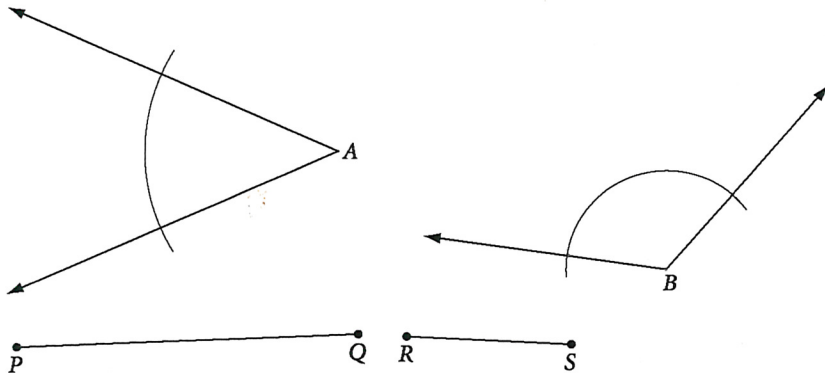# Constructions Packet – Using Tools of Geometry Name _____

Instructions: Use the constructions that you have learned to complete this packet. You may have to look up information in Chapter 3 in your book for some of the answers to the questions and problems.

## 6.5.1 - Duplicating Segments and Angles

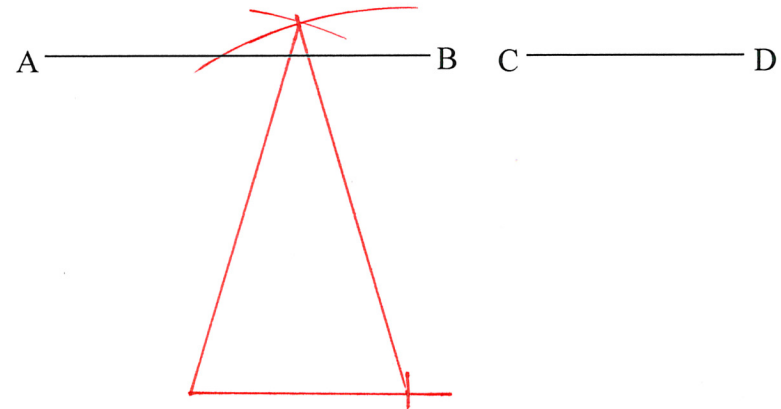In exercises 1-3, use the segments and angles below.

1) Duplicate ∠B

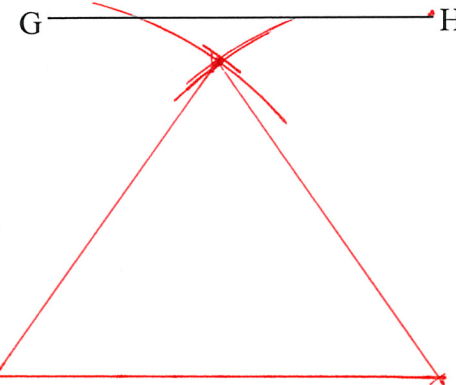2) Construct a line segment with length 2PQ.

3) Construct a line segment with length 3PQ − 2RS

4) Construct an isosceles triangle with two sides congruent to $\overline{AB}$ and base congruent to $\overline{CD}$.

A ———————— B    C ———————— D

4) Construct an equilateral triangle with sides congruent to $\overline{GH}$.

G ———————— H

5) What two peoples helped develop constructions?

Greeks and Egyptians

6) What two tools are needed to do constructions?

