

Name _____ Date _____ Class Period _____

Point of Concurrency Worksheet

Give the name the **point of concurrency** for each of the following.

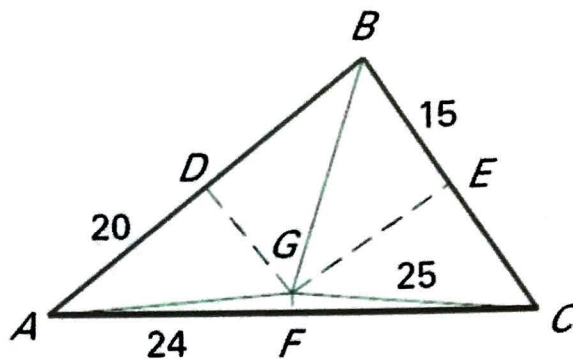
1. **Angle Bisectors** of a Triangle _____
2. **Medians** of a Triangle _____
3. **Altitudes** of a Triangle _____
4. **Perpendicular Bisectors** of a Triangle _____

Complete each of the following statements.

5. The **incenter** of a triangle is equidistant from the _____ of the triangle.
6. The **circumcenter** of a triangle is equidistant from the _____ of the triangle.
7. The **centroid** is _____ of the distance from each vertex to the midpoint of the opposite side.
8. To **inscribe** a circle about a triangle, you use the _____
9. To **circumscribe** a circle about a triangle, you use the _____
10. Complete the following chart. Write if the point of concurrency is *inside*, *outside*, or *on the triangle*.

	Acute Δ	Obtuse Δ	Right Δ
Circumcenter			
Incenter			
Centroid			
Orthocenter			

In the diagram, the perpendicular bisectors (shown with dashed segments) of $\triangle ABC$ meet at point G —the circumcenter. and are shown dashed. Find the indicated measure.



11. $AG =$ _____ 12. $BD =$ _____

13. $CF =$ _____ 14. $AB =$ _____

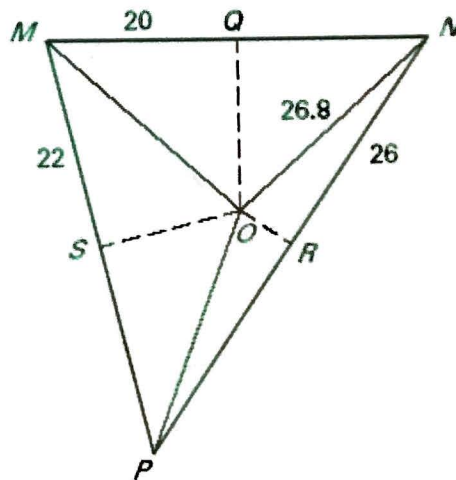
15. $CE =$ _____ 16. $AC =$ _____

17. $m\angle ADG =$ _____

18. If $BG = (2x - 15)$, find x .

$x =$ _____

In the diagram, the perpendicular bisectors (shown with dashed segments) of $\triangle MNP$ meet at point O —the circumcenter. Find the indicated measure.



19. $MO =$ _____ 20. $PR =$ _____

21. $MN =$ _____ 22. $SP =$ _____

23. $m\angle MQO =$ _____

24. If $OP = 2x$, find x .

$x =$ _____

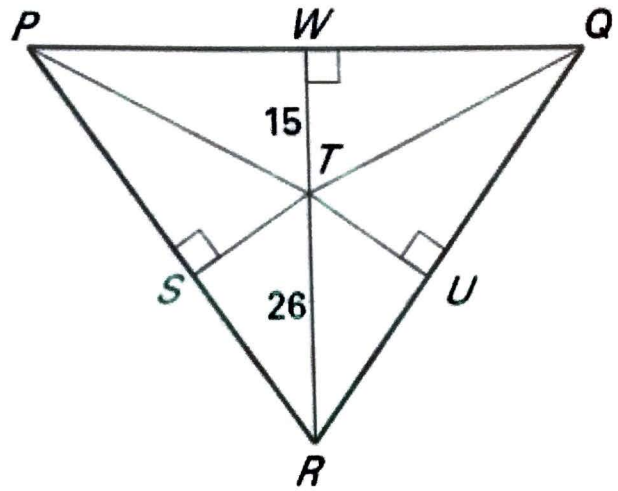
Point T is the incenter of $\triangle PQR$.

