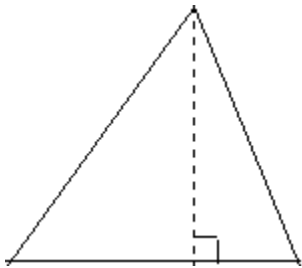


**For #1-7, fill in the correct answer.**

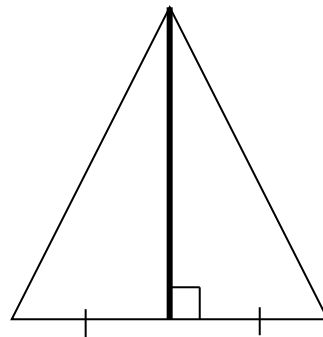
1. The point equidistant from the vertices of a triangle is the \_\_\_\_\_.
2. The distance from the vertex to the \_\_\_\_\_ is two thirds the length of the median.
3. The point of concurrency for the medians is called the \_\_\_\_\_.
4. The point of concurrency for the perpendicular bisectors is called the \_\_\_\_\_.
5. The point of concurrency for the lines containing the altitudes is called the \_\_\_\_\_.
6. The point of concurrency for the angle bisectors is called the \_\_\_\_\_.
7. The point equidistant from the sides of the triangle is the \_\_\_\_\_.

**For #8-13, identify the type of segment in each triangle.**

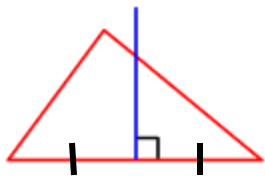
8.



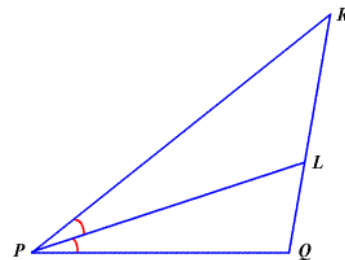
9.

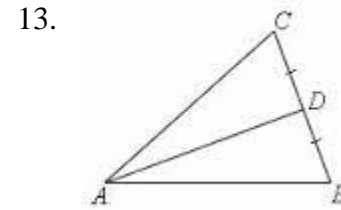
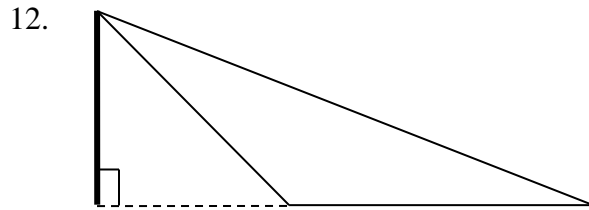


10.



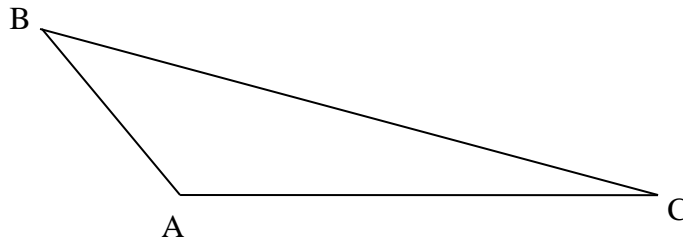
11.



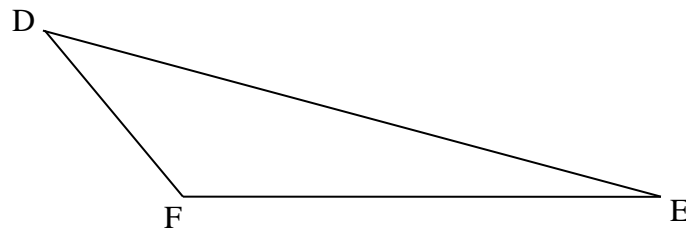


**For #14 & 16, use a ruler to draw the indicated segments of the triangle. You must be accurate and show all correct markings.**

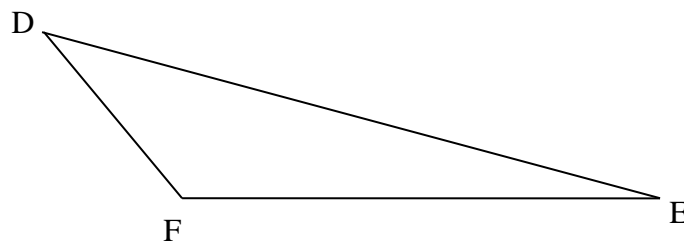
14. Perpendicular bisector of  $\overline{BC}$ .