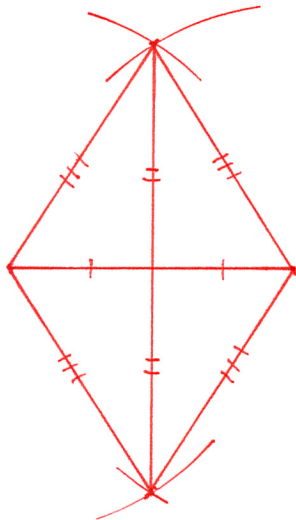Compass and Straight-Edge

# 6.5.2 - Constructing Perpendicular Bisectors
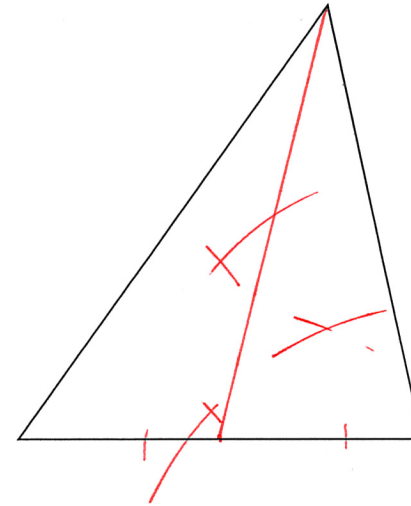
7) Draw a segment and construct its perpendicular bisector.

8) Draw Construct two congruent segments that are the perpendicular bisectors of each other. Form a quadrilateral by connecting the four endpoints. What type of quadrilateral does this seem to be?
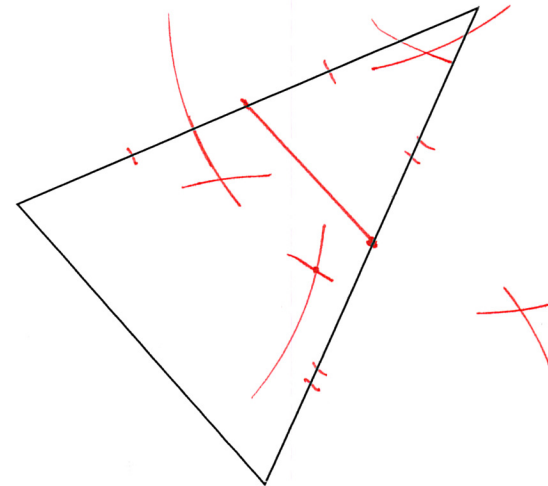
Rhombus

9) Construct a median for the following triangle:
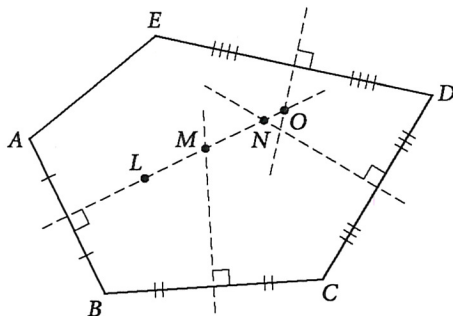
9) Construct a segment with a length of $\frac{5}{4}AB$.

A ———————————————— B

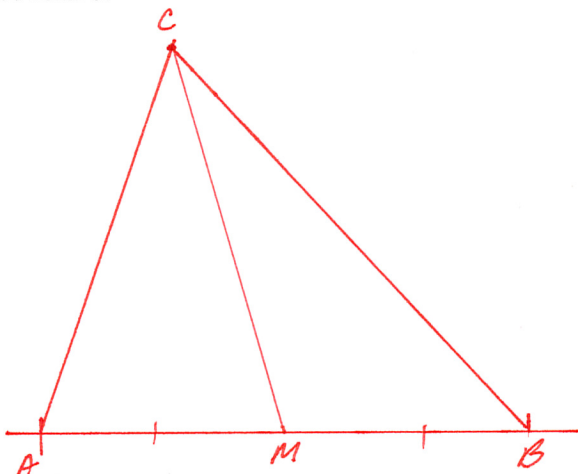10) Construct a midsegment for the following triangle:

11) Complete each statement as fully as possible:

    a)  L is equidistant from   *Points  A  &  B* .

    b)  M is equidistant from  *Points A+B , B+C* .

    c)  N is equidistant from  *Points A+B , C+D* .

    d)  O is equidistant from  *Points A+B , E+D* .



