Name Key Date _____ Class Period _____

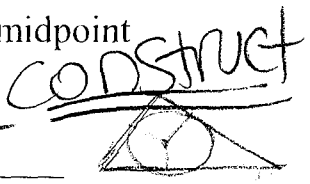
Point of Concurrency Worksheet

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

1. Angle Bisectors of a Triangle 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 2/3 of the distance from each vertex to the midpoint of the opposite side.



8. To ***inscribe*** a circle about a triangle, you use the incenter
9. To ***circumscribe*** a circle about a triangle, you use the circumcenter

10. **Complete the following chart. Write if the point of concurrency is *inside*, *outside*, or *on the triangle*.**

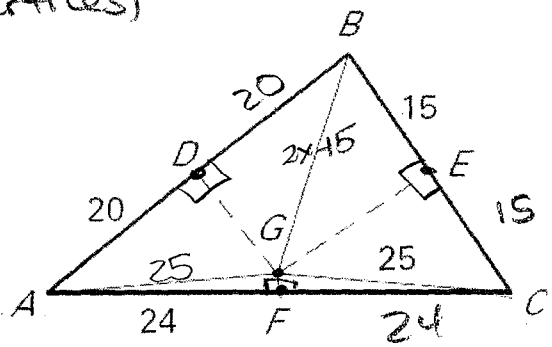
	Acute Δ	Obtuse Δ	Right Δ
Circumcenter	inside	outside	on
Incenter	inside	inside	inside
Centroid	inside	inside	inside
Orthocenter	inside	outside	on

midpt of hyp.

rt Δ

CONSTRUCT

In the diagram, the perpendicular bisectors (shown with dashed segments) of ΔABC meet at point G--the *circumcenter*. and are shown dashed. Find the indicated measure. (equi from vertices)



11. AG = 25 12. BD = 20

13. CF = 24 14. AB = 40

15. CE = 15 16. AC = 48

17. m∠ADG = 90°

18. IF BG = (2x – 15), find x.

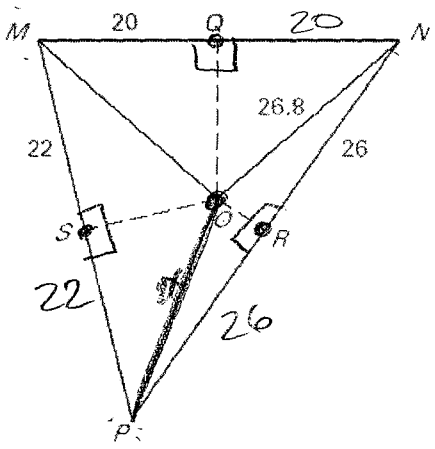
$2x-15=25$

$2x=40$

$x=20$

x = 20

In the diagram, the perpendicular bisectors (shown with dashed segments) of ΔMNP meet at point O—the *circumcenter*. Find the indicated measure.



19. MO = 26.8 20. PR = 26

21. MN = 40 22. SP = 22

23. m∠MQO = 90°

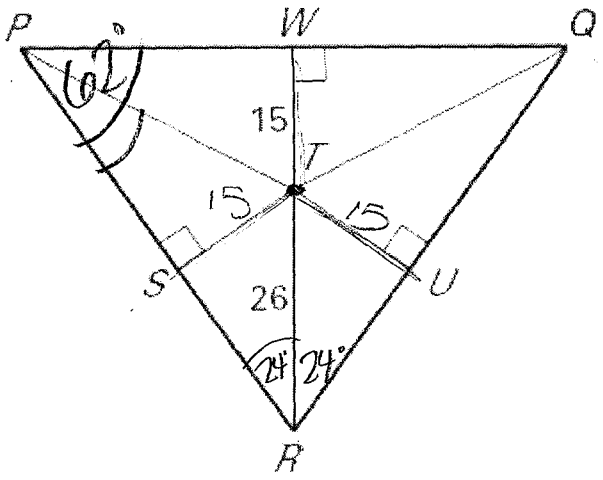
24. If OP = 2x, find x.

$\frac{2x}{2}=\frac{26.8}{2}$

x = 13.4

Point *T* is the *incenter* of ΔPQR.

(equi from sides)



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

the 4 bisectors.

26. ST = 15

27. If TU = (2x – 1), find x.

$2x-1=15$

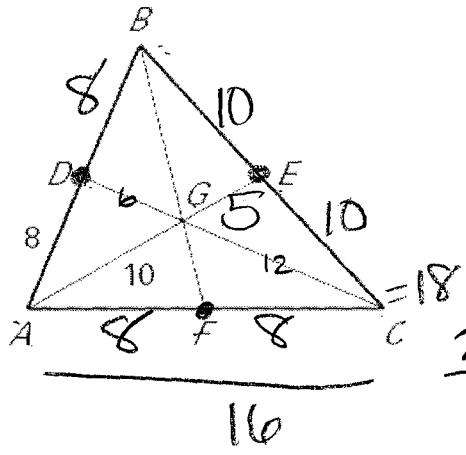
$2x=16$

x = 8

28. If $m\angle PRT = 24°$, then $m\angle QRT =$ 24°

29. If $m\angle RPQ = 62°$, then $m\angle RPT =$ 31°

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



$\frac{2}{3}(18)=12$

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

the medians.

