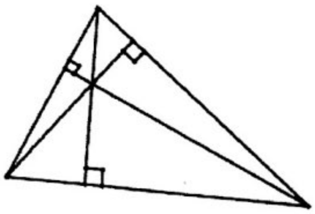
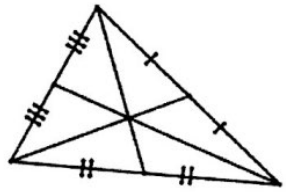
Geometry – Points of Concurrency Worksheet Name: ______________________ Period: ______

In each figure below, tell what point of concurrency is shown and what constructions form that point:



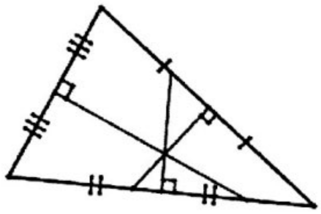
Point: ORTHOCENTER

Formed by: ALTITUDE



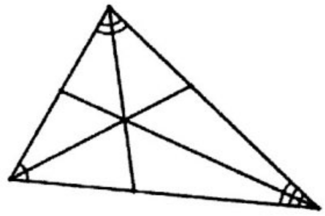
Point: CENTROID

Formed by: MEDIANS



Point: CIRCUMCENTER

Formed by: ⊥ BISECTOR



Point: INCENTER

Formed by: ∠ BISECTOR

Important Questions (REFER TO PAGE 311 and 322)

1. Which points of concurrency are always inside the triangle? INCENTER (PG 313) & CENTROID (P

2. Which point of concurrency is always on the vertex of a right triangle? ORTHOCENTER (PG 322)

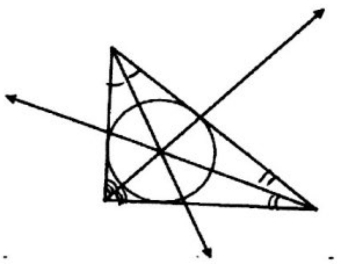
3. Which point of concurrency is always on the midpoint of the hypotenuse in a right triangle? CIRCUMCEN

4. Which points of concurrency are always outside of an obtuse triangle? ORTHOCENTER & CIRCUMCENTER (PG3 (PG3

5. BONUS: Which point of concurrency is the center of gravity in a triangle? CENTROID

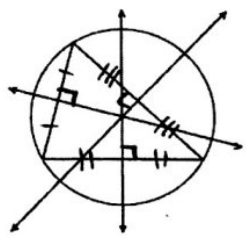
6. Which point of concurrency is equidistant from every vertex? CIRCUMCENTER

7. BONUS: Which point of concurrency is the center of an inscribed circle as shown below?
INCENTER
ANGLE BISECTORS



8. BONUS: Which point of concurrency is the center of a circumscribed circle as shown below?
CIRCUMCENTER

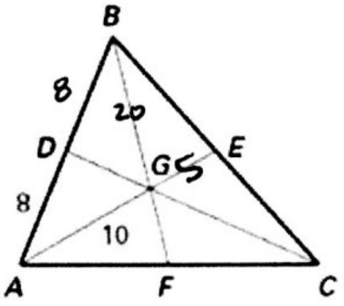
⊥ BISECTORS



Point G is the Centroid of ΔABC. AD = 8, AG = 10, and CD = 18. Find the length of the given segment.

$\overline{BD}$ 8

$\overline{AE}$ 15



$\overline{AB}$ 16

$\overline{CG}$ 12

CD = 18
÷ 3
GD = 6

$\overline{EG}$ 5

$\overline{DG}$ 6

D is the centroid of ΔABC, $\overline{AE}$ = 12, $\overline{AD}$ = 10, $\overline{CF}$ = 12. Find the length of each segment.

0.

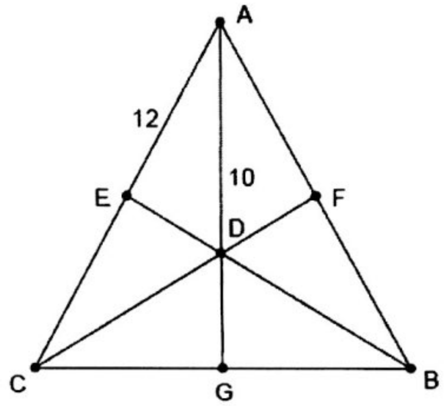
$\overline{DG}$ 5

$\overline{AG}$ 15

$\overline{EC}$ 12

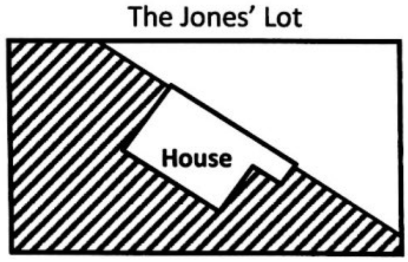
$\overline{AC}$ 24

$\overline{DF}$ 4



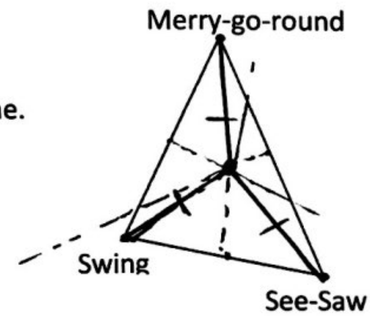
State a point of concurrency that would help solve each of the problems below. Then state how you would find that point of concurrency.

