

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. $BD =$ _____

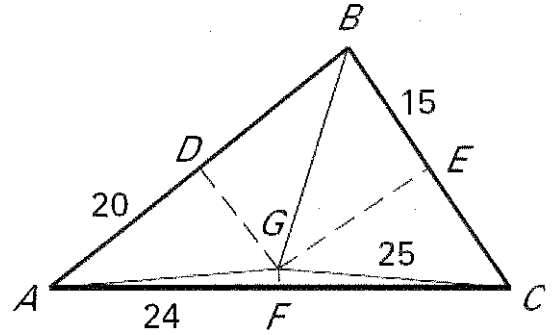
13. $CF =$ _____ 14. $AB =$ _____

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.

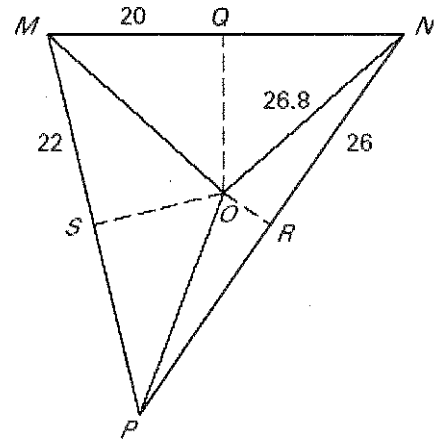
19. $MO =$ _____ 20. $PR =$ _____

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

23. $m\angle MQO =$ _____

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

$x =$ _____



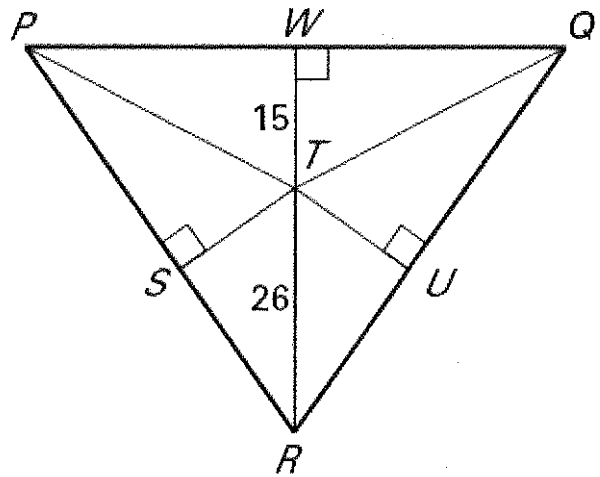
Point T is the incenter of $\triangle PQR$.

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

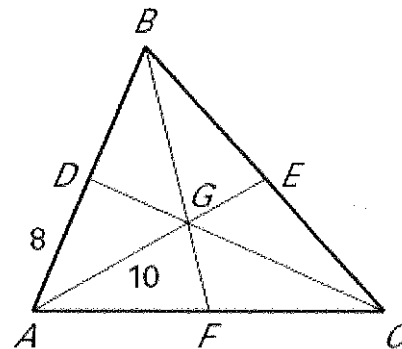
the _____.

31. $DB =$ _____ 32. $EA =$ _____

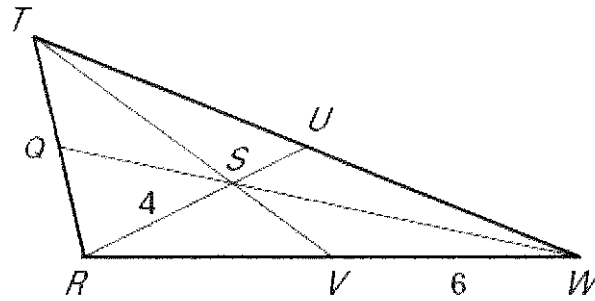
33. $CG =$ _____ 34. $BA =$ _____

35. $GE =$ _____ 36. $GD =$ _____

37. $BC =$ _____ 38. $AF =$ _____



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



39. $RV =$ _____

40. $SU =$ _____

41. $RU =$ _____

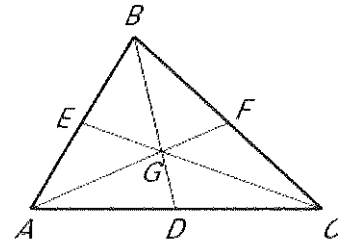
42. $RW =$ _____

43. $TS =$ _____

44. $SV =$ _____

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

45. $FG = x + 8$ and $GA = 6x - 4$



$x =$ _____

46. If $CG = 3y + 7$ and $CE = 6y$

$y =$ _____

Calculating points of Concurrency: What's the point?

