Geometry

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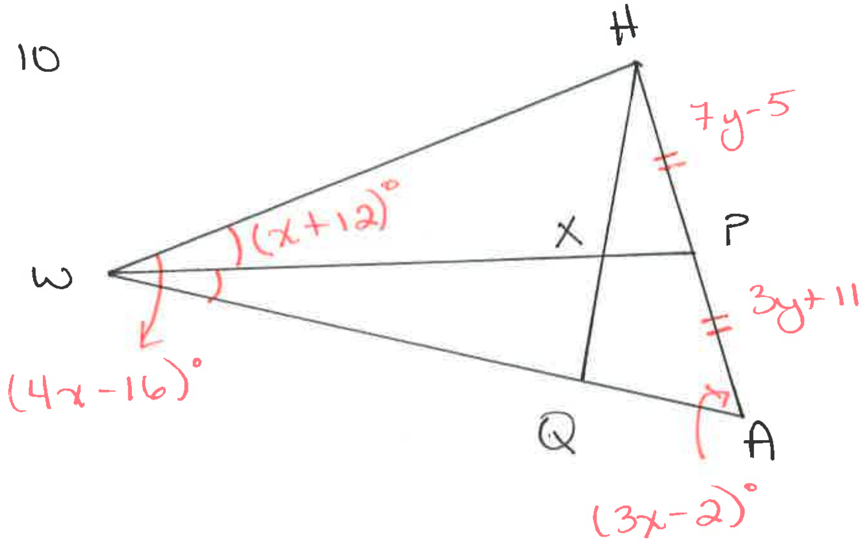
\# 10



Given:

$\overline{WP}$ is a median and an $\angle$ bisector

$AP = 3y + 11$

$PH = 7y - 5$

$m\angle HWP = x + 12$

$m\angle PAW = 3x - 2$

$m\angle HWA = 4x - 16$

Find x and y:

1) Since $\overline{WP}$ is a median, $AP = PH$

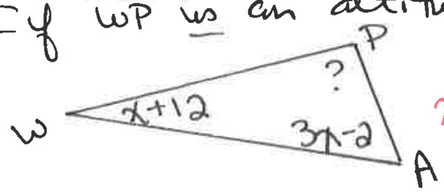
$$3y + 11 = 7y - 5$$
$$16 = 4y$$
$$\boxed{4 = y}$$

2) Since $\overline{WP}$ is an angle bisector, $m\angle HWA = 2(m\angle HWP)$

$$4x - 16 = 2(x + 12)$$
$$4x - 16 = 2x + 24$$
$$2x = 40$$
$$\boxed{x = 20}$$

Is $\overline{WP}$ also an altitude?

If $\overline{WP}$ is an altitude, $m\angle WPA = 90 \ldots$



$x + 12 + 3x - 2 + \quad = 180$

$x = 20$ $\quad 20 + 12 + 3(20) - 2 + ? = 180$

$? = 90$

Yes, $\overline{WP}$ is an altitude b/c $m\angle WPA = 90$.

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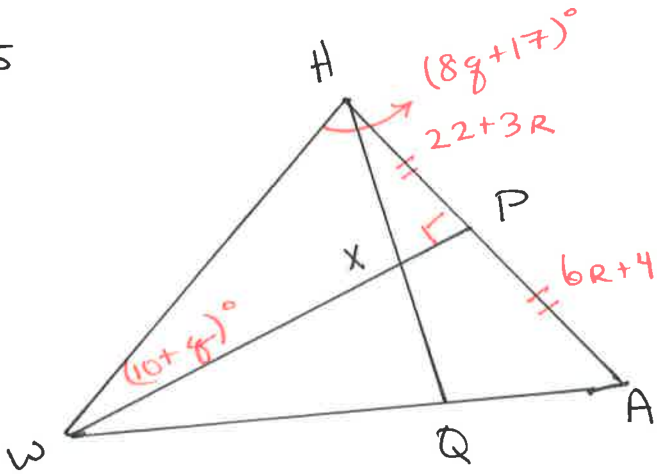

Given:

$\overline{WP}$ is a perpendicular (90°)

$\frac{1}{2}$ bisector

$m\angle WHA = 8g + 17$

$m\angle HWP = 10 + g$

$AP = 6R + 4$

$PH = 22 + 3R$

Find R, g, and $m\angle HWP$:

1) Because $\overline{WP}$ bisects $\overline{AH}$, $AP = PH$

$$6R + 4 = 22 + 3R$$
$$3R = 18$$
$$\boxed{R = 6}$$

2) Because $\overline{WP}$ is perpendicular, $m\angle WPH = 90$ and angle sum theorem tells us that

$$m\angle HWP + m\angle WHA + m\angle WPH = 180$$
$$10 + g + 8g + 17 + 90 = 180$$
$$9g + 117 = 180$$
$$9g = 63$$
$$\boxed{g = 7}$$

3) $m\angle HWP = 10 + g$

$$= 10 + 7$$

$$\boxed{m\angle HWP = 17^\circ}$$