Worksheet Altitude, Median, Angle bisector, perpendicular Bisector

Name the special segment for 1-4

1) \( \overline{AC} \) median
2) \( \overline{HE} \) perpendicular bisector
3) \( \overline{IL} \) angle bisector
4) \( \overline{MN} \) altitude

5) Draw a triangle with an altitude outside the triangle.

6) In \( \triangle ABC \), \( \overline{DE} \) is perpendicular bisector of \( \overline{AC} \) with D on \( \overline{AC} \). If \( AD = 2y + 4 \), \( CD = y + 12 \), and \( \angle EDC = 5(x - 12)^\circ \). Find the value of x and y. Find length of \( AD \), \( DC \), and \( AC \).

\[ 2y + 4 = y + 12 \]
\[ 5(x - 12) = 90 \]
\[ 3x - 60 = 90 \]
\[ 5x = 150 \]
\[ x = 30 \]

\[ AD = 2(8) + 4 = 20 \]
\[ DC = 8 + 12 = 20 \]
\[ AC = 40 \]

7) \( \overline{DB} \) is an altitude of \( \triangle ADC \), and \( \angle DBC = (n^2 + 81)^\circ \). Find the value of n.

\[ n^2 + 81 = 90 \]
\[ n^2 = 9 \]
\[ n = 3 \]

8) \( \overline{DB} \) and \( \overline{AE} \) are medians. If \( BE = 6x + 10 \), \( \overline{AC} = 3x + 3 \), \( CE = 6x + 12 \), \( BD = 2x + 60 \), then find the value of x and y and the length of the segments.

**skip #8**

9) \( \overline{YB} \) is an altitude of \( \triangle XYZ \), and \( \angle YBZ = (6x - 6)^\circ \). Find the value of x. What is the measure of \( \angle YBZ \)?

\[ 6x - 6 = 90 \]
\[ 6x = 96 \]
\[ x = 16 \]

10) In \( \triangle DEG \), \( \overline{FH} \) is a perpendicular bisector of \( \overline{DG} \) with H on \( \overline{DG} \). If \( DH = 2y + 3 \), \( GH = 7y - 42 \), and \( \angle FHG = (x^2 + 9)^\circ \), then find the value of x and y. What is the measure of \( \angle DG \)?

\[ 2y + 3 = 7y - 42 \]
\[ 45 = 5x \]
\[ 9 = y \]

\[ x^2 = 81 \]
\[ x = 9 \]

\[ DH = 2(4) + 3 = 21 \]

\[ DG = 2(9) = 18 \]
11) \( \overline{RS} \) is an altitude of \( \triangle RTE \), \( m \angle SRT = (4x - 8)° \), and \( m \angle STR = (6x + 13)° \). Find the value of \( x \).

\[
90 + 4x - 8 + 6x + 13 = 180
\]

\[
10x + 5 = 90
\]

\[
10x = 85
\]

\[
x = 8.5
\]

12) In \( \triangle RTE \), \( \overline{TA} \) bisects \( \angle RTE \), \( m \angle RTA = (3y - 4)° \), and \( m \angle ETA = (4y - 17)^° \). Find the measure of \( \angle RTE \).

\[
m \angle LRTA = 3(13) - 4 = 35°
\]

\[
m \angle RTE = 2(35) = 70°
\]

13) \( \overline{TA} \) is a median of \( \triangle RTE \), \( AE = 3x - 11 \), and \( AR = x + 5 \). Find \( AE, AR, \) and \( ER \).

\[
3x - 11 = x + 5
\]

\[
2x = 16
\]

\[
x = 8
\]

\[
AE = 3(8) - 11 = 13
\]

\[
AR = 13
\]

\[
ER = 0.5(13) = 6.5
\]

14) \( \overline{EY} \) is a median of \( \triangle RET \), \( RY = 2z - 1 \), and \( 7Y = 4z - 11 \). Find \( \overline{RT} \).

\[
2z - 1 = 4z - 11
\]

\[
10 = 2z
\]

\[
x = 5
\]

\[
RT = 2(2(5) = 10
\]

15) Find \( x \) and the measure of \( \angle PSR \), if \( \overline{PS} \) is a median.

\[
10x + 7 = 5x + 3
\]

\[
x = 10
\]

\[
PS = 2
\]

\[
m \angle PSR = 15(2) + 42
\]

16) Find \( x, CD, \) and \( DB \), if \( \overline{AD} \) is an altitude of \( \triangle ABC \).

\[
4x - 6 = 90
\]

\[
x = 24
\]

\[
4x = 96
\]

\[
CD = (2a) + 7 = 31
\]

\[
PB = 2(24) - 15 = 33
\]

17) \( \triangle WHA \), if \( \overline{WP} \) is a median and an angle bisector, \( AP = 3y + 11 \), \( PH = 7y - 5 \), \( m \angle HWP = x + 12 \), \( m \angle PAW = 3x - 2 \), and \( m \angle HWA = 4x - 16 \), find \( x \) and \( y \). Is \( \overline{WP} \) also an altitude, explain?

\[
7y - 5 = 3y + 11
\]

\[
y = 16
\]

\[
x = 4
\]

\[
2(x + 13) = 4x - 16
\]

\[
x = 2
\]

\[
40 = 2x
\]

\[
x = 20
\]

\[
\angle WPA = 3(20) + 12 = 84°
\]

\[
m \angle WPA = 180 - 72 - 58 = 46°
\]

\[
\text{YES}
\]