11. This rectangle represents the Jones' lot. The non-shaded triangular region represents their backyard. The Jones' want to build the largest possible circular pool in their back yard, how would you determine the location of the pool's center?



OMIT

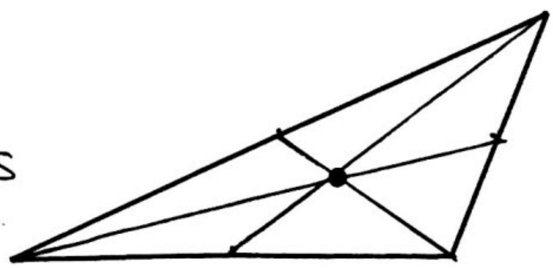
12. The Smith Construction Company has been hired to install a new water fountain at WinstonianPark. They would like to find the best location for the fountain so that the walking distance from each of the three main pieces of playground equipment is the same. How would they determine this point?



CONSTRUCT ⊥ BISECTORS IN ORDER TO FIND THE CIRCUMCENTER.

13. You are a sculptor and have just completed a large metal mobile. You want to hang this mobile, made of a flat triangular metal plate, in the State Capitol. This triangular piece will hang so that it will be suspended with the triangular surface parallel to the ground. How would you locate the point where the mobile will balance?

MEDIANS MEET @ CENTROID WHICH IS CENTER OF GRAVITY. CONSTRUCT MEDIANS TO FIND CENTROID.



14) **Given**

C **is a circumcenter.** (⊥ bisector)

AC = 12

MP = 14

TM = 10

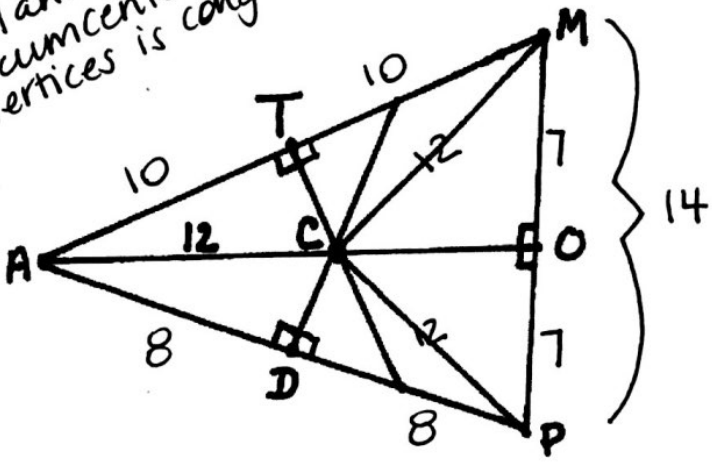
AD = 8

Find

AT= 10 — distance from circumcenter to vertices is congruent

CM= 12

DP= 8



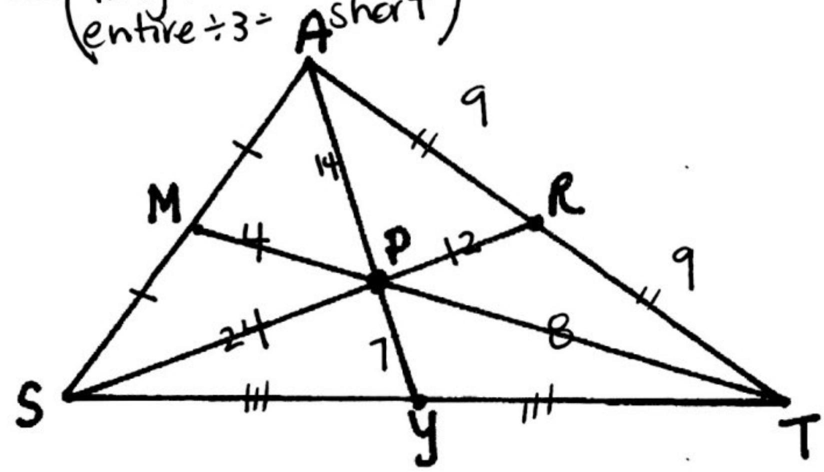
15) ***P*** **is a centroid.** (short x 2 = long
long ÷ 2 = short
entire ÷ 3 = short)

PR = 12

PT = 8

AR = 9

AY = 21



Find:

SP= 24

TM= 12

AT= 18

PY= 7

16) **True or False?**

T The perpendicular bisectors of a right triangle intersect on the triangle.
(on hypotenuse to be more specific)

F The center of balance of the triangle is the ~~incenter.~~ ~~med~~ centroid is correct

F To find the point that is equidistant from the sides, you need to find the ~~circumcenter~~. Incenter is correct

Fill in the blank.