25. If Point T is the *incenter*, then Point T is the point of concurrency of

the _____.

26. $ST =$ _____

27. If $TU = (2x - 1)$, find x .



$x =$ _____

28. If $m\angle PRT = 24^\circ$, then $m\angle QRT =$ _____

29. If $m\angle RPQ = 62^\circ$, then $m\angle RPT =$ _____

Point G is the centroid of $\triangle ABC$, $AD = 8$, $AG = 10$, $BE = 10$, $AC = 16$ and $CD = 18$. Find the length of each segment.

30. If Point G is the *centroid*, then Point T is the point of concurrency of

the _____.

31. $DB =$ _____

32. $EA =$ _____

33. $CG =$ _____

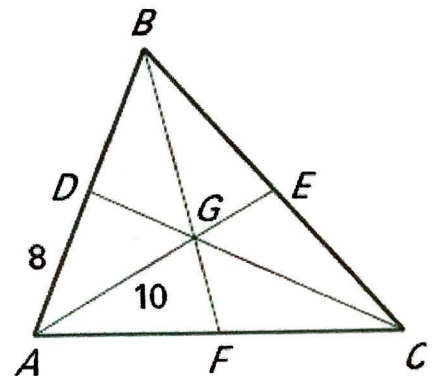
34. $BA =$ _____

35. $GE =$ _____

36. $GD =$ _____

37. $BC =$ _____

38. $AF =$ _____



Point of Concurrency Worksheet

Give the name the point of concurrency for each of the following.

1. Angle Bisectors of a Triangle Incenter
2. Medians of a Triangle Centroid
3. Altitudes of a Triangle Orthocenter
4. Perpendicular Bisectors of a Triangle Circumcenter

Complete each of the following statements.

5. The **incenter** of a triangle is equidistant from the sides of the triangle.
6. The **circumcenter** of a triangle is equidistant from the vertices of the triangle.
7. The **centroid** is $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.
8. Complete the chart. Write if the point of concurrency is inside, outside, or on the triangle.

HINT: On separate paper, draw the various Δ 's and experiment with the various special segments to determine where each point of concurrency exists.

	Acute Δ	Obtuse Δ	Right Δ
\perp Bisec	Inside	Outside	ON (hypotenuse)
\angle Bisec	Inside	Inside	Inside
Medians	Inside	Inside	Inside
Altitude	Inside	Outside	ON (Right \angle vertex)

In the diagram, point G is the circumcenter of ΔABC . Find the indicated measures.

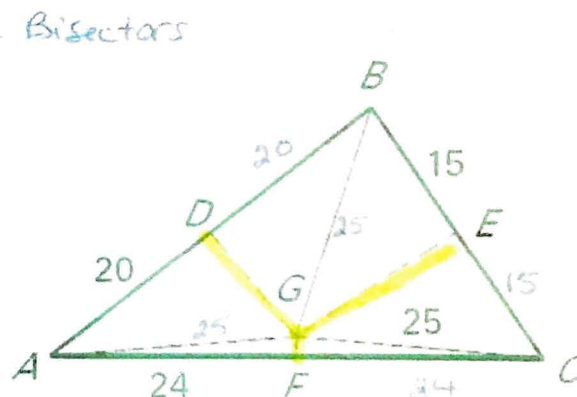
9. $AG =$ 25
10. $BD =$ 20
11. $CF =$ 24
12. $AB =$ 40
13. $CE =$ 15
14. $AC =$ 48
15. $m\angle ADG =$ 90°
16. If $BG = x^2 - 24x$, find the value of x.

$$x^2 - 24x = 25$$

$$x^2 - 24x - 25 = 0$$

$$(x - 29)(x - 1) = 0$$

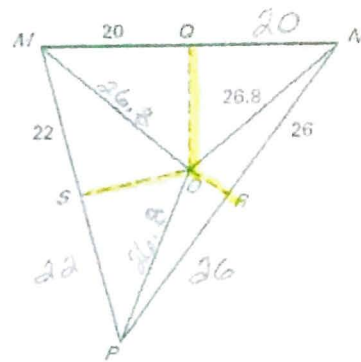
$$x = 29 \quad x = 1$$



⊥ Bisectors

In the diagram, point O is the circumcenter of $\triangle MNP$. Find the indicated measures.

