

## 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

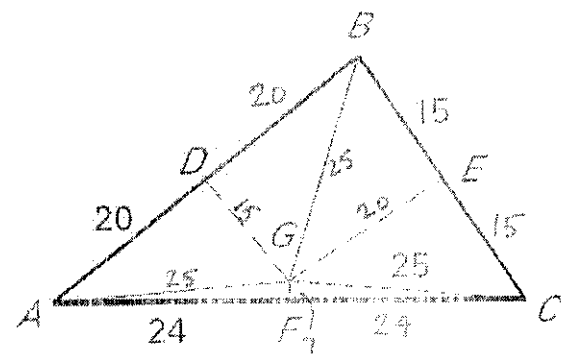
Complete each of the following statements.

5. The *incenter* of a triangle is equidistant from the sides of the triangle.
6. The *circumcenter* of a triangle is equidistant from the angles of the triangle.
7. The *centroid* is  $\frac{2}{3}$  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 $\Delta$	Obtuse $\Delta$	Right $\Delta$
Circumcenter	inside	outside	on
Incenter	inside	inside	inside
Centroid	inside	inside	inside
Orthocenter	inside	outside	on

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.

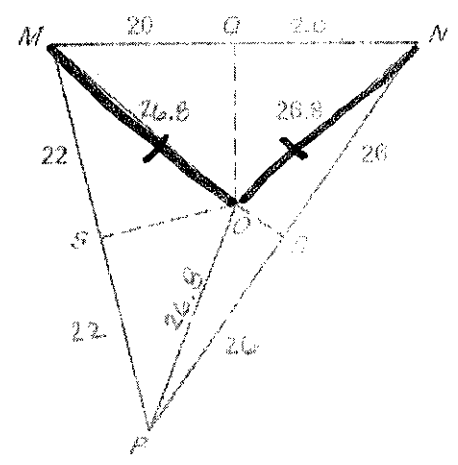
- 11.  $AG =$  25
- 12.  $BD =$  20
- 13.  $CF =$  24
- 14.  $AB =$  40
- 15.  $CE =$  15
- 16.  $AC =$  48
- 17.  $m\angle ADG =$   $90^\circ$



- 18. If  $BG = (2x - 15)$ , find  $x$ .  $BG = 25$
- $$2x - 15 = 25$$
- $$2x = 40$$
- $$x = 20$$
- $x =$  20

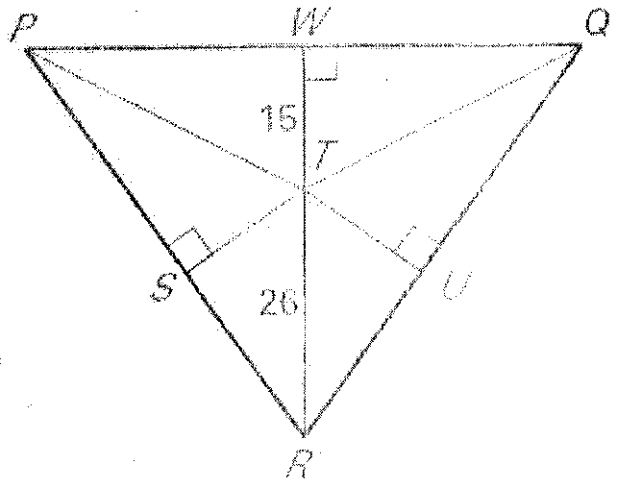
In the diagram, the perpendicular bisectors (shown with dashed segments) of  $\triangle MNP$  meet at point  $O$ —the *circumcenter*. Find the indicated measure.

- 19.  $MO =$  26.8
- 20.  $PR =$  26
- 21.  $MN =$  40
- 22.  $SP =$  22
- 23.  $m\angle MQO =$   $90^\circ$
- 24. If  $OP = 2x$ , find  $x$ .  $OP = 26.8$



- $$2x = 26.8$$
- $$x = 13.4$$
- $x =$  13.4

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 angle bisectors.

26.  $ST =$  15

27. If  $TU = (2x - 1)$ , find  $x$ .  $TU = 15$

$$2x - 1 = 15$$

$$2x = 16$$

$$x = 8$$

$x =$  8

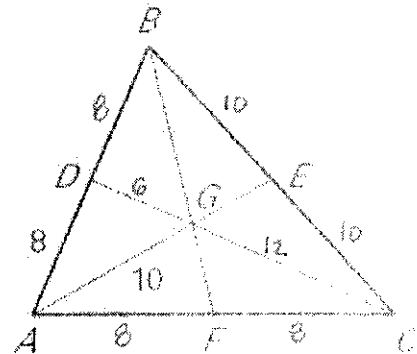
28. If  $m\angle PRT = 24^\circ$ , then  $m\angle QRT =$   $24^\circ$

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

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  $G$  is the point of concurrency of

the medians.