12) Draw a segment. Label it $\overline{CM}$. $\overline{CM}$ is a median of $\triangle ABC$.
    Construct $\triangle ABC$.



## 6.5.3 - Constructing Perpendiculars To a Line

For Exercises 13–17, decide whether each statement is true or false. If the statement is false, explain why or give a counterexample.
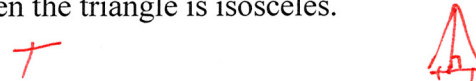
13)  In a triangle, an altitude is shorter than either side from the same vertex.

    *F*

14)  In a triangle, an altitude is shorter than the median from the same vertex.

    *F*

15)  In a triangle, if a perpendicular bisector of a side and an altitude coincide, then the triangle is isosceles.
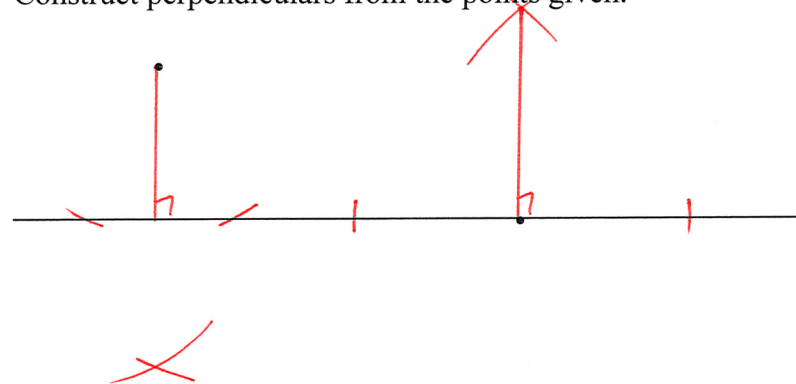
    *T*

16)  Exactly one altitude lies outside a triangle.

    *F*

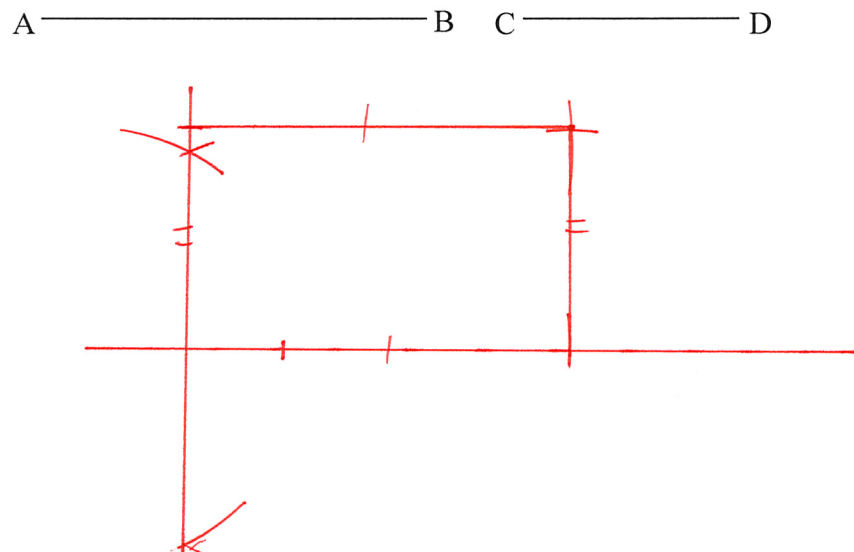17)  The intersection of the perpendicular bisectors of the sides lies inside the triangle.

