

GEOMETRY

Triangle Constructions

NAME _____

Period _____

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° and 0° .
- Place a point on your paper where the protractor indicates a 90° angle.
- (if 90° is off your paper, turn the protractor upside down and go the other way)
- Call the point at 90° 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.

NAME _____

DIAGRAM #1

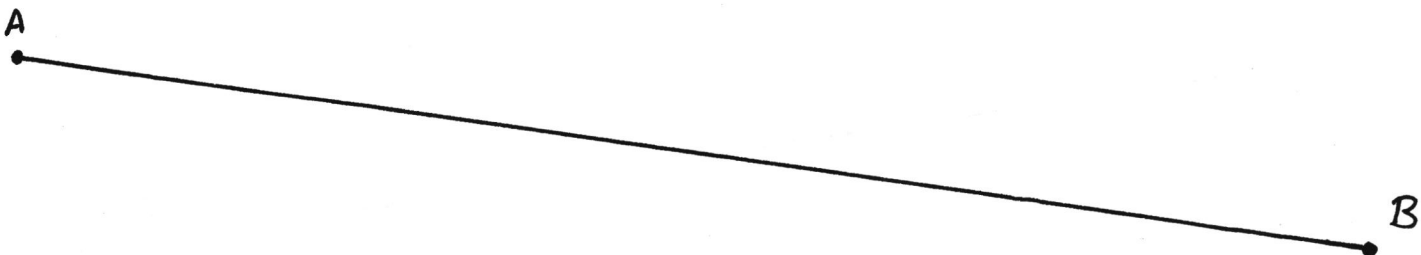