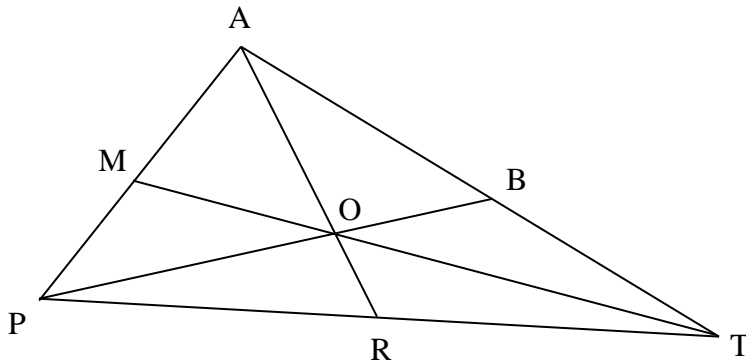
15. Altitude from D to  $\overline{EF}$ .



16. Median from F to  $\overline{DE}$ .



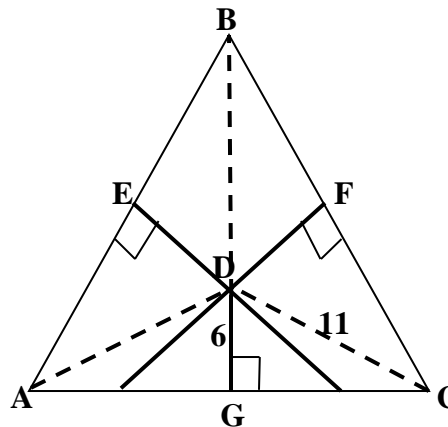
Use the following diagram for #17-21. T is the centroid of  $\triangle PAT$ .



17. If  $PB = 27$ , then  $PO =$  \_\_\_\_\_.
18. If  $AO = 14$ , then  $OR =$  \_\_\_\_\_.
19. If  $BO = 5$ , then  $BP =$  \_\_\_\_\_.
20. If  $TO = 16$ , then  $TM =$  \_\_\_\_\_.
21. If  $RO = 3$ , then  $OA =$  \_\_\_\_\_.

Use the following diagram for #22 - 24. Point D is the circumcenter of  $\triangle ABC$ .  
 $DC = 11$ ,  $DG = 6$

22.  $GC =$  \_\_\_\_\_
23.  $AC =$  \_\_\_\_\_
24.  $BD =$  \_\_\_\_\_

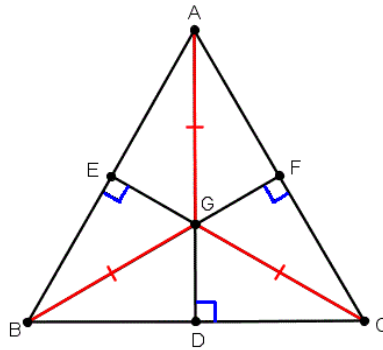


Use the following diagram for #25 - 27. Point G is the incenter of  $\triangle ABC$ .  
 $DC = 4$ ,  $GF = 5$ ,  $m\angle ABC = 50^\circ$

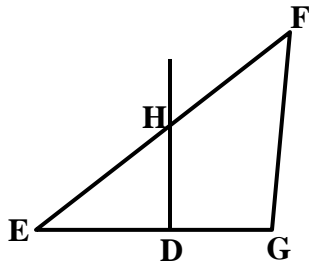
25.  $BC =$  \_\_\_\_\_

26.  $m\angle ABF =$  \_\_\_\_\_

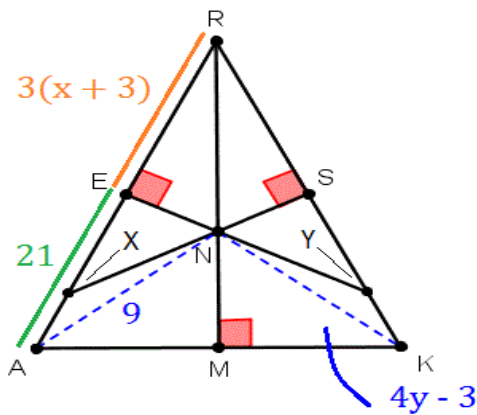
27.  $GE =$  \_\_\_\_\_



28. In  $\triangle EFG$ ,  $\overline{DH}$  is a perpendicular bisector of  $\overline{EG}$  with D on  $\overline{EG}$ . If  $ED = 7x + 10$ ,  $GD = 9x - 2$ , and  $m\angle HDG = (4y + 2)^\circ$ . Find the value of x and y. Show work.



