

### Construction #1 **MIDPOINT of a SEGMENT.**

Diagram #1 Find the **midpoint** of segment  $\overline{AB}$

- Measure the length of segment  $\overline{AB}$  using a ruler.
- Write the length of the segment in the picture.
- Divide the length of  $\overline{AB}$  by two.
- Measure that distance from point A on  $\overline{AB}$ .
- Draw a point M in the middle of  $\overline{AB}$ .
- M is the midpoint.
- Write the lengths of  $\overline{AM}$  and  $\overline{BM}$  in the diagram.
- Write the word "**MIDPOINT**" under point M.
- Answer the questions about Construction #1 on the question sheet.

### Construction #2 **PERPENDICULAR BISECTOR of a SEGMENT.**

Diagram #1 Draw the **Perpendicular Bisector** of  $\overline{AB}$ .

- Find the midpoint of  $\overline{AB}$  (you already did this in construction #1)
- Place the protractor on  $\overline{AB}$ , so that the vertex of the protractor lines up with the midpoint of  $\overline{AB}$ , and the segment lines up with  $180^\circ$  and  $0^\circ$ .
- Place a point on your paper where the protractor indicates a  $90^\circ$  angle.
- (if  $90^\circ$  is off your paper, turn the protractor upside down and go the other way)
- Call the point at  $90^\circ$  C.
- Draw  $\overline{MC}$ , measure it and write the measurement in the picture.
- Write the words "**PERPENDICULAR BISECTOR**" on the segment.
- Answer Construction #2, part b on the question sheet.
- Draw  $\overline{CA}$  and  $\overline{CB}$ , measure them and write their measurements in the picture.
- Answer Construction #2, part c on the question sheet.
- Extend  $\overline{MC}$  to the other side of  $\overline{AB}$ . (as far as you want)
- Place point D on  $\overline{MC}$ , but on the other side of  $\overline{AB}$  (anywhere)
- Draw, measure and record  $\overline{DA}$  and  $\overline{DB}$
- Finish questions about Construction #2, on the question sheet.

### Construction #3 ANGLE BISECTOR.

Diagram #2 Draw the angle bisector of  $\angle XYZ$

- Use the protractor to measure  $\angle XYZ$ .
- Divide that measure by 2.
- Place the protractor back on  $\angle XYZ$ , like you are going to measure it...
- Draw a point R, at the halfway measurement.
- Draw ray  $\overrightarrow{YR}$ .
- Write the words "**ANGLE BISECTOR**" on the ray.
- Answer Construction #3, part e on the question sheet.
- Find the point on  $\overrightarrow{YZ}$  that is 10 cm from Y. Label that point S.
- Find the point on  $\overrightarrow{YX}$  that is 10 cm from Y. Label that point T.
- Label That distance on you diagram.
- Construct a line through point S, that is perpendicular to  $\overrightarrow{YZ}$ .
- Construct a line through point T, that is perpendicular to  $\overrightarrow{YX}$ .
- The two perpendicular lines you just made and  $\overrightarrow{YR}$  should all meet at the same point. Call that point Q.
- Answer Construction #3, part f on the question sheet.

### Construction #4 ANGLE BISECTORS in a TRIANGLE.

Diagram #3 Construct the 3 angle bisectors in a  $\triangle ABC$ .

- Find the measure of each angle in  $\triangle ABC$ .
- Divide that measure by 2.
- Construct an angle bisector for ALL 3 angles.
- All 3 angle bisectors should intersect at the same point. Call that point X.
- X is the incenter of  $\triangle ABC$ . Write "**INCENTER**" next to X.
- Answer Construction #4, part g on the question sheet.

**Construction #5 PERPENDICULAR BISECTORS in a TRIANGLE.**

**Diagram #4** Construct the 3 perpendicular bisectors in a  $\triangle XYZ$ .

- Measure the lengths of all 3 sides of  $\triangle XYZ$ .
- Write those 3 measures in the picture.
- Find the midpoint of each side.
- Label the midpoint of  $\overline{XY}$  R.
- Label the midpoint of  $\overline{YZ}$  S.
- Label the midpoint of  $\overline{XZ}$  T.
- Construct a line through R, perpendicular to  $\overline{XY}$ .
- Construct a line through S, perpendicular to  $\overline{YZ}$ .
- Construct a line through T, perpendicular to  $\overline{XZ}$ .
- Mark the right angles in your picture.
- If you did this right, all 3 perpendicular bisectors should intersect at the same point. Call that point C.
- C is the circumcenter. Write "**CIRCUMCENTER**" next to point C.
- Draw in and measure  $\overline{CX}$ ,  $\overline{CY}$  and  $\overline{CZ}$ .
- Write all 3 measurements into your picture.
- Answer Construction #5, part h on the question sheet.

**Construction #6 MEDIANS of a TRIANGLE.**

**Diagram #5** Construct the 3 medians of  $\triangle LMN$

- Find the Measure of each side, and write it in the diagram.
- Find the midpoint of  $\overline{LM}$ , label it T.
- Find the midpoint of  $\overline{MN}$ , label it U.
- Find the midpoint of  $\overline{LN}$ , label it V.
- Draw  $\overline{UL}$ ,  $\overline{VM}$  and  $\overline{TN}$ .
- Each of these segments is called a median. Write "**MEDIAN**" on each segment.
- If you did this right, they all intersect at the same point, label that point C.
- C is the centroid. Write "**CENTROID**" next to point C.
- Complete the measurements and answer Construction #6, part i.

Construction #7 **MIDSEGMENTS of a TRIANGLE.**

Diagram #6 Construct the 3 midsegments of  $\triangle ABC$

- Find the Measure of each side, and write it in the diagram.
- Measure  $\angle A$ ,  $\angle B$  and  $\angle C$ , record the measurements in the diagram.
- Measure  $\overline{AB}$ ,  $\overline{BC}$  and  $\overline{AC}$ . Record the measurements in the diagram.
- Find the midpoint of  $\overline{AB}$ , label it X.
- Find the midpoint of  $\overline{BC}$ , label it Y.
- Find the midpoint of  $\overline{AC}$ , label it Z.
- Draw, measure and record  $\overline{XZ}$ ,  $\overline{XY}$  and  $\overline{YZ}$ .
- Each of these segments is called a midsegment. Write "**MIDSEGMENT**" on each.
- Complete the measurements and answer Construction #7, part j.
- Measure the following angles:  $\angle AXZ$ ,  $\angle BXY$  and  $\angle CYZ$ .
- Complete the measurements and answer Construction #7, part k.