DIAGRAM #2

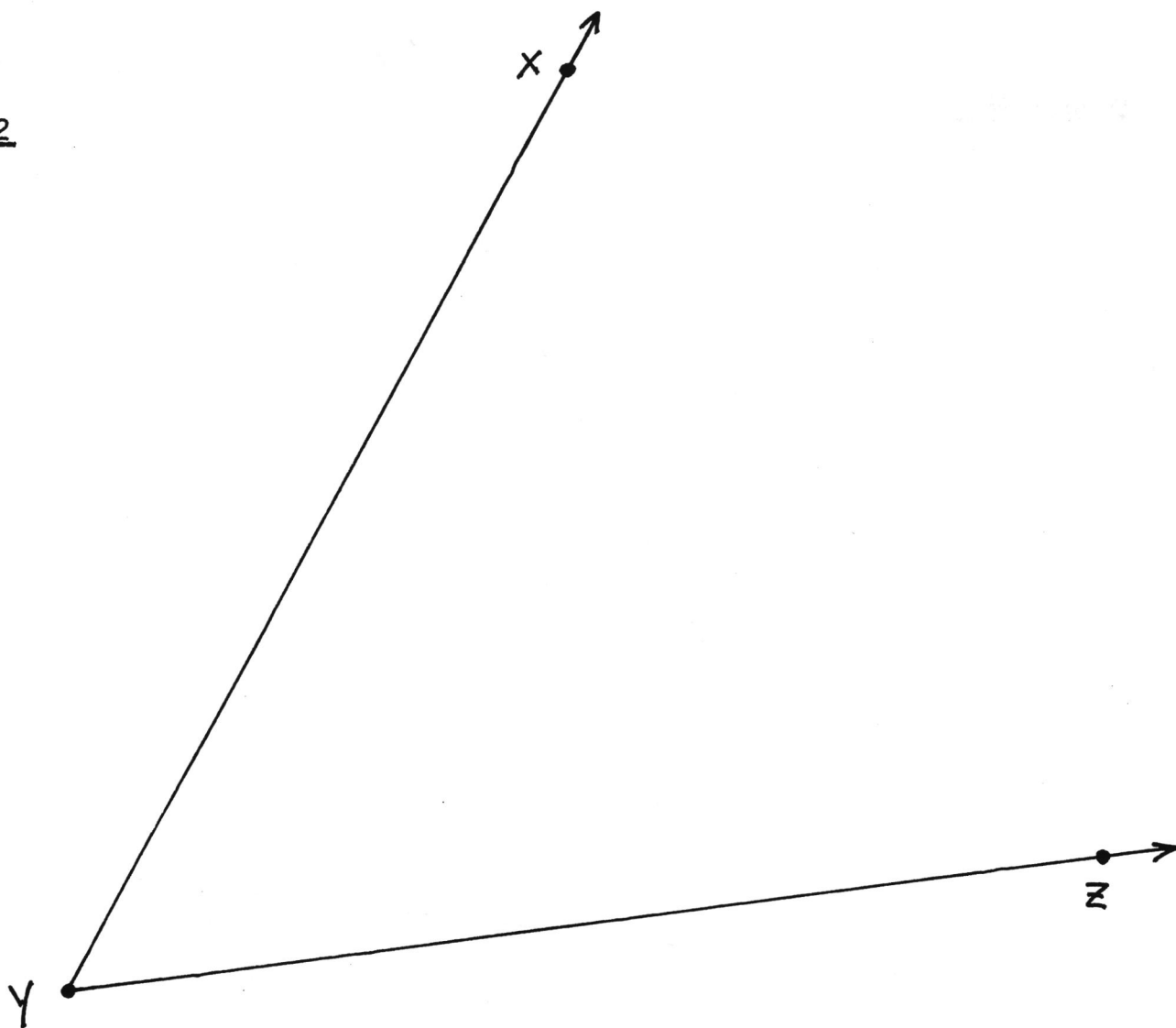


DIAGRAM #3

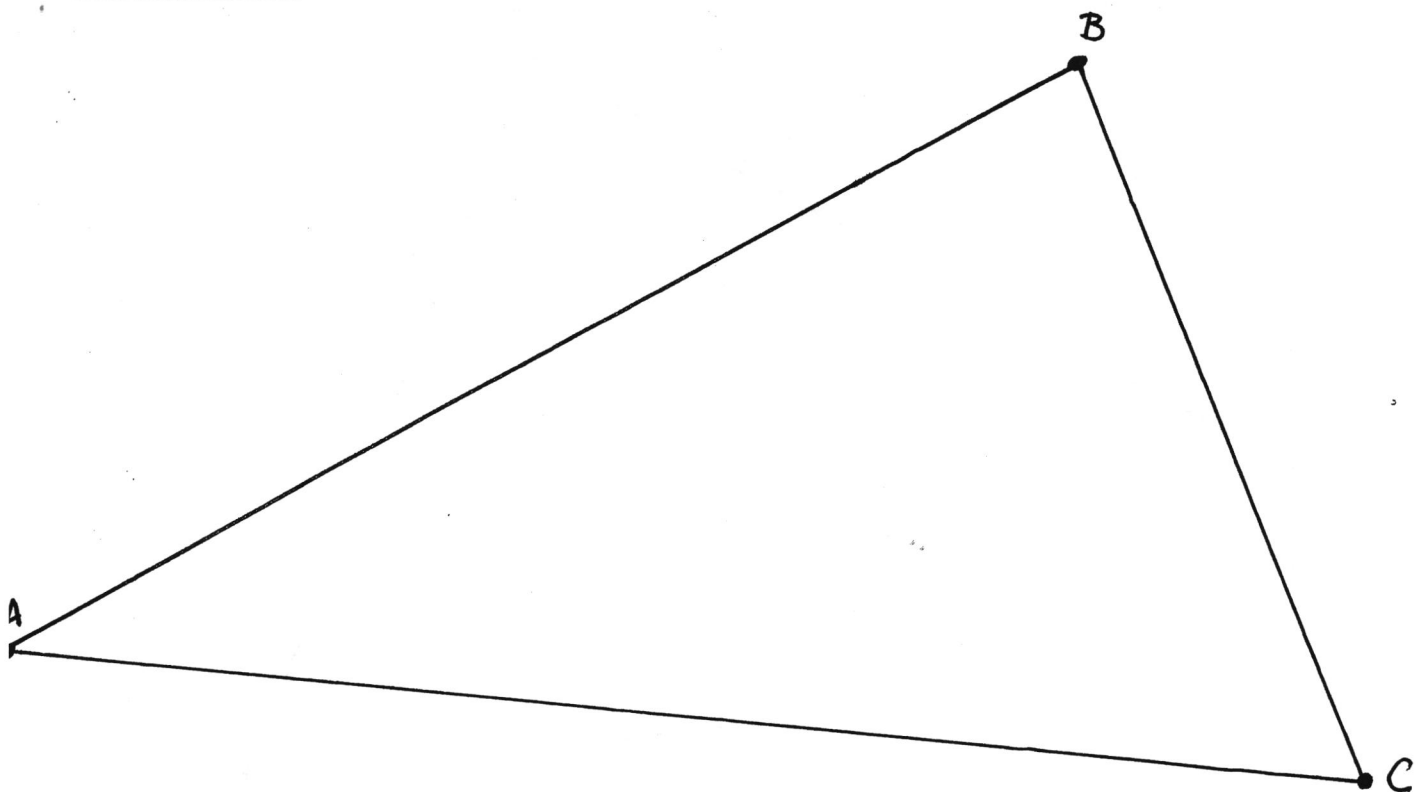


DIAGRAM #4

