

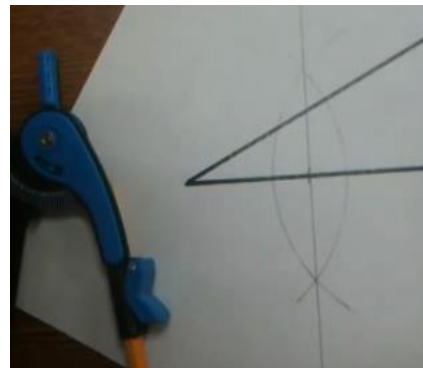
Constructions for Special Segments of Triangles Written Directions

Perpendicular Bisector Steps:

1. Open your compass to a size that is a little more than half the largest side of the triangle.
2. Keeping the compass at the same size opening create three circles with the same size radius by placing the metal tip on the vertex and turning the paper in a circle.



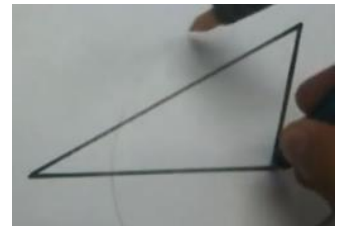
3. Find where two of the circles cross on side of the triangle and connect the two intersection points with a segment. This segment is your first perpendicular bisector. Be sure to draw the right angle and the tic marks to show the midpoint.



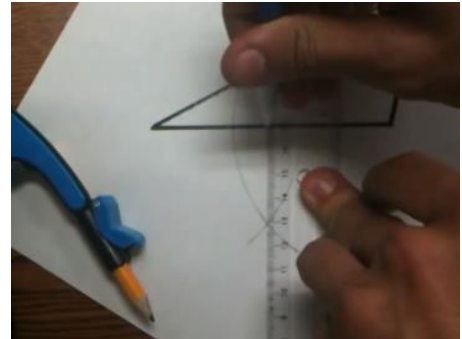
4. Continue this same process for all three sides. The location where are three perpendicular bisectors intersect is the point of concurrency called the circumcenter.

Median Steps:

1. Open your compass to a size that is a little more than half the largest side of the triangle.
2. Keeping the compass at the same size opening create three circles with the same size radius by placing the metal tip on the vertex and turning the paper in a circle.



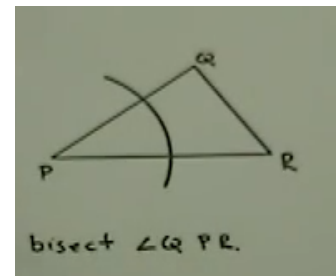
- Find where two of the circle cross on side of the triangle and connect the two intersection points with your ruler. Then with the ruler still in place mark a larger dot on the side of the triangle, this point is the midpoint of this side of the triangle. To create the median, connect the angle opposite this side with the point you just drew. This segment is your first median of three. Be sure to draw the tic marks to show the side is bisected.



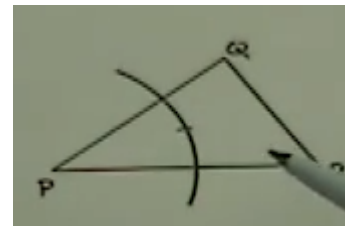
- Continue this same process for all three sides. The location where are three medians intersect is the point of concurrency called the centroid.

Angle Bisector Steps:

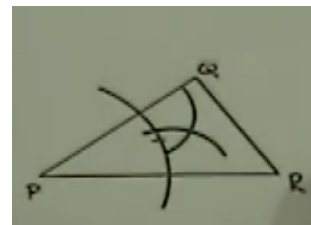
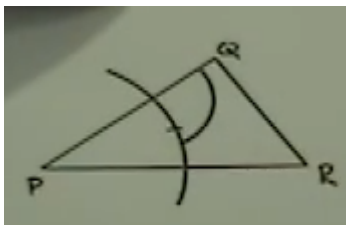
- Open your compass and place the point on one of the vertices. Draw an arc using your compass that intersects the two sides of the triangle that create your angle you are bisecting.



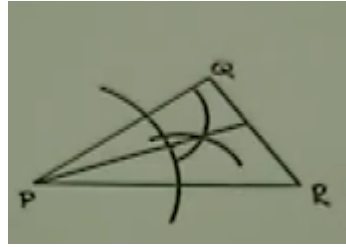
- Next, using the arc that has been created guess where the middle of that arc is.



- Then place the medal tip of your compass where your arc meets one of the sides. Open your compass so that it is slightly larger than the marking you just drew on the arc. Then repeat this same process (with the same opening) on the other arc and side intersection.



- Lastly, to finish up, draw a segment from the vertex of the angle being bisected, through the intersection of the arcs you drew in step 3, and finish on the side opposite your bisected angle. This creates your first of three angle bisectors.



- Repeat this process for each of the three vertices to create all three angle bisectors. The point of concurrency/intersection of the three angle bisectors is called the incenter.

Altitude Steps:

Acute Triangle: 3 altitudes inside the triangle

Right Triangle: 2 altitudes are the legs of the triangle and 1 altitude inside the triangle

Obtuse Triangle: 2 altitudes are outside the triangle and 1 altitude inside the triangle

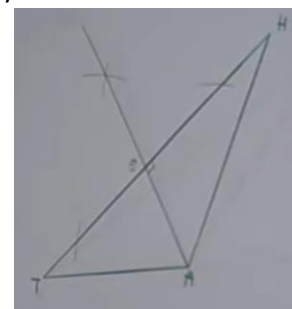
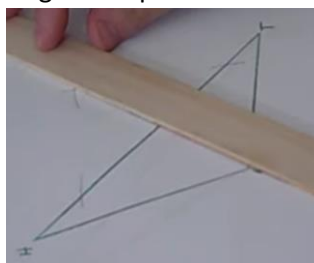
- Place the metal tip of the compass at a vertex.
- Open the compass just enough that when you make an arc it will cross the opposite side in two places. Adjust the size of the compass opening until these two markings are achieved.



- Once you have your arc, take the metal tip of the compass and place it on one of the two intersection points created by the arc you just created and the side of the triangle opposite the vertex you chose in step one. Open the compass a little wider than half the arc you constructed in step two. Keeping this same width of the compass make two new arcs that intersect outside the triangle from the two intersection points.

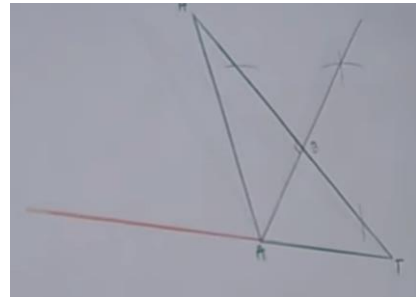


- After you have created your two smaller intersecting arcs outside of the triangle, connect the vertex from step one to the new intersection point created in step three. This is the one of the altitudes of your triangle. Do not forget the right-angle marking. Then repeat these steps to create all three altitudes of your triangle. The point of concurrency for all three altitudes is called the orthocenter.



NOTE: If you have a right triangle, two of the side's "legs" are the altitudes, and the third altitude is created by using the four steps above. If your triangle is a right triangle then you will need to repeat steps 1 – 4 three times, one for each vertex of the triangle. An obtuse triangle is different because two of the three altitudes will be outside the triangle and only one will be inside and follow the directions above rather than below.

1. When you are constructing an altitude from an acute angle's vertex of an obtuse triangle you must extend the side of the opposite side to create an opportunity for perpendicular intersection.



2. After you have extended the sides of the triangle opposite the two acute angles of an obtuse triangle you continue with steps two through four from above.