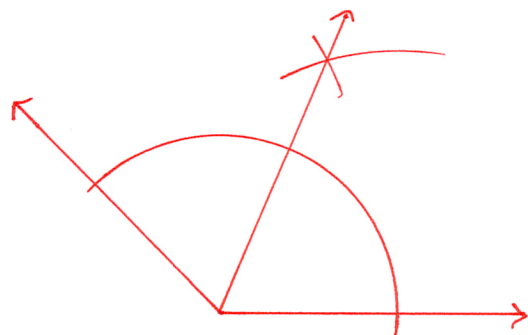    *F*

18)  Construct perpendiculars from the points given.

19) The shortest distance from a point off a line and the line is a

_____perpendicular_____. (Shortest Distance Theorem)

20) Construct a rectangle with sides equal in length to $\overline{AB}$ and $\overline{CD}$.
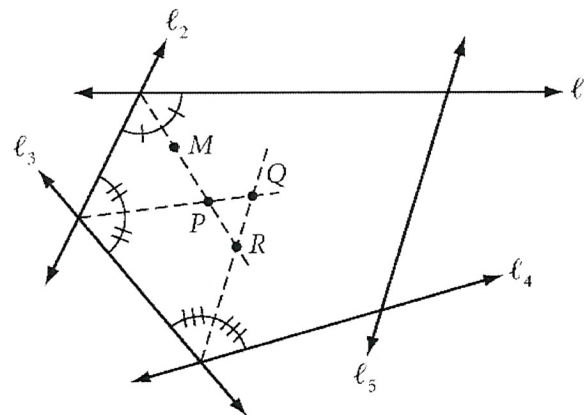
A————————B   C————————D



## 6.5.4 - Constructing Angle Bisectors

21) Draw an obtuse angle. Construct the angle bisector.



22) Complete each statement as fully as possible:

a) M is equidistant from _____$l_1 + l_2$_____.

b) P is equidistant from __$l_1 + l_2$__ , __$l_2 + l_3$__.

c) Q is equidistant from __$l_2 + l_3$__ , __$l_3 + l_4$__.

d) R is equidistant from __$l_4 + l_2$__ , __$l_3 + l_4$__.



23) If a point is on the angle bisector of an angle, then it is

_____equidistant_____ from the

sides of the angle. (Angle Bisector Theorem).
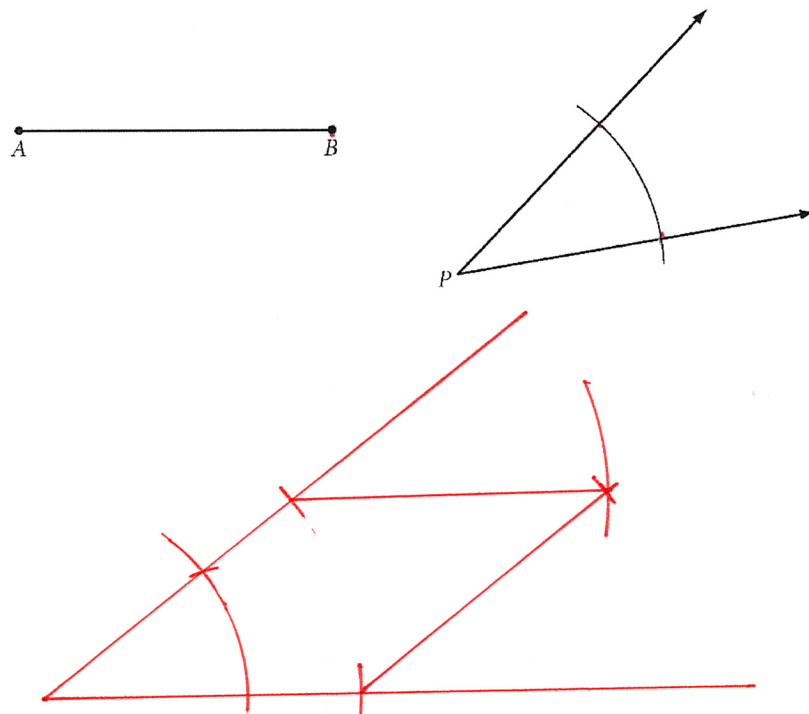
# 6.5.5 - Constructing Parallel Lines

