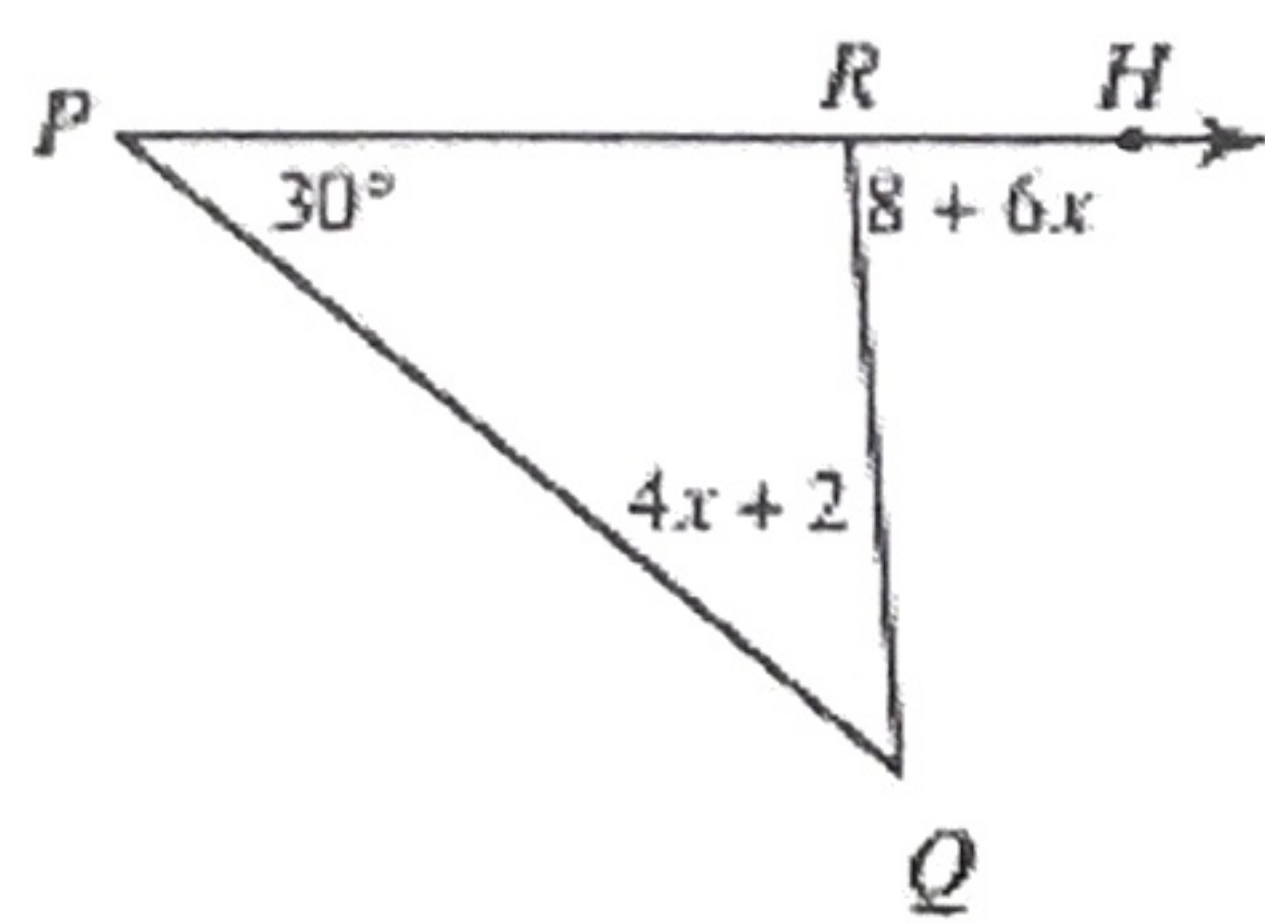
$\angle HRQ$ is exterior to the triangle and will equal the sum of $\angle P$ and $\angle Q$.
8 + 6x = 30 + 4x + 2 so I will combine like terms
$\dfrac{40}{10} = \dfrac{10x}{10}$
$4 = x$

Explain Marci's error(s) in reasoning.

① Marci had to find an exterior angle measure
② She stopped at X=4
③ She made 2 mistakes
  • she doesn't know how to combine only like terms
  • she didn't actually find the angle measure.
④ It should be   8+6x = 30 + 4x + 2   8+2x = 32   m∠HRQ
  * 8 + 6x = 4x + 32   −8 | −8   = 8 + 6(12)
  −4x   −4x $\dfrac{2x}{2} = \dfrac{24}{2}$ X = 12   = 8 + 72
                                                              = 80°