Circumcenter

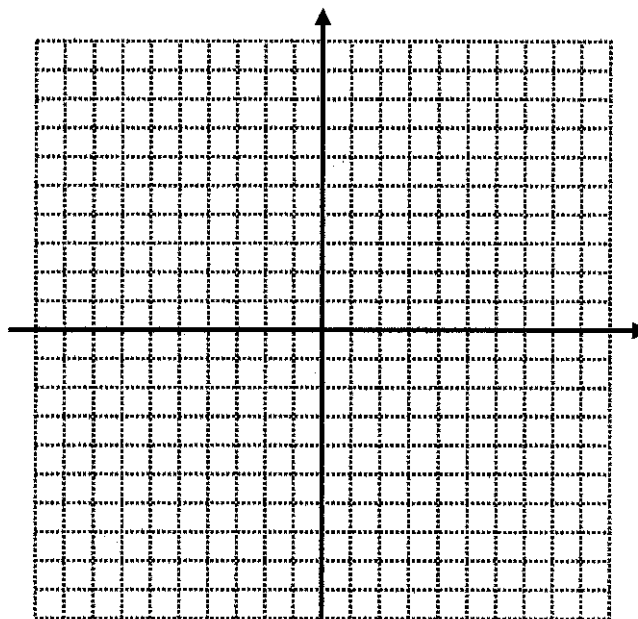
1. Plot the points $A(-4, -2)$, $B(0, 2)$, $C(4, -4)$. Draw $\triangle ABC$.

a. Calculate the midpoint of \overline{AB} .

b. Find the slope of \overline{AB} .

c. What is the slope of the perpendicular bisector of \overline{AB} .

d. Write and graph the equation of the line containing perpendicular bisector of \overline{AB} .



e. Follow the same steps to write and graph the equation of the line containing perpendicular bisector of \overline{AC} .

f. Calculate the circumcenter (point D) of $\triangle ABC$. Plot and label the point on the graph. Check by constructing a circumscribed circle.

Orthocenter

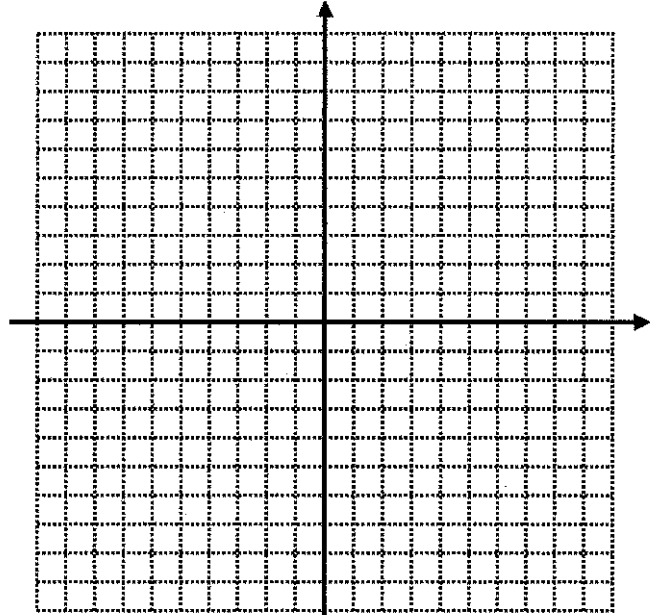
2. Plot the points $A(-2, 2)$, $B(4, 4)$, $C(2, -2)$. Draw triangle $\triangle ABC$.

a. Find the slope of \overline{AB} .

b. What is the slope of altitude \overline{CD} ?

c. Write and graph the equation of the line containing altitude \overline{CD} .

d. Follow the same steps to write and graph the equation of the line containing altitude \overline{BE} .



e. Calculate the orthocenter (point G) of $\triangle ABC$. Plot and label the point on the graph.

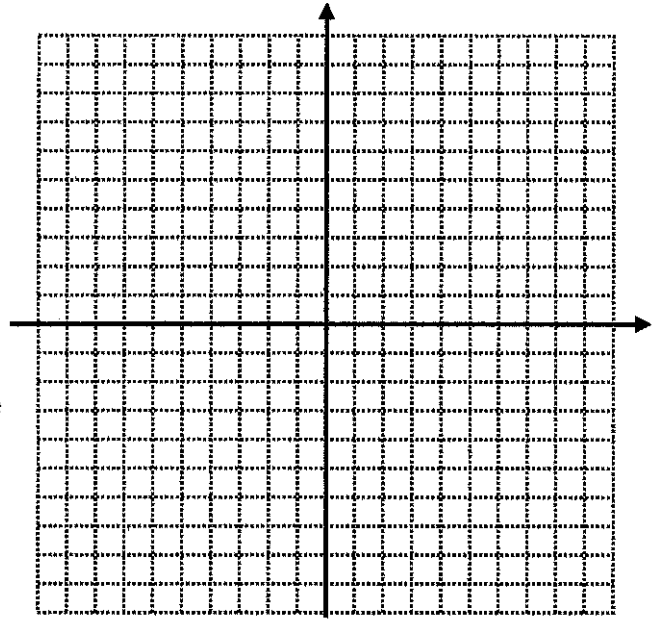
f. Find the equation of the line containing altitude \overline{AF} . Your orthocenter should be on that line as well. Substitute your point into this equation to check that it works.

Centroid

3. Plot the points $A(0, -6)$, $B(-10, -6)$, $C(1, 0)$. Draw $\triangle ABC$.

a. Find the midpoint of \overline{AB} and label that point D.

b. Write and graph the equation of the line containing median \overline{CD} .



c. Follow the same steps to write and graph the equation of the line containing the median \overline{AE} .

d. Calculate the centroid (point F) of $\triangle ABC$. Plot and label the point on the graph. Find the average of your x's and the average of your y's. Do your calculations match?

e. Two vertices of a triangle are $(0, 0)$ and $(9, 0)$. The centroid is $(6, 1)$. Find the third vertex of the triangle.

f. Connect the midpoints of each side of the triangle to form a smaller triangle within the original triangle. Find the coordinates of the centroid of the smaller triangle. What happened and why?