24) Draw a line and a point not on the line. Use a compass and straightedge to construct a line through the given point parallel to the given line.
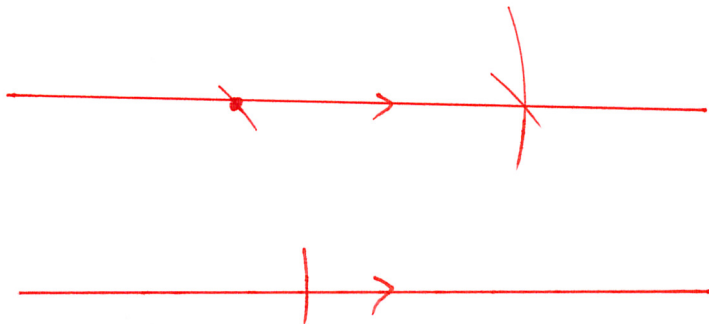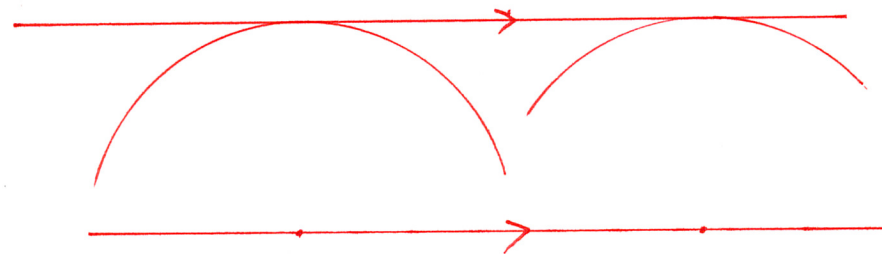
25) Construct a parallelogram that's not a rectangle or a rhombus.
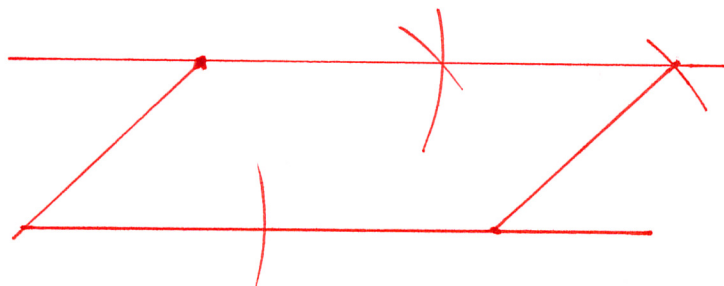
26) Construct a rhombus with sides equal in length to $\overline{AB}$ and having an angle congruent to $\angle P$.
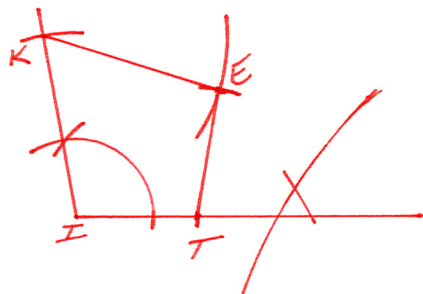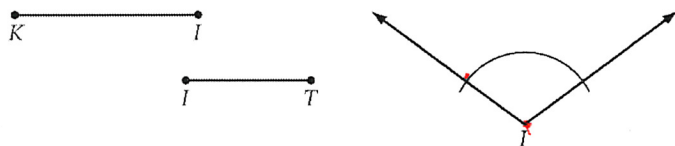
27) Construct two parallel lines that have a distance between them equal in length to $\overline{JK}$.
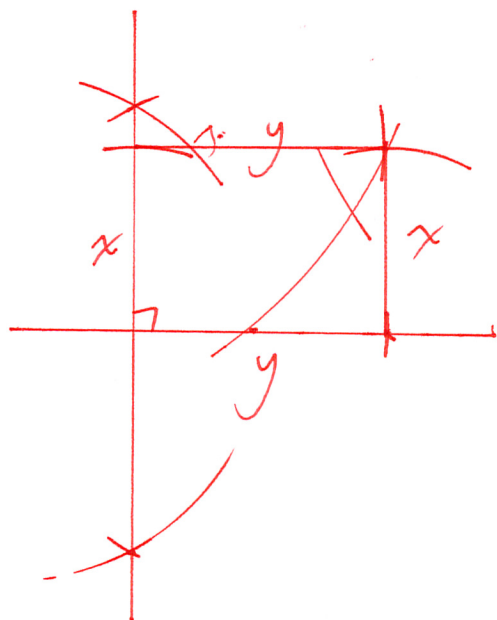
## 6.5.6 - Constructing Problems
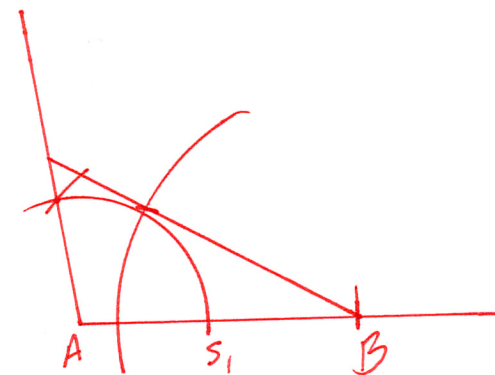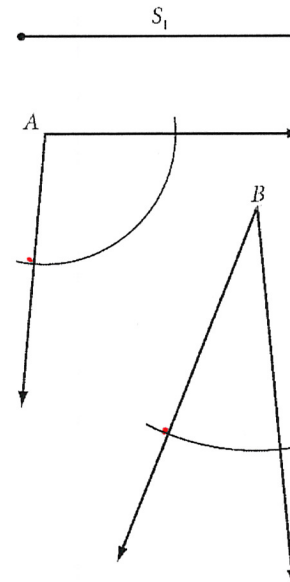
28) Construct kite KITE using these parts:

In Exercises 30–31, construct a triangle using the given parts.

30)

29) Construct a rectangle with a perimeter of this length.

31)

$S_1$

$S_2$

$S_3$

$s_1$  $s_2$

$s_3$
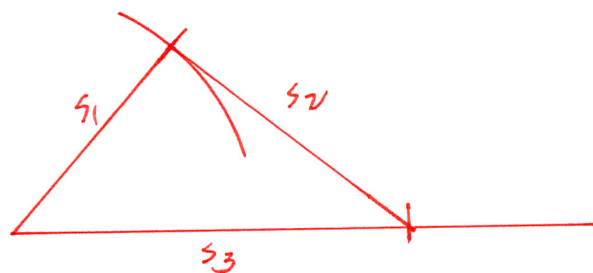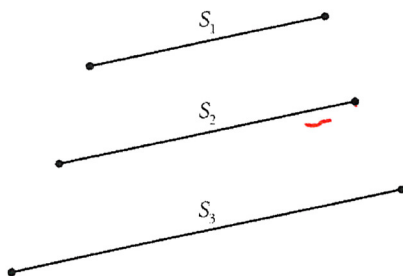
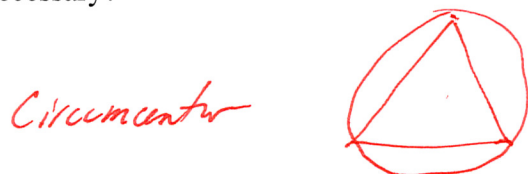## 6.5.7 - Points of Concurrency

32) A circular revolving sprinkler needs to be set up to water every part of a triangular garden. Where should the sprinkler be located so that it reaches all of the garden, but doesn't spray farther than necessary?