29. N is the circumcenter of  $\triangle ARK$ .



$ER =$  \_\_\_\_\_

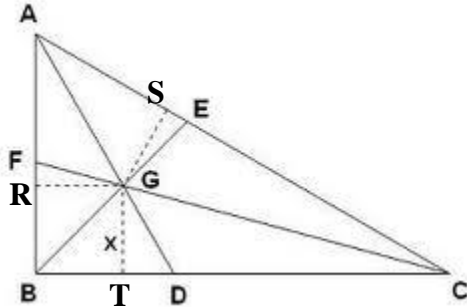
$x =$  \_\_\_\_\_

$KN =$  \_\_\_\_\_

$RN =$  \_\_\_\_\_

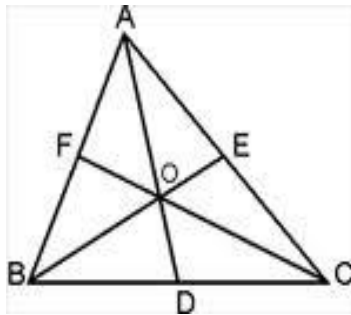
$y =$  \_\_\_\_\_

30.  $G$  is the incenter of  $\triangle ABC$ .  $\overline{GR} \perp \overline{AB}$ ,  $\overline{GT} \perp \overline{BC}$ ,  $\overline{GS} \perp \overline{AC}$ ;  $GR = 7$ , and  $m\angle BAC = 60^\circ$ .



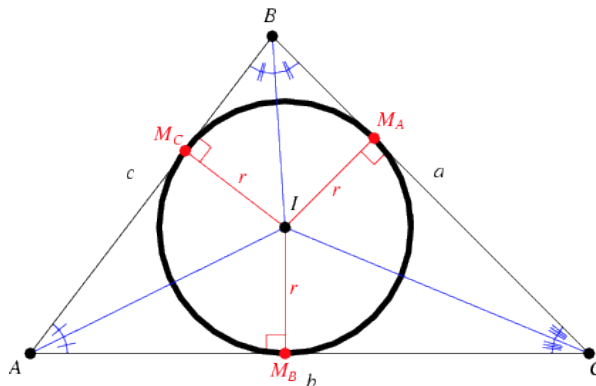
$GT =$  \_\_\_\_\_       $m\angle BAG =$  \_\_\_\_\_

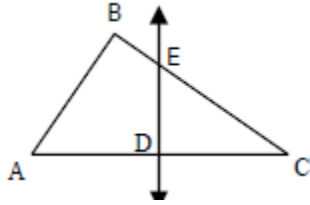
31.  $O$  is the centroid of  $\triangle ABC$ . Each question is unrelated to the previous question.



- If  $CO = 6$ , then  $OF =$  \_\_\_\_\_.
- If  $AD = 12$ , then  $AO =$  \_\_\_\_\_ and  $OD =$  \_\_\_\_\_.
- If  $BF = 4$ , then  $AF =$  \_\_\_\_\_.
- If  $OE = 5$ , then  $BO =$  \_\_\_\_\_.

32.  $I$  is the incenter of  $\triangle ABC$ . Let  $m\angle ABC = (6x - 4)^\circ$  and  $m\angle ABI = (2x + 10)^\circ$ . Find  $x$  and the  $m\angle CBI$ .

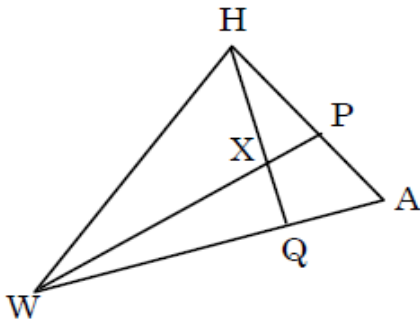




In  $\triangle ABC$ ,  $\overline{DE}$  is a perpendicular bisector of  $\overline{AC}$  with D on  $\overline{AC}$ .

33. If  $m\angle EDC = (2y + 12)^\circ$ . Find the value of  $y$ .

34. If  $AD = 2x + 6$  and  $DC = 4x - 42$ . Find the value of  $x$ .



35.  $\overline{WP}$  is a median and an angle bisector of  $\triangle HWA$ .

$m\angle HWP = (2x - 3)^\circ$  and  $m\angle HWA = (6x - 26)^\circ$ . Find  $x$ .