17. $MO = \underline{26.8}$ 18. $PR = \underline{26}$
 19. $MN = \underline{40}$ 20. $SP = \underline{22}$
 21. $m\angle MQO = \underline{90}$
 22. If $OP = 6x - 5$, find x.



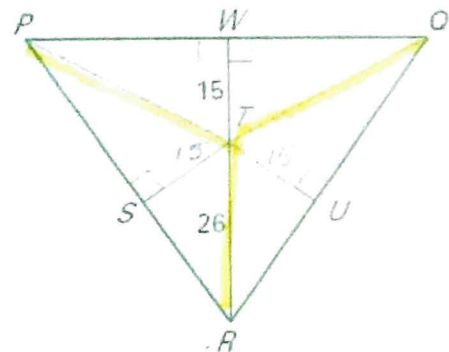
$6x - 5 = 26.8$
 $6x = 31.8$
 $x = 5.3$

Point T is the incenter of $\triangle PQR$. Find the indicated measures.

23. $ST = \underline{15}$
 24. If $TU = x^2 + 2x$, find x.
 25. If $m\angle PRT = 24^\circ$, then $m\angle QRT = \underline{24^\circ}$
 26. If $m\angle RPQ = 62^\circ$, then $m\angle RPT = \underline{31^\circ}$

∠ Bisector

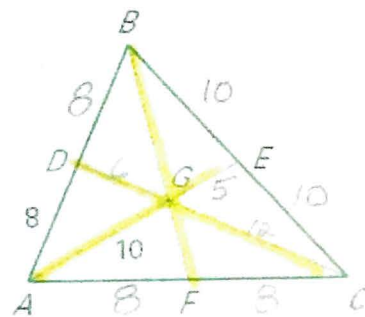
$x^2 + 2x = 15$
 $x^2 + 2x - 15 = 0$
 $(x+5)(x-3) = 0$
 $x = -5$ $x = 3$



Point G is the centroid of $\triangle ABC$, $AD = 8$, $AG = 10$, $BE = 10$, $AC = 16$ and $CD = 18$. Find the length of each segment.

Medians

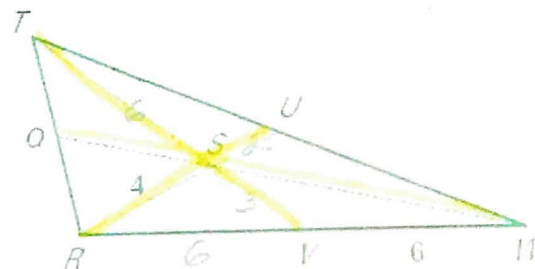
27. $DB = \underline{8}$ 28. $EA = \underline{15}$
 29. $CG = \underline{12}$ 30. $BA = \underline{16}$
 31. $GE = \underline{5}$ 32. $GD = \underline{6}$
 33. $BC = \underline{20}$ 34. $AF = \underline{8}$



Point S is the centroid of $\triangle RTW$, $RS = 4$, $VW = 6$, and $TV = 9$. Find the length of each segment.

35. $RV = \underline{6}$ 36. $SU = \underline{2}$
 37. $RU = \underline{6}$ 38. $RW = \underline{12}$
 39. $TS = \underline{6}$ 40. $SV = \underline{3}$

Medians



Point G is the centroid of $\triangle ABC$. Use the given information to find the value of the variable.

41. $FG = x + 8$ and $GA = 6x - 4$
 42. If $CG = 3y + 7$ and $CE = 6y$

(4) $GA = 2FG$
 $6x - 4 = 2(x + 8)$
 $6x - 4 = 2x + 16$
 $4x = 20$
 $x = 5$

(4) $CG = 2CE$
 $3y + 7 = 2(6y)$
 $3y + 7 = 12y$
 $-9y = -7$
 $y = 7/9$