Circumcenter

33) You need to supply electric power to three transformers, one on each of three roads enclosing a large triangular track of land. Each transformer should be the same distance from the power-generation plant and as close to the plant as possible. Where should you build the power plant, and where should you locate each transformer?
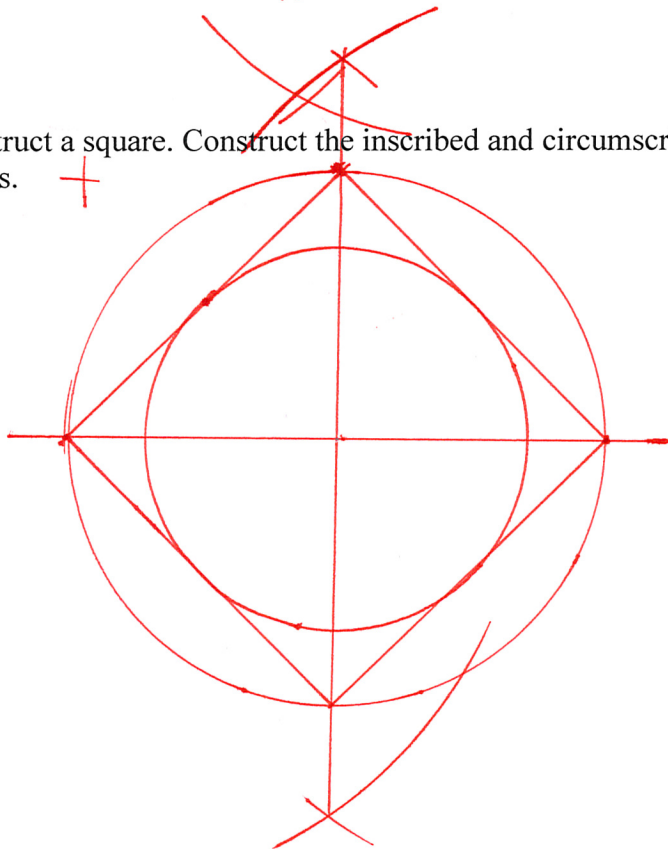
Incenter