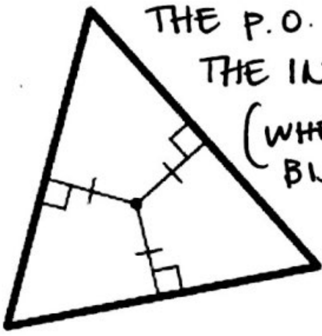
The centroid is $^2/_3$ the distance of the median from the vertex.

To find the point that is equidistant from the vertices of a triangle, we need to draw or construct the three ⊥ bisectors of a triangle.

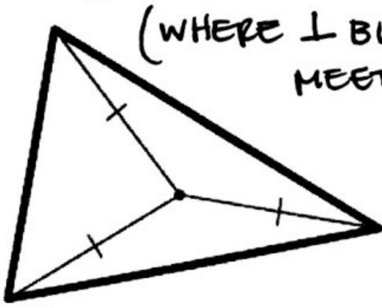
(P.O.C.)

Name the point of concurrency shown for the bold triangle.

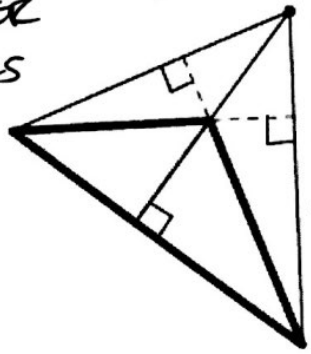
17. IF DISTANCE FROM P.O.C BACK TO SIDES IS CONGRUENT THEN THE P.O.C IS THE INCENTER (WHERE ∠ BISECTORS MEET)



18. IF THE DISTANCE FROM P.O.C BACK TO EACH VERTEX IS CONGRUENT THEN THE P.O.C IS THE CIRCUMCENTER (WHERE ⊥ BISECTORS MEET)



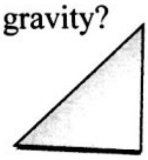
19. IF LINES THAT CREATE P.O.C. LEAVE VERTEX & MEET OPPOSITE SIDE IN 90° ∠ THEN THEY ARE THE ALTITUDE THEREFORE THE P.O.C IS THE ORTHOCENTER.



20. Suppose that a space station needs to be placed equidistant from a group of three planets. How could you determine the location of the space station?

FIND THE CIRCUMCENTER

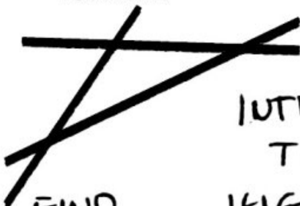
21. A new aircraft is going to be triangular in shape. How would you find its center of gravity?



FIND THE MEDIAN

22. Suppose the state highway patrol wants to build a new station so that is the same distance to three intersecting highways. How would you go about finding the location?

NOT WHERE HIGHWAYS INTERCEPT BUT THE ACTUAL HIGHWAY (SEGMENT)



FIND THE INCENTER

Circle the letter with the name of the correct point of concurrency.

23. The three altitudes of a triangle intersect at the ____________________.

(a) circumcenter (b) incenter (c) centroid (d) orthocenter

24. The three medians of a triangle intersect at the ____________________.

(a) circumcenter (b) incenter (c) centroid (d) orthocenter

25. The three perpendicular bisectors of a triangle intersect at the ____________________.

(a) circumcenter (b) incenter (c) centroid (d) orthocenter

26. The three angle bisectors of a triangle intersect at the ____________________.

(a) circumcenter (b) incenter (c) centroid (d) orthocenter

27. It is equidistant from the three vertices of the triangle. LEAVES SIDES TO P.O.C BACK TO VERTICES (S-M-A)

(a) circumcenter (b) incenter (c) centroid (d) orthocenter

28. It is equidistant from the three sides of the triangle. LEAVES ANGLE TO P.O.C BACK TO SIDES (A-MS

(a) circumcenter (b) incenter (c) centroid (d) orthocenter

29. It divides each median into two sections at a 2:1 ratio.

(a) circumcenter (b) incenter (c) centroid (d) orthocenter