31. DB = 8

32. EA = 15

33. CG = 12

34. BA = 16

35. GE = 5

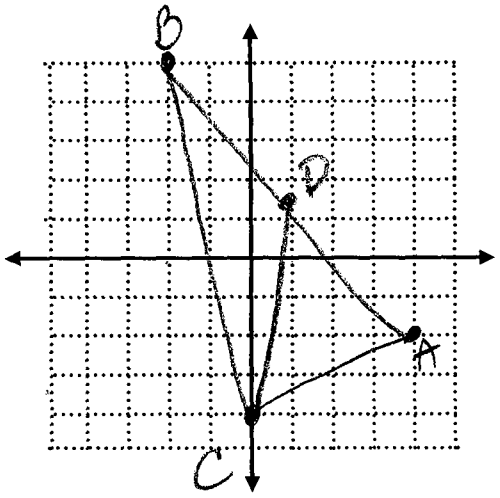
36. GD = 6

37. BC = 20

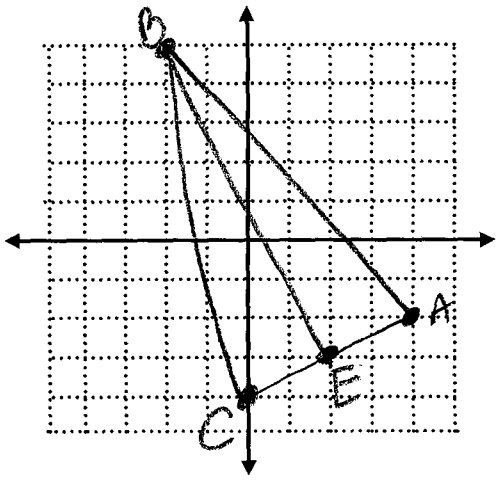
38. AF = 8

39. Graph ΔABC on **both** grids below using the points A(4, -2), B(-2, 5), and C(0, -4).

a.



b.



40. Using the graph in 39a, find the midpoint of $\overline{AB}$. (Hint: Midpoint Formula is on your chapter 1 theorems.) Label this point D on graph 39a. Connect point D to C. What special segment is $\overline{CD}$?

midpoint of $\overline{AB}$ = (1 , 3/2) $\overline{CD}$ is a median

41. Using the graph in 39b, find the midpoint of CA. Label this point E on graph 39b. Connect point E to point B. Now, find the slope of $\overline{BE}$ and $\overline{AC}$. What kinds of lines are $\overline{BE}$ and $\overline{AC}$? Name the three special segments that $\overline{BE}$ could be.

$m(BE) = \frac{5+3}{-2-2} = \frac{8}{-4} = -2$

midpoint of $\overline{CA}$ = (2 , -3) E slope of $\overline{BE}$ = −2 slope of $\overline{AC}$ = 1/2 $m(AC) = \frac{-4+2}{0-4} = \frac{-2}{-4} = \frac{1}{2}$

$\overline{BE}$ and $\overline{AC}$ are ⊥ lines.

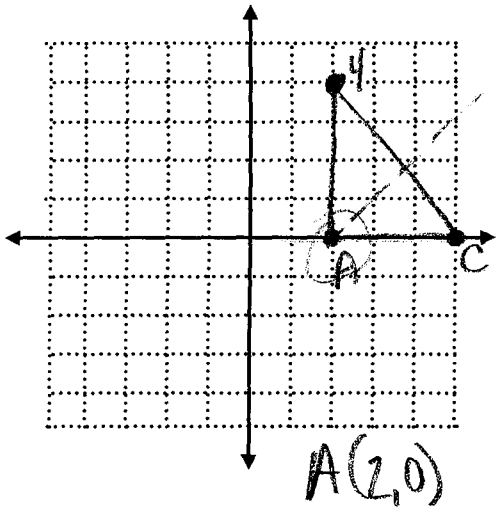
$\overline{BE}$ could be an altitude, ⊥ bisector, median or ∠ bisector (b/c isosceles?)

Find the orthocenter of ΔABC.

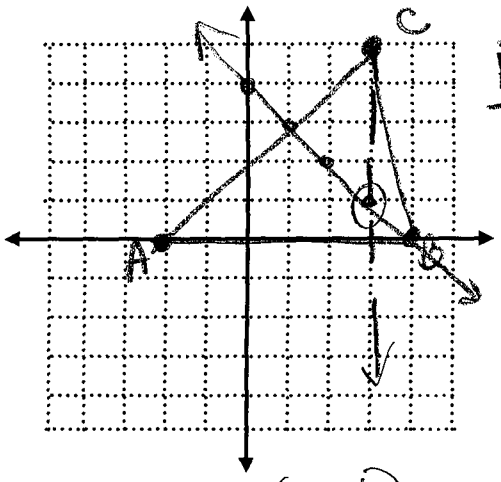
$d(AB) = \sqrt{(4+2)^2+(-2-5)^2} = \sqrt{36+49} = \sqrt{85}$ ✓

$d(CB) = \sqrt{(-2-0)^2+(5+4)^2} = \sqrt{4+81} = \sqrt{85}$

42. $A(2, 0), B(2, 4), C(5, 0)$



43. $A(-2, 0), B(4, 0), C(3, 5)$



Alt. From B: (4,0)

$m(AC) = \frac{5-0}{3+2} = \frac{5}{5} = 1$

$m_{\perp} = -1$

$y - 0 = -1(x - 4)$

$y = -x + 4$