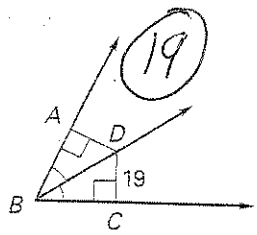
Adv. Geom. 5.3 Angle Bisectors

Key

1. Find AD.



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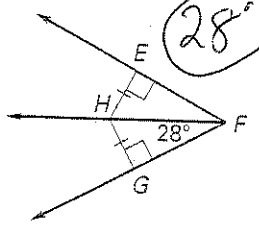
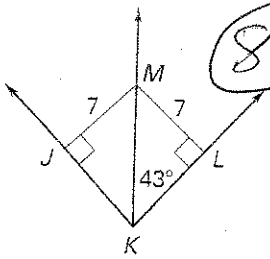
2. Find $m\angle EFH$.



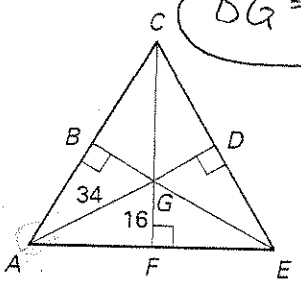
28°

3. Find $m\angle JKL$.



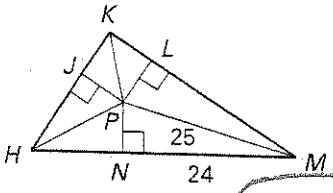
86°

13. Point G is the incenter of $\triangle ACE$. Find BG.



$BG = 16$

14. Point P is the incenter of $\triangle HKM$. Find JP.



$x^2 + 24^2 = 25^2$

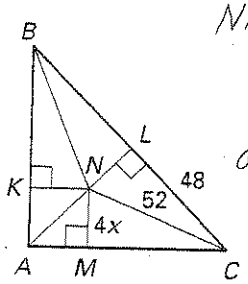
$x = 7$

$\overline{JP} = \overline{PN}$

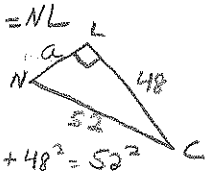
$JP = 7$

Find the value of x that makes N the incenter of the triangle.

15.



$NM = NL$



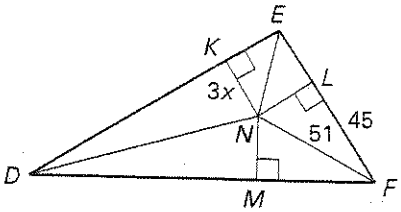
$a^2 + 48^2 = 52^2$

$a = 20$

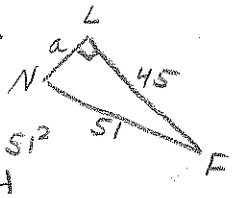
$4x = 20$

$x = 5$

16.



$NK = NL$



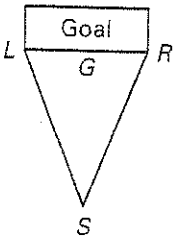
$a^2 + 45^2 = 51^2$

$a = 24$

$3x = 24$

$x = 8$

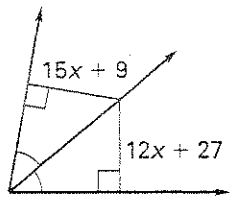
17. **Hockey** You and a friend are playing hockey in your driveway. You are the goalie, and your friend is going to shoot the puck from point S. The goal extends from left goalpost L to right goalpost R. Where should you position yourself (point G) to have the best chance to prevent your friend from scoring a goal? *Explain.*



We will get this answer in Class Monday. What do you think? why?

Find the value of x.

1.

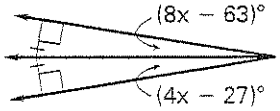


$15x + 9 = 12x + 27$

$3x = 18$

$x = 6$

2.

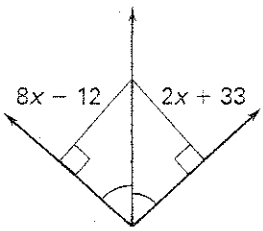


$8x - 63 = 4x - 27$

$4x = 36$

$x = 9$

3.



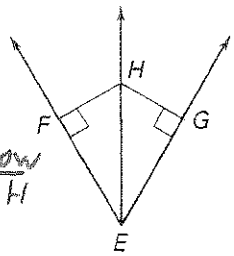
$8x - 12 = 2x + 33$

$6x = 45$

$x = \frac{45}{6} = \frac{15}{2} = 7.5$

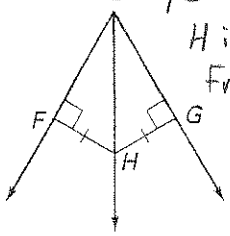
Can you conclude that $\overline{EH}$ bisects $\angle FEG$? Explain.

4.



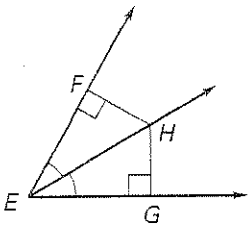
NO.
Don't know
$\overline{FH} \cong \overline{GH}$

5.



Yes.
H is equidistant From $\overrightarrow{EF}$ and $\overrightarrow{EG}$

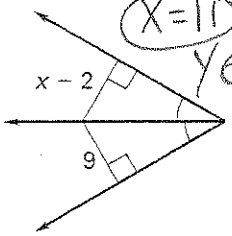
6.



Yes $\angle FEH \cong \angle GEH$

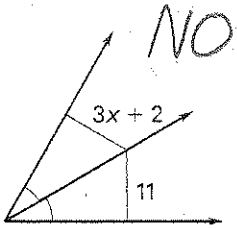
Can you find the value of x?