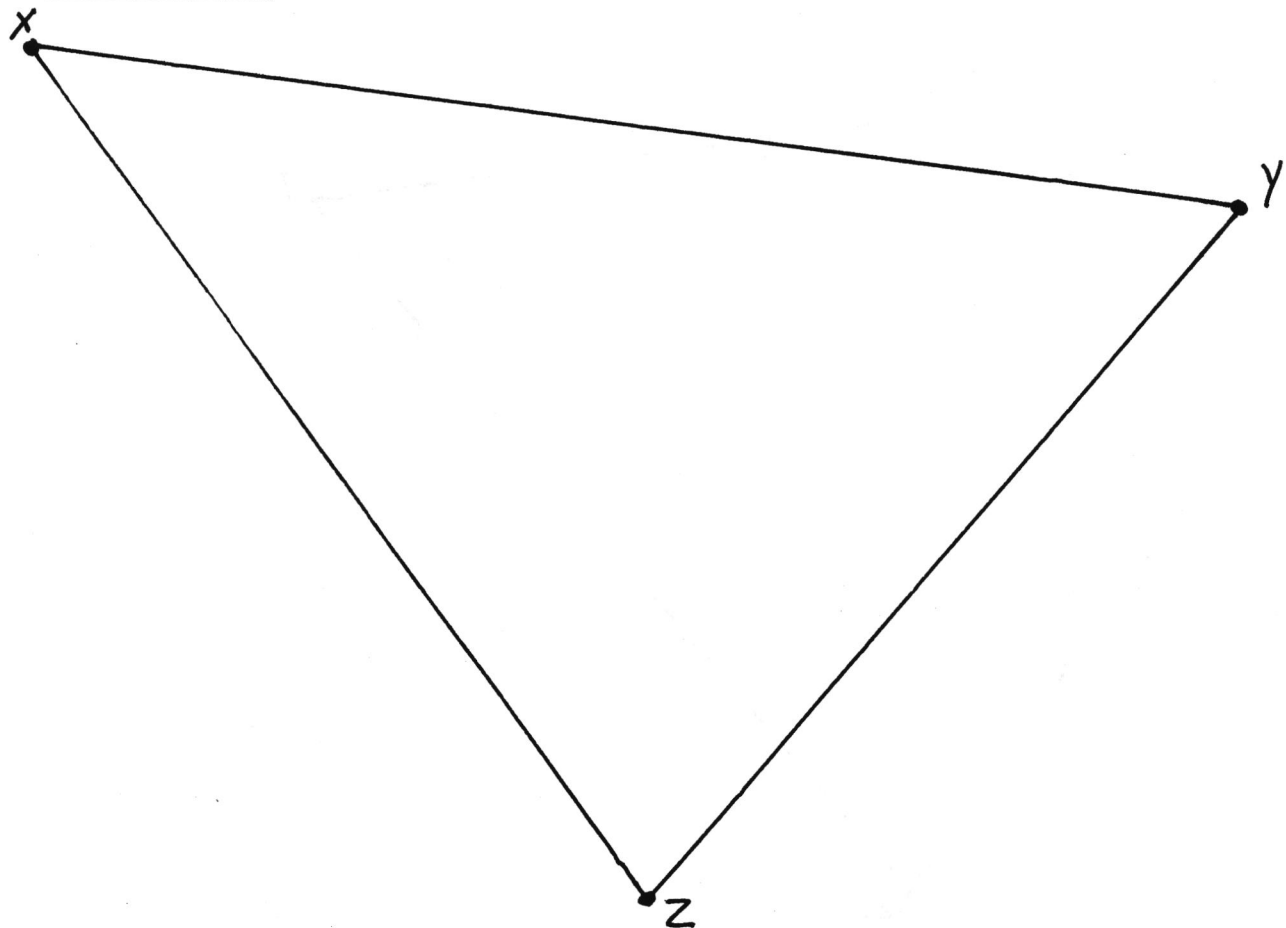


DIAGRAM #5

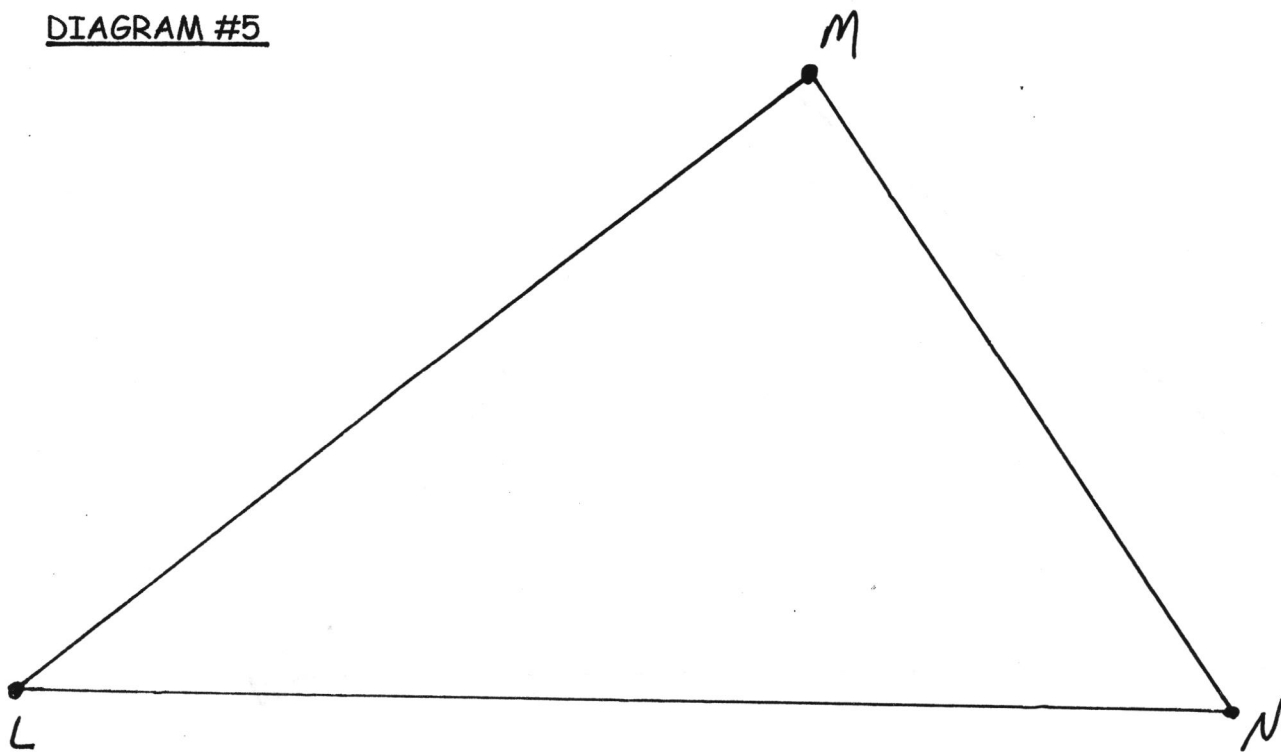
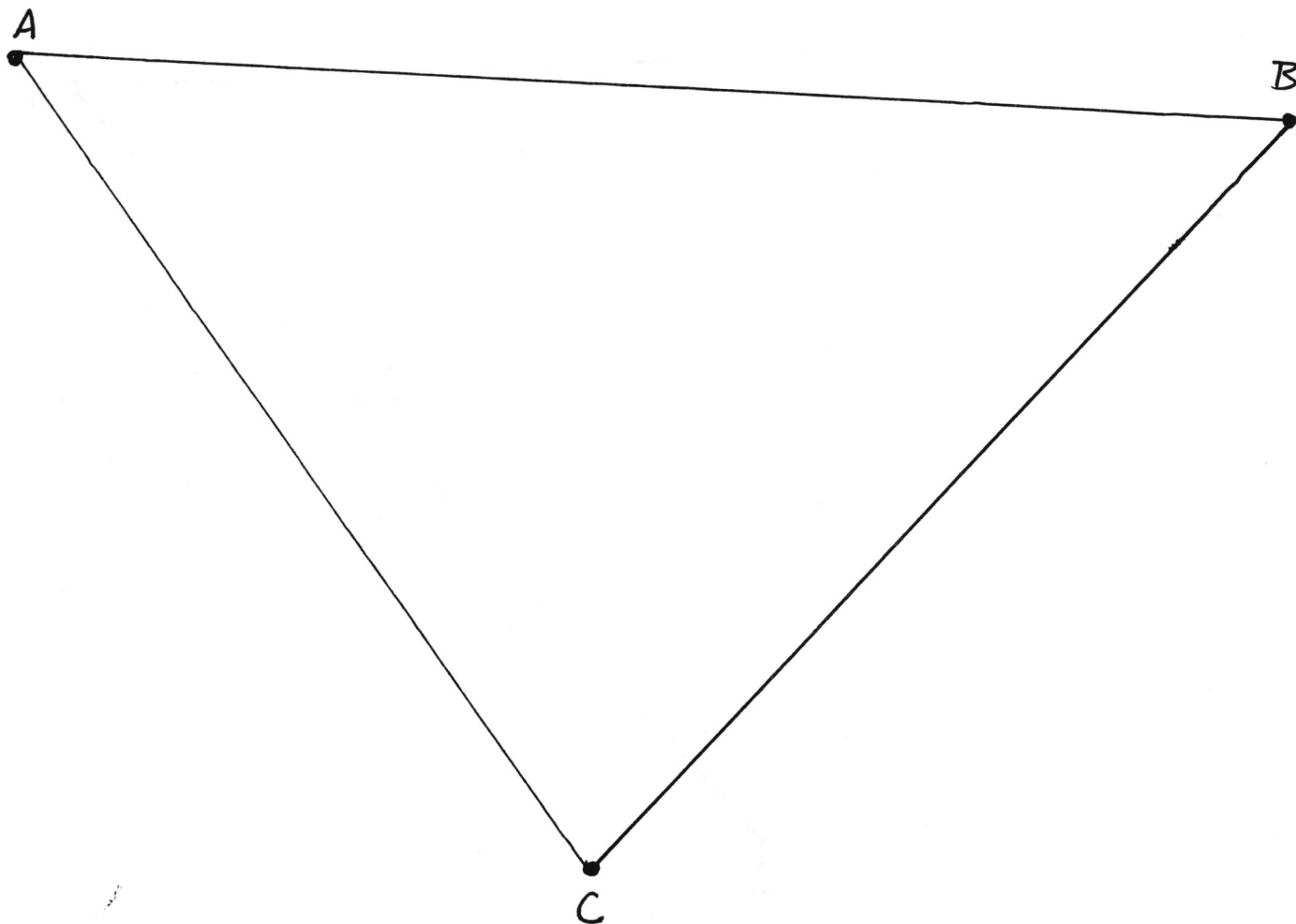