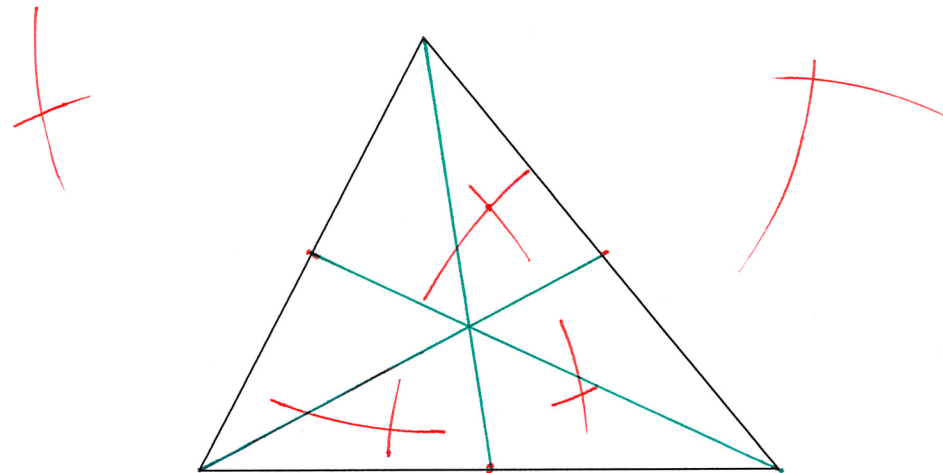34) Construct the circumcenter of the following triangle. Circumscribe the triangle.
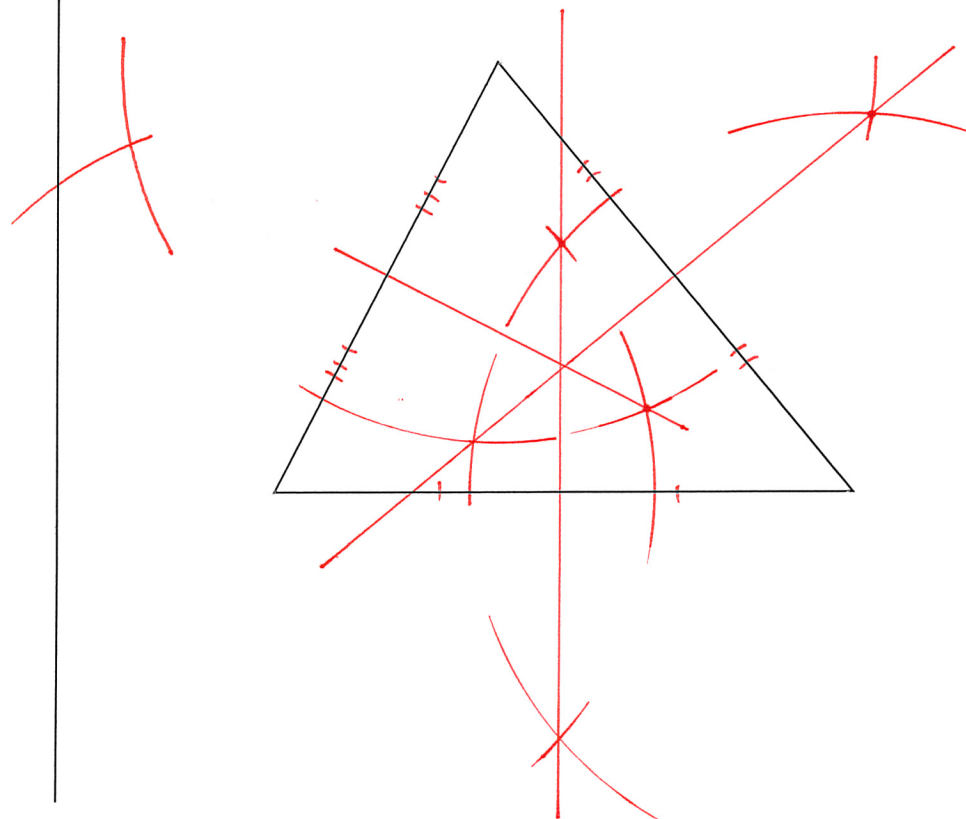
35) Construct the incenter of the following triangle. Inscribe the triangle with a circle.
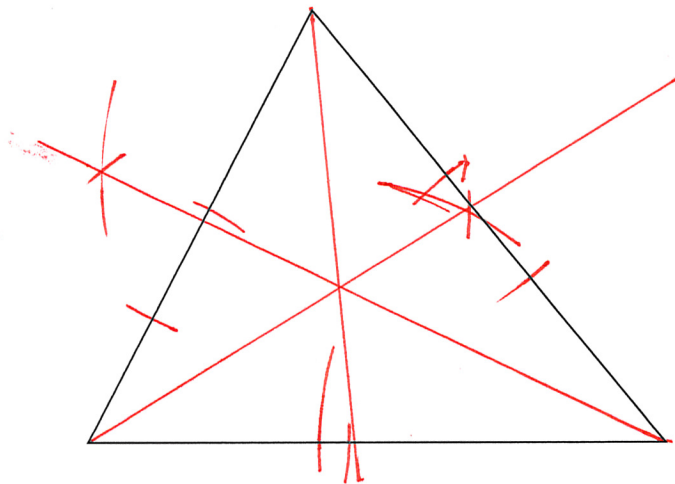


36) Construct a square. Construct the inscribed and circumscribed circles.



37) Construct the centroid of the triangle.



38) The centroid of a triangle divides each median into two parts so that the distance from the centroid to the vertex is _____twice_____ the distance from the centroid to the midpoint.

39) The centroid is also know as the __center of__ __gravity__.