31.  $DB =$  8

32.  $EA =$  15

33.  $CG =$  12

34.  $BA =$  16

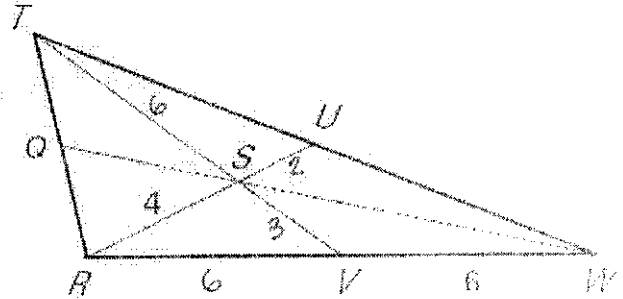
35.  $GE =$  5

36.  $GD =$  6

37.  $BC =$  20

38.  $AF =$  8

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



39.  $RV = \underline{6}$   
 40.  $SU = \underline{2}$   
 41.  $RU = \underline{6}$   
 42.  $RW = \underline{12}$   
 43.  $TS = \underline{6}$   
 44.  $SV = \underline{3}$

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

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

$FG$  is half of  $GA$

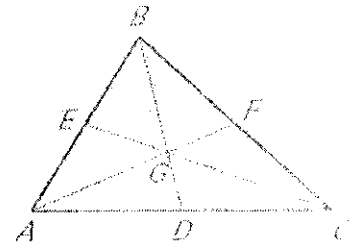
$$FG = \frac{GA}{2}$$

$$x + 8 = \frac{6x - 4}{2} \rightarrow x + 8 = 3x - 2$$

$$10 = 2x$$

$$x = 5$$

$x = \underline{5}$



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

$CG$  is two-thirds of  $CE$

$$CG = \frac{2}{3} \cdot CE$$

$$3y + 7 = \frac{2}{3} \cdot 6y$$

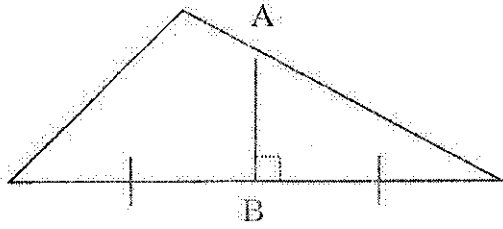
$y = \underline{7}$

$$3y + 7 = 4y$$

$$y = 7$$

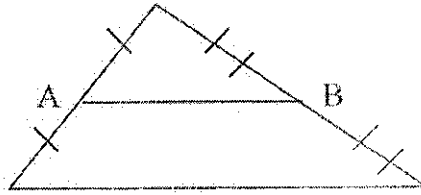
Is segment AB a midsegment, perpendicular bisector, angle bisector, median, altitude, or none of these?

47)



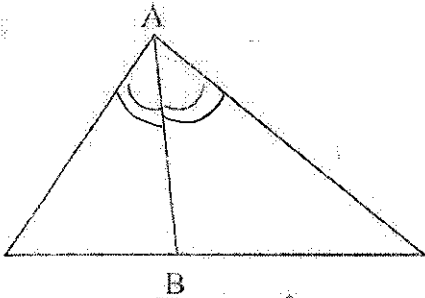
perpendicular bisector

48)



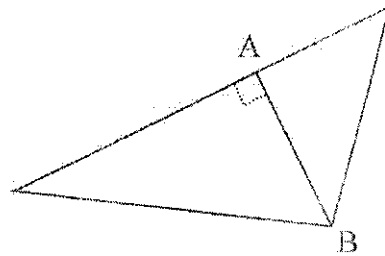
midsegment

49)



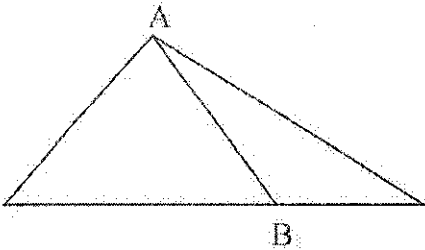
angle bisector

50)



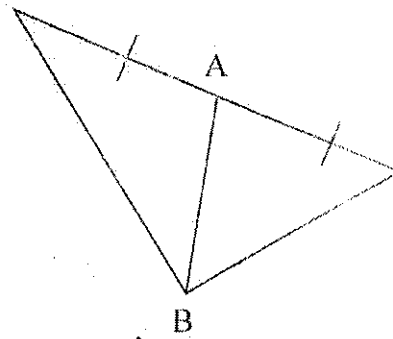
altitude

51)



none

52)



median