DIAGRAM #6



Construction #1 MIDPOINT of a SEGMENT

a. $m\overline{AB} = \underline{\hspace{2cm}}$ $m\overline{AM} = \underline{\hspace{2cm}}$ $m\overline{BM} = \underline{\hspace{2cm}}$

M is called the midpoint of \overline{AB} because ...

Construction #2 PERPENDICULAR BISECTOR of a SEGMENT

b. $m\angle AMC = \underline{\hspace{2cm}}$ $m\angle BMC = \underline{\hspace{2cm}}$

c. $m\overline{CA} = \underline{\hspace{2cm}}$ $m\overline{CB} = \underline{\hspace{2cm}}$

\overline{MC} is called the perpendicular bisector of \overline{AB} because ...

Which 2 triangles are congruent?

By what Theorem?

d. $m\overline{DA} = \underline{\hspace{2cm}}$ $m\overline{DB} = \underline{\hspace{2cm}}$

IF you drew another point, E on \overline{MC} , What would be true about \overline{AE} and \overline{BE} ?

Construction #3 ANGLE BISECTOR

e. $m\angle XYZ = \underline{\hspace{2cm}}$ $m\angle XYR = \underline{\hspace{2cm}}$ $m\angle RYZ = \underline{\hspace{2cm}}$

\overrightarrow{YR} is called the angle bisector of $\angle XYZ$ because

f. $m\angle XYQ = \underline{\hspace{2cm}}$ $m\angle ZYQ = \underline{\hspace{2cm}}$

$m\overline{QS} = \underline{\hspace{2cm}}$ $m\overline{QT} = \underline{\hspace{2cm}}$

Which 2 triangles are congruent?

By what Theorem?

Construction #4 ANGLE BISECTORS in a TRIANGLE

g. $m\angle A =$ _____ $m\angle BAX =$ _____ $m\angle CAX =$ _____
 $m\angle B =$ _____ $m\angle ABX =$ _____ $m\angle CBX =$ _____
 $m\angle C =$ _____ $m\angle ACX =$ _____ $m\angle BCX =$ _____

What do we call the point where all the angle bisectors meet? _____

Construction #5 PERPENDICULAR BISECTORS in a TRIANGLE

h. The point where all the perpendicular bisector meet is called the _____

$m\angle YRC =$ _____ $m\angle ZSC =$ _____ $m\angle XTC =$ _____
 $m\overline{CX} =$ _____ $m\overline{CY} =$ _____ $m\overline{CZ} =$ _____

Construction #6 MEDIANS of a TRIANGLE

i. A segment connecting the midpoint of a side to the opposite vertex is called a _____.

The medians of a triangle intersect at a point called the _____.

$m\overline{CL} =$ _____ $m\overline{CM} =$ _____ $m\overline{CN} =$ _____
 $m\overline{CU} =$ _____ $m\overline{CV} =$ _____ $m\overline{CT} =$ _____

Construction #7 MIDSEGMENTS of a TRIANGLE

j. A segment that joins the midpoints of two sides of a triangle is called a _____.

$m\overline{AB} =$ _____ $m\overline{BC} =$ _____ $m\overline{AC} =$ _____
 $m\overline{ZY} =$ _____ $m\overline{XZ} =$ _____ $m\overline{XY} =$ _____

In your own words, what is the pattern or connection between the midsegments and the sides of a triangle?

k. $m\angle AXZ =$ _____ This the same measure as _____?

By corresponding angles, which two lines are parallel? _____

$m\angle BXY =$ _____ This the same measure as _____?

By corresponding angles, which two lines are parallel? _____

$m\angle CYZ =$ _____ This the same measure as _____?

By corresponding angles, which two lines are parallel? _____