7.



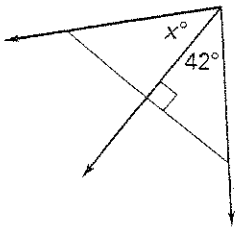
X=11
Yes

8.



NO

9.

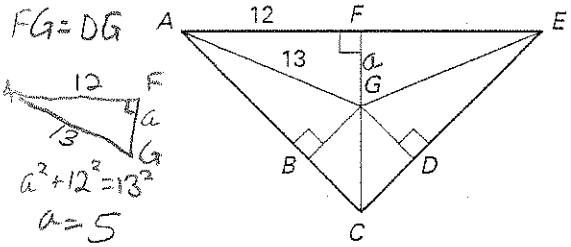


NO

Find the indicated measure.

10. Find DG. DG = 5

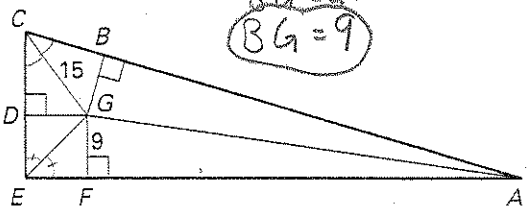
FG = DG



$a^2+12^2=13^2$
$a=5$

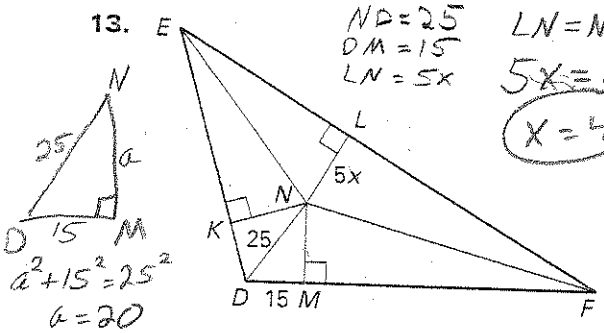
11. Find BG. Assume G is the incenter.

BG = GF
BG = 9



Find the value of x that makes N the incenter of the triangle.

13.

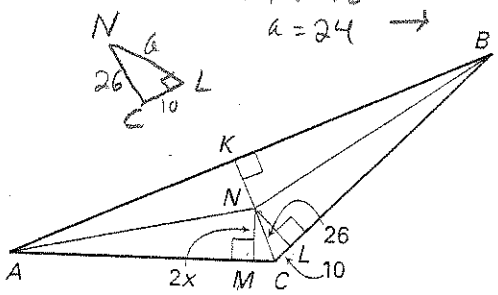


$a^2+15^2=25^2$
$a=20$

ND = 25
DM = 15
LN = 5x

LN = NM
5x = 20
x = 4

14.



$a^2+10^2=26^2$
$a=24$ →

NM = NL
2x = 24
x = 12

7.

For $\triangle ABC$ with vertices $A(x_1, y_1)$, $B(x_2, y_2)$, and $C(x_3, y_3)$, the coordinates of the incenter N is given by

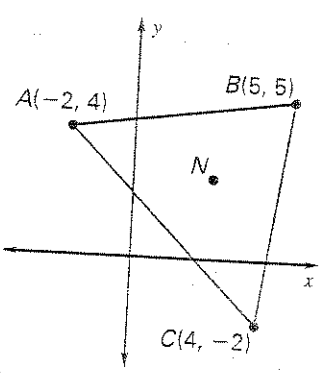
$$N\left(\frac{ax_1 + bx_2 + cx_3}{a+b+c}, \frac{ay_1 + by_2 + cy_3}{a+b+c}\right) =$$ See attached

where a is the length of $\overline{BC}$, b is the length of $\overline{CA}$, and c is the length of $\overline{AB}$.

$x = a = \sqrt{(5-4)^2+(5-2)^2} = \sqrt{1+49} = \sqrt{50} = 5\sqrt{2}$

$CA = b = \sqrt{(-2-4)^2+(4-2)^2} = \sqrt{36+36} = \sqrt{72} = 6\sqrt{2}$

$AB = c = \sqrt{(-2-5)^2+(4-5)^2} = \sqrt{49+1} = \sqrt{50} = 5\sqrt{2}$



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$$N\left(\frac{ax_1+bx_2+cx_3}{a+b+c}, \frac{ay_1+by_2+cy_3}{a+b+c}\right)$$

$a = 5\sqrt{2}$
$b = 6\sqrt{2}$
$c = 5\sqrt{2}$
$A(x_1, y_1) = A(-2, 4)$
$B(x_2, y_2) = B(5, 5)$
$C(x_3, y_3) = C(4, -2)$

$$N = \left(\frac{(5\sqrt{2})(-2)+(6\sqrt{2})(5)+(5\sqrt{2})(4)}{5\sqrt{2}+6\sqrt{2}+5\sqrt{2}}, \frac{(5\sqrt{2})(4)+(6\sqrt{2})(5)+(5\sqrt{2})(-2)}{5\sqrt{2}+6\sqrt{2}+5\sqrt{2}}\right)$$

$$N = \left(\frac{-10\sqrt{2}+30\sqrt{2}+20\sqrt{2}}{16\sqrt{2}}, \frac{20\sqrt{2}+30\sqrt{2}-10\sqrt{2}}{16\sqrt{2}}\right)$$

$$N = \left(\frac{40\sqrt{2}}{16\sqrt{2}}, \frac{40\sqrt{2}}{16\sqrt{2}}\right)$$

$$N = \left(\frac{40}{16}, \frac{40}{16}\right)$$

$$= \left(\frac{10}{4}, \frac{10}{4}\right)$$

$$N = (2.5, 2.5)$$